FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) AS PER NEP 2020

FYUGP HONOURS/HONOURS WITH RESEARCH:

BCA
BBA
BCom
BSc Chemistry
BSc Mathematics

BSc Physics
BSc Botany
BSc Zoology
BA Economics
BA Education

BA English
BA Mass Communication
BA Psychology
BA Public Administration
BA Philosophy
BSc Hospitality and Hotel Administration
ASSAM DON BOSCO UNIVERSITY

REGULATIONS AND SYLLABUS

2023-2024

FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP) AS PER NEP 2020
FYUGP HONOURS/HONOURS WITH RESEARCH

School of Technology
Bachelor of Computer Applications

School of Commerce and Management
Bachelor of Commerce
Bachelor of Business Administration

School of Fundamental and Applied Sciences
Bachelor of Science Chemistry
Bachelor of Science Mathematics
Bachelor of Science Physics

School of Life Sciences
Bachelor of Science Botany
Bachelor of Science Zoology

School of Humanities and Social Sciences
Bachelor of Arts Economics
Bachelor of Arts Education
Bachelor of Arts English
Bachelor of Arts Mass Communication
Bachelor of Arts Psychology
Bachelor of Arts Public Administration
Bachelor of Arts Philosophy

School of Professional Studies
BSc Hospitality and Hotel Administration
Dedicated to:
FR. (DR.) STEPHEN MAVELY
FOUNDING VICE CHANCELLOR
(2006 - 2023)

A Maestro of Success
Epitome of Efficiency
and Legacy
NOTE

This handbook contains important information to help guide and inform you during your programme of study. We recommend that you keep this handbook for the duration of your studies in the University so that you can refer to it as needed. Please note that the onus of ignorance of the regulations and information contained in this handbook will be on the student and will not be ground for any consideration. You are also required to keep abreast of the amendments and additions to the regulations and syllabus that will be officially notified from time to time.
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Administrative Officer (Tapesia): Dr. Wilson Mathews (+91 91017 30062)
Administrative Officer (Azara): Mr. Bikash Agarwal (+91 8638929361)
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ASSAM DON BOSCO UNIVERSITY REGULATIONS

2023-2024

GRADUATE DEGREE PROGRAMMES

(Applicable to All BA, BSC, BCOM, BBA and BCA)

Subject to the provisions of NEP 2020 with Multiple Entry and multiple Exit, following are the regulations of Assam Don Bosco University concerning the Graduate Programmes leading to the award of the Bachelor’s Degree in various disciplines of Three-Year (Bachelor’s Degree) and/or Four-Year (Honours/Research).

1.0 Academic Calendar
1.1 Semester: Each academic year is divided into two semesters of approximately 90 working days: An Autumn Semester (July – December) and a Spring Semester (January – June). The Autumn Semester shall ordinarily begin in July for students already on the rolls and the Spring Semester shall ordinarily begin in January. However, the first semester (autumn, for newly admitted students) may begin later depending on the completion of admission formalities.
1.2 Summer Term: A summer term is for eight weeks during summer vacation. Internship/apprenticeship/work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study. Regular courses may also be offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in coursework.
1.3 The schedule of academic activities approved by the Academic Council for each semester, inclusive of the schedule of continuous evaluation for the semester, dates for the conduct of end-semester examinations, the schedule of publication of results, etc., shall be laid down in the Academic Calendar for the semester.

2.0 Programmes of Study
2.1 The University follows an outcome based learning approach following National Higher Education Qualification Framework (NHEQF)*, explicitly defining the course/programme outcomes and programme specific outcomes, in the curriculum for all the Graduate Degree Programmes. (* available at https://www.ugc.gov.in/pdfnews/2990035_Final-NHEQF.pdf)
2.2 The Undergraduate Programme (UG) is structured with multiple exit options of Certificate, Diploma, basic Bachelor’s Degree at the completion of first, second and third years respectively. The students who complete four years Undergraduate Programme, either in one stretch or through multiple exits and re-enter would get a Bachelor’s Degree with Honours. If the student completes a rigorous research project in their major area(s) of study during the fourth year of a Bachelor’s Degree will be awarded Honours with research.

3.0 Duration of the Programme
3.1 The duration of the UG programme is 4 years or 8 semesters. Students who desire to undergo a 3-year UG Programme will be allowed to exit after completion of the 3rd year.
3.2 If a student wants to leave after the completion of the first or second year, the student will be given a UG Certificate or UG Diploma, respectively, provided they secure the prescribed number of credits (as given in Table 1).
3.3 Students who exit with a UG certificate or UG diploma are permitted to re-enter within three years and complete the degree programme.
3.4 Students may be permitted to take a break from the study during the period of study but the total duration for completing the programme shall not exceed 7 years.
3.5 Students who successfully complete their Bachelor’s Degree with Honours, with suitable grades are eligible to enter the doctoral (Ph. D) Programme in the relevant discipline or enter the “Two-semester” Master’s Degree Programme. (Ref 11.5)

4.0 Curriculum Components
4.1 The curriculum consists of major courses, minor courses and courses from other disciplines, language courses, skill courses, and a set of courses on Environmental education, understanding India, Digital and technological solutions, Health & Wellness, Yoga education, and sports & fitness. At the end of the second semester, students can decide either to continue with the chosen major or request a change of major. (Ref 6.12)
5.0 Credit hours for different types of courses
The workload relating to a course is measured in terms of credit hours. A credit is a unit by which the coursework is measured. It determines the number of hours of instruction required per week over the duration of a semester. Each course may have
- lecture and tutorial component
- lecture and practicum component
- lecture, tutorial, and practicum component
- only practicum component

5.1.1 A one-credit Lecture/tutorial in a course is equivalent to 15 hours of engagement.
5.1.2 A one-credit course in practicum or lab work or Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service, and fieldwork is equivalent to 30 hours of engagement.

5.2 Type of Courses and Credit distribution: The UG programme will consist of the following categories of courses and the minimum credit requirements for 3-year UG and 4-year UG (Honours) or UG (Honours with Research) programmes are given below:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Broad Category of Course</th>
<th>Minimum Credit Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3-year UG</td>
</tr>
<tr>
<td>1</td>
<td>Major Courses</td>
<td>120</td>
</tr>
<tr>
<td>2</td>
<td>Minor Courses</td>
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<td>9</td>
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<td>6</td>
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<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Community Engagement (CE)</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Summer Internship</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Research Project / Dissertation</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

5.3 Academic Bank of Credits (ABC) a national-level facility for “credit transfer” is created for students to transfer and consolidate the credits earned by them by undergoing courses from any recognized HEIs. The ABC allows for credit redemption through the process of commuting the accrued credits in the Academic Bank Account maintained in the ABC for the purpose of fulfilling the credits requirements for the award of certificate/diploma/degree by the authorized HEIs. Upon collecting a certificate, diploma or degree, all the credits earned till then, in respect of that certificate, diploma or degree, shall stand debited and deleted from the account concerned. The procedure for depositing credits earned, its shelf life, and redemption of credits would be as per UGC (Establishment and Operationalization of ABC scheme in Higher Education) regulations and its amendments, 2021.

6.0 Major and Minor disciplines:
6.1.1 Major discipline is the discipline or subject of main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline.
6.1.2 Minor discipline helps a student to gain a broader understanding beyond the major discipline. For example, if a student pursuing an Economics major obtains a minimum of 12 credits from a bunch of courses in Statistics, then the student will be awarded B.A. degree in Economics with a Minor in Statistics.
6.2 Internship/apprenticeship can be carried out during the summer break mandatorily for students who exit after two semesters or four semesters of study in addition to the skill based courses.
6.3 Audit Courses: Students who secure a CGPA of at least 8 at the end of the 4th semester may opt to take one audit course per semester from any Department from the 5th semester onwards, provided the course teacher permits the auditing of the course. This shall be done under the guidance of the Departmental Faculty Advisor/mentor. The student is free to participate in the evaluation process for such courses. However, an attendance of 75% is necessary for obtaining a P grade for such courses. When auditing courses are offered by other departments, it shall be the responsibility of the student to attend such courses without missing courses of one’s own department and semester.
6.4 Bridge Courses: The Departments shall make provision for Bridge Courses to facilitate admission of students from varied backgrounds to a programme of their choice.
6.5 Value-added Courses: Each department shall offer value-added courses. Value-Added courses are part of the curriculum designed to provide necessary skills to increase the employability quotient and equipping the students with essential skills to succeed in life. Certificates will be awarded to those who successfully complete the course. Guidelines refer.....
6.6 In order to qualify for a Graduate Degree, a student is required to complete the minimum credit requirements as prescribed by the competent academic authority. (Refer 3.4)

6.7 In addition to the prescribed credit requirement, a student shall have to complete Institutional mandatory courses with Pass grade, as prescribed by the competent academic authority, from time to time, which shall be recorded in the Grade sheet but not taken into account for computing the SGPA and the CGPA.

6.8 The medium of instruction shall be English and examinations and project reports shall be in English (not applicable for MIL Course).

6.9 The course structure and syllabi of the Graduate Degree Programmes shall be approved by the Academic Council of the University. Departmental Boards of Studies (DBS) shall discuss and recommend the syllabi of all the courses offered by the department from time to time. The proposals from the departments are forwarded to make recommendations to the Academic Council for consideration and approval.

6.10 In addition, students may also opt for additional courses in consultation with their mentors (Cf. 6.11). Courses may also be chosen from SWAYAM/NPTEL. Students are required to participate in the evaluation process of such courses. The grades obtained for such courses shall be recorded in the grade sheet, but not taken into account for computing SGPA and CGPA.

Guidelines for These courses

6.11 Faculty Advisor/Mentor: A faculty advisor/mentor (and a co-mentor to perform the duties of a mentor during the absence of the mentor) shall be assigned for each student. Generally, the faculty advisor/mentor shall be assigned by the concerned department, in consultation with the Director of the School concerned. (Faculty advisors/ mentors shall help their mentees to plan their courses of study, advise them on matters relating to academic performance and personality development, and help them to overcome various problems and difficulties faced by them.

6.12 Change of Major Discipline: The University may permit a student to change from one major discipline of study to another after the first two semesters.

6.12.1 Students shall be allowed a change in major discipline provided that the strength of a Programme offering the specific Major discipline should not fall below the existing strength by more than ten percent and should not go above the sanctioned strength by more than ten percent.

6.12.2 Only those students shall be eligible for consideration of a change of major discipline, who has completed all the credits required in the first two semesters of their studies, in their first attempt.

6.12.3 Applications for a change of major discipline must be made by intending eligible students in the prescribed form. The Office of the Registrar shall call for applications at the beginning of the third semester and the completed forms must be submitted by the last date specified in the notification.

6.12.4 Students may enlist up to two choices of major disciplines, in order of preference, to which they wish to change over. It shall not be permissible to alter the choice after the application has been submitted.

6.12.5 Change of major discipline shall be made strictly in order of merit of the applicants. For this purpose the CGPA obtained at the end of the second semester shall be considered. In case of a tie, the following shall be considered in the given order: the SGPA of the second semester, the SGPA of the first semester, grades obtained by the applicants in the courses of the second semester in an order given in the grade and approved by the Office of the Registrar.

6.12.6 A committee consisting of the Directors and Head of Departments of the concerned School, chaired by the Registrar shall examine the applications and consider them on the basis of the criteria laid out above.

6.12.7 The details of major discipline changes effected shall be notified to the students by the Registrar, within 7 days of the submission of applications.

6.12.8 All changes of major discipline shall be final and binding on the applicants. No student shall be permitted, under any circumstance, to refuse the change of major discipline offered.

6.12.9 All changes of major discipline made in accordance with the above rules shall be effective from the third semester of the applicants concerned. No change of branch shall be permitted after this.

7.0 Admission

7.1 All admissions to the Graduate Degree Programmes of the University shall be on the basis of merit. There may, however, be provision for direct admission for a limited number of NRI/FN students.

7.2 Eligibility Criteria: To be considered for admission to a Graduate Degree Programme a candidate should have passed the Higher Secondary examination of a recognized Board of Higher Secondary Education or an equivalent examination of any University / Board/ or equivalent stage of education corresponding to Level-4 *(cf. 2.1)

7.2.1 Admission will be on the basis of performance of the candidate at the qualifying examination, entrance test and/or personal interview and/or CUET Score/any other entrance tests approved by the competent authority.

7.3 Reservation of seats for the programme shall be as per the guidelines laid out in the Statutes of the University (As approved by the competent authority).

7.4 Admissions shall ordinarily close after a specified period from the date of commencement of the first semester, through a notification. However, in exceptional cases, admission of a candidate after the last date may be recommended to the
University with justification, by the School / Departments concerned. Under such an event, this period shall not exceed four weeks from the date of commencement of the first/third semester.

7.4.1 The attendance of such students shall be computed from the date of admission.

7.4.2 Such students may be offered the opportunity of taking part in in-semester assessment modules which may have already been completed.

7.5 All candidates shall be required to satisfy the norms prescribed by the University for Medical Fitness prior to admission.

7.6 Anti-Ragging Affidavit: Students and Parents Undertaking Affidavit In compliance of the UGC Regulations, it is compulsory for each student and every parent to submit an online Anti-Ragging undertaking affidavit every academic year. The Link to fill out the online undertaking affidavit by students and parents is:

www.antiragging.in/affidavit_registration_disclaimer.html
www.c4yindia.org/Home/Undertaking

8.0 Transfer of Admission

Transfer of admissions is permissible only for autumn semesters (at the end of second, fourth and sixth semesters for students of other universities and within the University.

8.1 Evaluation Committee for Multiple entry and Exit: With the provision of multiple entry and exit, students from other HEIs will be allowed entry to appropriate Level. Evaluation Committee will be set up to see the eligibility of such students who desire to join the University from other HEIs with a lateral entry.

8.2 The Conditions for transfer admission of students of other Universities

8.2.1 A Candidate migrating from any other University may be permitted to join odd semester of the degree programme provided he/she has passed all the subjects of previous semesters with 4 credits of internship completed. Such candidates must satisfy all other conditions of eligibility stipulated in the regulations of the University.

8.2.2 His/her transfer admission shall be within the intake permitted in the University.

8.2.3 He/she shall fulfill the attendance requirements as per the University Regulation.

8.2.4 The candidate who is migrating from other Universities is eligible for overall SGPA/CGPA or Class and not for ranking. He/ She shall complete the programme as per the regulation governing the maximum duration of completing the programme as per this regulation.

9.0 University Registration

9.1 Candidates who are admitted to a programme shall have to register as bona-fide students with the University as per the University regulations within a period specified by the University, by a formal application routed through the Director of the School concerned.

10.0 Attendance

10.1 To be permitted to appear for the end-semester examination of a particular course, a student is required to have a minimum attendance of 75% for that course.

10.2 Deficiency in attendance up to 10% may be condoned by the Director of the School in the case of leave taken for medical and other grievous reasons, which are supported by valid medical certificates and other requisite documents.

10.3 Some students, due to exceptional situations like their own serious sickness and hospitalization or death of members of the inner family circle (restricted to only father, mother, siblings), may have attendance below 65%. Such students may be given bonus attendance percentage for a particular course based on his/her attendance for that course during the remaining days of the current semester, as given in the following table:

<table>
<thead>
<tr>
<th>Attendance during the remaining days of the current semester</th>
<th>Bonus percentage available in the current semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% or more</td>
<td>5</td>
</tr>
<tr>
<td>90% or more but less than 95%</td>
<td>4</td>
</tr>
<tr>
<td>85% or more but less than 90%</td>
<td>3</td>
</tr>
<tr>
<td>80% or more but less than 85%</td>
<td>2</td>
</tr>
<tr>
<td>75% or more but less than 80%</td>
<td>1</td>
</tr>
</tbody>
</table>

They shall be permitted to appear for the end-semester examination of the course if on the strength of this bonus attendance percentage, they obtain 65% attendance for that course.

10.4 If the sum of the credits of the courses for which a student is unable to appear at the end-semester examinations exceeds 50% of the total credits allotted for the semester, he/she shall not be permitted to appear for the entire end-semester examinations.

10.5 The School may propose to set aside a certain portion of the in-semester assessment marks for attendance. The number of marks and modalities of their allotment shall be made known to the students at the beginning of each semester.
10.6 Leave
10.6.1 Any absence from classes should be with prior sanctioned leave. The application for leave shall be submitted to the
Office of the Director of the concerned School on prescribed forms, through proper channels, stating fully the reasons
for the leave requested along with supporting documents.
10.6.2 In case of emergency such as sickness, bereavement or any other unavoidable reason for which prior application could
not be made, the parent or guardian must promptly inform the office of the Director of the concerned School.
10.6.3 If the period of absence is likely to exceed 10 days, a prior application for grant of leave shall have to be submitted
through the Director of the concerned School to the Registrar of the University with supporting documents in each case;
the decision to grant leave shall be taken by the Registrar on the recommendation of the Director of the concerned
School.
10.6.4 The Registrar may, on receipt of an application, also decide whether the student be asked to withdraw from the
programme for that particular semester because of long absence.
10.7 It shall be the responsibility of the student to intimate the concerned teachers regarding his/her absence before availing
the leave.

11.0 Grading System
11.1 Three types of courses are offered in the Graduate programmes:
Graded courses: For the majority of the courses, students shall be assessed and given grades.
Pass/Non-Pass courses: There are some courses for which the students are expected to obtain a P grade to be eligible for
the degree.
Audit Courses: A third category of courses are audit courses. These are optional. However, students who opt for these
courses must have the required attendance to obtain a P grade in the course.
11.2 Based on the performance of a student, each student is awarded a final letter grade in each graded course at the end of
the semester and the letter grade is converted into a grade point. The correspondence between percentage marks, letter
grades and grade points is given in the table below:

<table>
<thead>
<tr>
<th>Marks (x) obtained (%)</th>
<th>Grade</th>
<th>Description</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 ≥ x ≤ 100</td>
<td>O</td>
<td>Outstanding</td>
<td>10</td>
</tr>
<tr>
<td>80 ≥ x &lt; 90</td>
<td>A+</td>
<td>Excellent</td>
<td>9</td>
</tr>
<tr>
<td>70 ≥ x &lt; 80</td>
<td>A</td>
<td>Very Good</td>
<td>8</td>
</tr>
<tr>
<td>60 ≥ x &lt; 70</td>
<td>B+</td>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>50 ≥ x &lt; 60</td>
<td>B</td>
<td>Above Average</td>
<td>6</td>
</tr>
<tr>
<td>40 ≥ x &lt; 50</td>
<td>C</td>
<td>Average</td>
<td>5</td>
</tr>
<tr>
<td>35 ≥ x &lt; 40</td>
<td>P</td>
<td>Pass</td>
<td>4</td>
</tr>
<tr>
<td>x &lt; 35</td>
<td>F</td>
<td>Fail</td>
<td>0</td>
</tr>
<tr>
<td>AB</td>
<td>Ab</td>
<td>Absent</td>
<td>0</td>
</tr>
</tbody>
</table>

11.2.1 Audit Courses can be graded as ‘P’ Pass and ‘F’ Fail without any credits
11.2.2 In addition, a student may be assigned the grades ‘P’ and ‘F’ for pass marks and non-
Pass/No-pass courses, or the grade ‘X’ (not permitted).
11.2.3 A student shall be assigned the letter grade ‘X’ for a course if he/she is not permitted to appear for the end semester
examination of that course due to lack of requisite attendance.
11.2.4 A letter grade ‘F’ or ‘X’ in any course implies failure in that course.
11.2.5 A student is considered to have completed a course successfully and earned the credits if she/he secures a letter grade
other than ‘F’, or ‘X’.
11.3 At the end of each semester, the following measures of the performance of a student in the semester and in the
programme up to that semester shall be computed and made known to the student together with the grades obtained by
the student in each course:
11.3.1 The Semester Grade Point Average (SGPA): From the grades obtained by a student in the courses of a semester, the
SGPA shall be calculated using the following formula:

\[
SGPA = \frac{\sum_{i=1}^{N} GP_i \times NC_i}{\sum_{i=1}^{N} NC_i}
\]

Where, \(GP_i\) = Grade points earned in the \(i^{th}\) course
\(NC_i\) = Number of credits for the \(i^{th}\) course
\(n\) = the number of courses in the semester

11.3.2 The Cumulative Grade Point Average (CGPA): From the SGPA obtained by a student in the completed semesters, the
CGPA shall be calculated using the following formula:

\[ CGPA = \frac{\sum_{i=1}^{n} SGPI_i \times NSCI_i}{\sum_{i=1}^{n} NSCI_i} \]

Where,
- \( SGPI_i \) = Semester Grade point of the \( i^{th} \) semester
- \( NSCI_i \) = Number of credits for the \( i^{th} \) semester
- \( n \) = the number of semesters completed

11.3.3 The CGPA may be converted into a percentage by multiplying CGPA by 10.
11.3.4 Both the SGPA and CGPA shall be rounded off to the second place of decimal and recorded as such. Whenever these CGPA are to be used for official purposes, only the rounded off values shall be used.

11.4 In the case of an audit course, the letters ‘P’ or ‘F’ shall be written alongside the course name in the Grade Sheet. Such courses are not taken into account in the calculation of the SGPA or CGPA. However, the award of the degree is subject to obtaining a ‘P’ grade in all such courses. A student is not required to register again for passing the failed audit courses.

11.5 Only those students who secure CGPA of 7.5 and above in the first six semesters may choose to undertake research in the fourth year.

12.0 Assessment of Performance

12.1 A student’s performance is evaluated through a continuous system of evaluation comprising tests, quizzes, assignments, seminars, minor projects, major projects and end-semester examinations.

12.2 Theory Courses: Theory courses shall have two components of evaluation – in-semester assessment of 40% weightage and an end-semester examination having 60% weightage.

12.2.1 The modalities of the conduct of in-semester assessment and weightages attached to its various components shall be as published by the School at the beginning of each semester.

12.3 Lab Courses: Lab courses shall be evaluated on the basis of attendance; assessment of tasks assigned and end-semester test/viva voce. The weightage assigned for these components of the evaluation is given in the following table:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>10</td>
</tr>
<tr>
<td>Assessment of Tasks Assigned</td>
<td>30</td>
</tr>
<tr>
<td>End-semester test / viva voce</td>
<td>60</td>
</tr>
</tbody>
</table>

12.3.1 The modalities of the conduct of evaluation under the heading “Assessment of tasks assigned”, its components and the weightages attached to its various components shall be published by the department concerned at the beginning of each semester.

12.3.2 The evaluation of the end-semester test for a lab course may be done on the basis of criteria and weightage to be specified in the question paper, among which are included
- Organisation of the experiment
- Actual conduct of the experiment and accuracy of the result
- Extent of completion
- A comprehensive viva-voce which examines the overall grasp of the subject

12.4 End Semester examinations

12.4.1 End-semester examinations for the theory courses, generally of three hours’ duration, shall be conducted by the University. The Director of the concerned school and the Examination department shall make the arrangements necessary for holding the examinations.

12.4.2 In the end-semester examinations, a student shall be examined on the entire syllabus of the courses.

12.4.3 A student shall not obtain a pass grade for a course without appearing for the end-semester examination in that course.

12.5 Industry Training/Internship Programme

12.5.1 Departments require students to undergo industry training/internship programmes.

12.5.2 Departments are to notify the students at the beginning of their programmes about the details of industry training/internship.

12.5.3 After the Industry Training/Internship programme, the student shall furnish a certificate from the organisation where he/she underwent the programme as proof of successful completion.

12.5.4 The student shall submit a training/internship report to the department in a format to be laid down by the concerned department. He/she shall also give a seminar to present the learning outcomes of the programme in the presence of the faculty members and students of the department. The student shall be evaluated on the basis of the report, the seminar and interaction during the seminar and grades shall be assigned. These grades shall be given a weightage of two credits in the subsequent semester.

12.6 Field-based learning/Minor project:

12.6.1 Minor project work is conducted during the sixth semester of the programme, and is to be done individually or in groups.
within the campus/Outside the campus with due permissions.

12.6.2 Each department shall constitute a Departmental Project Evaluation Committee (DPEC) consisting of the Head of the Department, Project Co-ordinator and two senior teachers from the department, with the Project Co-ordinator as the convenor. The DPEC shall co-ordinate the conduct and assessment of the project.

12.6.3 The DPEC shall notify the schedule and modalities for the following stages in the implementation of the project.

- Submission of the topic of the project
- Notification for assignment of project supervisors
- Submission of the synopsis
- Schedule and modality for the submission of weekly activity reports
- Schedule for the seminar presentation of synopsis
- Schedule for Progress Seminars, submission of progress reports and viva voce examination
- Date for the submission of the project report and a brief summary
- Dates for the external evaluation of the project

12.6.4 The DPEC may ask a student to resubmit a synopsis if the same does not get its approval.

12.6.5 The Convener of the DPEC shall submit to the Controller of Examinations a panel of at least three names of external examiners at least three weeks before the external examination. The Controller of Examinations shall appoint the external examiner(s) from this panel. The project supervisor shall be the internal examiner.

12.6.6 Each student shall submit to the DPEC three bound, typed copies of the project report, and prepared according to the prescribed format, after the pre-submission seminar, by the due date. The student shall also submit three copies of a brief summary of the project that shall be forwarded to the concerned examiners.

12.6.7 The DPEC shall make the arrangements necessary to conduct the external evaluation in consultation with the examiner(s) appointed by the University, during the dates notified.

12.6.8 The DPEC shall forward the in-semester assessment marks to the Controller of Examinations by the date specified by the Examination Department.

12.6.9 The end-semester assessment shall have the following components:

- Project implementation: 40 marks
- Seminar presentation: 20 marks
- Viva voce examination: 20 marks
- Project documentation: 20 marks

12.6.10 Those who obtain an ‘F’ grade for the minor project shall be required to re-enrol for it in the subsequent semesters.

12.7 The evaluation of performance in non-credit courses shall be done by the authorities conducting them and they shall communicate the grades to the Director of the concerned School who shall forward them to the Controller of Examinations.

12.8 The Director of the concerned School shall forward the marks obtained in the in-semester evaluation to the Controller of Examinations within the prescribed time as may be notified.

12.8.1 All evaluated work in a course except the end semester answer scripts shall be returned to the students promptly.

12.9 Eligibility for appearing in the end-semester examinations: A student shall be permitted to appear for the end-semester examinations, provided that

12.9.1 A student has not been debarred from appearing in the end semester examinations as disciplinary action for serious breach of conduct.

12.9.2 He/she has satisfactory attendance during the semester according to the norms laid out in the clause 8 of these regulations.

12.9.3 He/she has paid the prescribed fees and any other dues of the university within the date specified.

12.10 Registration for end-semester Examinations

12.10.1 The University shall, through a notification, invite applications from students to register for the end-semester examinations.

12.10.2 Students who have registered with the University (vide clause 9) and those who have applied for such registration may apply to appear for the end-semester examinations of the university, in response to the notification issued by the University, provided that they fulfill the eligibility norms as laid down in clause (ref 12.9)

12.10.3 All eligible candidates shall be issued an admit card for the relevant examination and for specified courses. A student who does not have a valid admit card may not be permitted to write the end-semester examinations.

12.10.4 A student who secures an ‘F’ grade in any course in a semester may register for the end-semester examination for that course in a subsequent semester when that course is offered again, within the maximum period of time allotted for the completion of the programme. The in-semester assessment marks obtained by him/her in the last semester in which the said course was attended by him/her shall be retained.

12.10.5 Similarly, in case of an ‘NP’ grade in non-credit courses the student shall have to re-register for it in the appropriate semester of the next academic session.

12.10.6 When a student re-registers for the end semester examination of a course, in accordance with clause 10.10.4 above,
the better of the two grades obtained (the old and the new) shall be considered for the calculation of SGPA and CGPA.

12.11 **Conduct of Examinations**: The University shall conduct the end-semester examinations in accordance with the applicable regulations on such dates as are set down in the Academic Calendar or as notified.

12.12 **Declaration of Results**: The University shall declare the results of a semester and make available to the students their grade sheets within the time-frame prescribed by the relevant regulations of the university and specified in the academic calendar.

12.13 The University may withhold the results of a student for any or all of the following reasons
- he/she has not paid his/her dues
- there is a disciplinary action pending against him/her
- he/she has not completed the formalities for University Registration according to the requirement of section 5 of these Regulations.

12.13.1 **Re-examining of answer scripts**

12.13.2 If a student feels that the grade awarded to him/her in a course is not correct, he/she may apply to the University for the re-examining of his/her answer script.

12.13.3 Re-examining of scripts may be of two different categories – scrutiny and re-evaluation.

12.13.4 **Scrutiny**: The activities under this category shall ordinarily be confined to checking correctness of the total marks awarded and its conversion into appropriate letter grades whether any part/whole of a question has been left unevaluated inadvertently correctness of transcription of marks on the tabulation sheet and the grade sheet issued in respect of the course under scrutiny.

12.13.5 **Re-evaluation**: Re-evaluation of the answer script by independent experts in the concerned subject(s).

12.13.6 Application for re-examining of answer scripts
- A student may apply for scrutiny or re-evaluation for one or more courses of the just-concluded end-semester examinations within seven calendar days from the date of publication of its results in the application form prescribed for this purpose.
- He/she shall pay the prescribed fee to the University as notified.
- A student applying for scrutiny/re-evaluation shall expressly state on the application form whether the application made is for Scrutiny or for Re-evaluation. In each case, the student may also request to see his/her answer script.
- All applications for scrutiny/re-evaluation must be routed through the Director of the concerned School.

12.13.7 If in the process of re-examining, the grade obtained in a course changes, the better of the two grades shall be assigned to the course. If there is a change, the new grade shall be recorded and a new grade sheet shall be issued to the student.

12.13.8 Without prejudice to any of the clauses of section 10.14, a student who has been found to have used unfair means during an examination shall not be eligible to apply for scrutiny or re-evaluation of answer scripts.

12.14 **Repeat Examination**: The University shall conduct repeat examination for those with F grade at a different time slot, as set down in the Academic Calendar or as notified. Such students should register for these examinations.

12.15 **Improvement Examination**

12.15.1 After the completion of the entire programme of study, a student may be allowed the provision of improvement examinations. These are to be availed of only once each in the Autumn and Spring semesters that immediately follow the completion of the programme, and within the maximum number of years permissible for a programme.

12.15.2 A student who has taken migration from the University shall not be eligible to appear for Improvement Examination.

12.15.3 A student may not choose more than the number of courses specified below for improvement examinations.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Number of Courses for Improvement Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autumn Semester</td>
</tr>
<tr>
<td>BCA</td>
<td>4</td>
</tr>
<tr>
<td>BCOM</td>
<td>4</td>
</tr>
<tr>
<td>BBA</td>
<td>4</td>
</tr>
<tr>
<td>BA</td>
<td>4</td>
</tr>
<tr>
<td>BSc</td>
<td>4</td>
</tr>
</tbody>
</table>

12.15.4 After the improvement examination, the better of the two grades obtained (the old and the new) shall be considered for the calculation of SGPA and CGPA.

12.15.5 If the student improves his/her grades through the improvement examination, new grade sheets and comprehensive transcripts shall be issued to the student.

12.16 **Special Examination**

12.16.1 The University shall conduct Special Examinations to benefit the following categories of students:
12.16.1.1 Students who, on the completion of the final semester, have some ‘F’ graded courses in the two final semesters, but no ‘F’ graded courses in any of the previous semesters
12.16.1.2 Students who have only one ‘F’ graded course in a semester other than the two final semesters and do not have ‘F’
graded courses in the two final semesters.

12.16.2 The Special Examinations shall ordinarily be conducted each year within a month of the declaration of the results of the Spring Semester.

12.16.3 Students who fail to secure 50% of the credits offered in the final semester shall not be eligible to appear for the special examinations. Such students will be governed by the provisions of clause 10.5 of these regulations. However, this restriction shall not apply in the case of students who are unable to appear in the end semester examinations due to exceptional situations like their own serious illness and hospitalisation or death of members of the inner family circle (restricted to only father, mother, siblings).

12.16.4 Students who have ‘X’ graded courses only in the last two semesters may be offered the opportunity for participating in a Tutorial Programme which may be conducted during the semester break immediately following the end-semester examinations of the final semester and students who earn 85% attendance for the programme shall be permitted to appear for the Special Examinations. Separate fees shall be charged for the Tutorial Programme.

12.16.5 Students who do not obtain pass grades in any course at the special examinations shall have to apply in the prescribed format and appear for the end-semester examination of these courses when they are scheduled by the University during subsequent relevant end-semester examinations.

13.0 Enrolment (for semesters other than the first)

13.1 Every student is required to enroll for the relevant courses before the commencement of each semester within the dates fixed for such enrolment and notified by the Registrar.

13.2 Students who do not enroll within the dates announced for the purpose may be permitted late enrolment up to the notified date on payment of a late fee.

13.3 Only those students shall be permitted to enroll who have

- Cleared all University, Departmental, Hostel and Library dues and fines (if any) of the previous semester,
- Paid all required University, Departmental and Hostel fees for the current semester, and
- Not been debarred from enrolling on any specific ground.

13.4 No student may enroll for a semester if he/she has not appeared for whatever reason, in the end semester examinations of the previous semester.

13.5 Students who due to lack of due attendance have been debarred from exams in any semester (including first and second) will have to re-enroll for the same.

14.0 Eligibility for the Award of the Graduate Degree

14.1 A student shall be declared to be eligible for the award of the four-semester Graduate Degree for which he/she has enrolled if he/she has

14.1.1 completed all the credit requirements for the degree with grade ‘C’ or higher grade in each of the mandatory graded courses and grade ‘P’ in all mandatory non-graded courses;

14.1.2 satisfactorily completed all the non-credit requirements for the degree viz., Extra Academic Activities, Industry Training, Field Work, Internship Programme, etc. (if any);

14.1.3 Obtained a CGPA of 5.00 or more at the end of the semester in which he/she completes all the requirements for the degree;

14.1.4 Owes no dues to the University, School, Department, Hostels; and

14.1.5 Has no disciplinary action pending against him/her.

14.2 The award of the Graduate Degree must be recommended by the Academic Council and approved by the Board of Management of the University.

14.2.1 Degree will be awarded, to student completes least fifty per cent of the credits from the University awarding the degree or diploma or certificate (https://www.ugc.gov.in/pdfnews/9327451_Academic-Bank-of-Credits-in-Higher-Education.pdf)

15.0 Termination from the Programme

15.1 If more than the number of years permitted for the completion of a programme have elapsed since the student was admitted, and the student has not become eligible for the award of Degree, the student shall be removed from the programme.

15.2 A student may also be required to leave the Programme on disciplinary grounds on the recommendations of the Students’ Disciplinary Committee of the concerned School.
SCHEME OF IN-SEMESTER ASSESSMENT
GRADUATE DEGREE PROGRAMMES

EVALUATION OF THEORY COURSES
For theory courses, in-semester assessment carries 40% weightage. Different components along with the weightage of each are given in the table below:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Test (Two Class tests of one and a half hour duration)</td>
<td>20</td>
<td>Average of the two marks shall be considered</td>
</tr>
<tr>
<td>Assignment (Individual and Group)</td>
<td>10</td>
<td>Group assignments for two courses and individual assignments for the remaining courses</td>
</tr>
<tr>
<td>Non-formal evaluation</td>
<td>5</td>
<td>Based on response and interaction in class, quizzes, open book tests, etc.</td>
</tr>
<tr>
<td>Attendance</td>
<td>5</td>
<td>For norms regarding attendance cfr. clause 10 of the Regulations for Undergraduate Programmes</td>
</tr>
</tbody>
</table>

There shall be no re-test for In-semester assessment under any circumstance. The original marks of all the In-semester assessment components shall be retained for all further repeat examinations.

ATTENDANCE
Marks for attendance will be given according to the following scheme:

<table>
<thead>
<tr>
<th>Attendance Percent (x)</th>
<th>Marks Allotted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory</td>
</tr>
<tr>
<td>75 &lt;= x &lt; 80</td>
<td>2</td>
</tr>
<tr>
<td>80 &lt;= x &lt; 90</td>
<td>3</td>
</tr>
<tr>
<td>90 &lt;= x &lt; 95</td>
<td>4</td>
</tr>
<tr>
<td>95 &lt;= x &lt; 100</td>
<td>5</td>
</tr>
</tbody>
</table>

EVALUATION OF LABORATORY COURSES/ SKILL ENHANCEMENT COURSES/INTERNSHIPS
All Laboratory courses, Skill enhancement course, internships are evaluated on the basis of attendance; performance of tasks assigned and end semester test/viva voce examination. The distribution of marks within these components will be specified by individual departments along the lines of the break-up given below:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>10</td>
</tr>
<tr>
<td>assessment of tasks assigned</td>
<td>30</td>
</tr>
<tr>
<td>End Semester Test and/or Viva-Voce Examination</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

EVALUATION OF PROJECTS
The guidelines for the conduct and evaluation of Minor and Mini Projects shall be laid down by the Department. The components of evaluation and allotment of marks may be as follows:

<table>
<thead>
<tr>
<th>In Semester Evaluation (weightage 60)</th>
<th>Marks</th>
<th>End Semester Evaluation (weightage 40)</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synopsis</td>
<td>10</td>
<td>Project Implementation</td>
<td>16</td>
</tr>
<tr>
<td>Seminar presentation of synopsis</td>
<td>15</td>
<td>Seminar Presentation</td>
<td>8</td>
</tr>
<tr>
<td>(Analysis and Design)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress Seminar</td>
<td>15</td>
<td>Viva Voce Examination</td>
<td>16</td>
</tr>
<tr>
<td>(Implementation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Documentation</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

ADBU|Regulations and Syllabus|2023-24|15
RULES, PROCEDURES AND BEHAVIOURAL GUIDELINES

1. Dress Code and Identity Card
   1.1 The dress code of the University consists of shirt / top (of the prescribed colour and material), trousers (of the prescribed colour and material), shoes (black) and socks (dark grey), a belt (black/dark brown, if required) and a tie (blue, with diagonal stripes). Students are required to come to the University following this dress code. The tie will be required to be worn only on formal occasions. An apron (of the prescribed colour) is to be worn in the Chemistry Lab and during Workshop Practice. During winter, students may wear only a blazer and/or a sweater (full sleeve or sleeveless) of the prescribed colour and material.
   1.2 The Student Identity Card is to be brought to the University every day and is to be produced whenever asked for. Entry to the University campus shall be only on production of the Identity Card. The Identity Card is also the Library Card.
   1.3 All students should wear the ID card around the neck from entry in the morning to exit in the evening.

2. Morning Assembly
   2.1 The morning assembly is a daily programme in the university on all class days during which all members, i.e., students, faculty, staff and management meet together. The assembly starts at the prescribed time. During the assembly, important announcements are made and a thought or insight is shared. The assembly is concluded with an invocation to God to bless the activities of the day. Note that any announcement made at the morning assembly is considered as being equivalent to notifying the same in the notice boards. All students should reach the assembly venue before prescribed time. Immediately after assembly all should proceed to the classroom to start class. Any change in procedures will be notified by the concerned School at the beginning of the Semester.
   2.2 One of the following prayers may be used to conclude the Morning Assembly:

   The Our Father
   Our Father, who art in heaven,
   Hallowed be thy name, Thy kingdom come, Thy will be done on earth as it is in heaven.
   Give us this day, our daily bread
   And forgive us our trespasses
   As we forgive those who trespass against us. And lead us not into temptation,
   But deliver us from all evil, Amen.

   Or

   Prayer for Peace
   Lord, make me an instrument of your peace,
   where there is hatred, let me sow love;
   where there is injury, pardon;
   where there is doubt, faith;
   where there is despair, hope;
   where there is darkness, light;
   where there is sadness, joy;
   O Divine Master, grant that I may not so much seek to be consoled as to console;
   to be understood as to understand;
   to be loved as to love.
   For it is in giving that we receive;
   it is in pardoning that we are pardoned;
   and it is in dying that we are born to eternal life. Amen

3. Punctuality in Attending Classes
   3.1 All are expected to be at their respective assembly venues five minutes before assembly time.
   3.2 Normally no student shall leave the University before all the classes are over. In case of an emergency, a student may leave with proper written permission from the HOD of the concerned department.
   3.3 While all students are encouraged to have their lunch in the University Canteens, students are permitted to take lunch outside the University.

4. Make-up Classes, Leave of Absence and Earned Attendance
   4.1 If any student misses any laboratory class due to illness or other grievous problems, he/she is required to meet the concerned teacher for completing the experiments as soon as possible. Such make-up attendance will be taken into
consideration at the end of the semester if attendance is less than 75%. At most two make-up attendances may thus be earned by any student.

4.2 Any student who is required to be engaged in a University activity or a pre-planned training and placement activity during class hours, may apply for the grant of an ‘earned attendance’ from the concerned HODs in the prescribed form available at the Reception. Such applications must be forwarded by the Activity In-Charge. For club related activities, Faculty Advisor of the concerned club will be the Activity In-Charge. In all other cases, Faculty In-Charge or Assistant Faculty In-Charge of Student Affairs will be the Activity In-Charge. Filled up forms shall be submitted preferably before or in case of emergency, immediately after the activity for which earned attendance is to be granted.

4.3 Any student going to participate in any activity or competition outside the University must apply to the Faculty In-Charge of student Affairs using the prescribed form which must be forwarded by the Assistant Faculty In-Charge of Student Affairs in consultation with respective Club Advisers. On return, these students must report back to the Assistant Faculty In-Charge of Student Affairs for recording the outcome.

4.4 Any student who is not able to attend classes due to medical or other grievous reasons are required to apply for leave in the prescribed form along with valid medical certificates and other requisite documents, to the Faculty In-charge, students’ affairs within seven days of joining back. Such applications must be signed by a parent of the student and forwarded by the mentor of the concerned student and the HOD of the concerned department. Only these students will be considered for condonation of deficiency in attendance.

5. **Discipline**

5.1 Personal, academic and professional integrity, honesty and discipline, a sense of responsibility and a high degree of maturity is expected of all students inside and outside the campus. Integrity calls for being honest in examinations and assignments, avoiding plagiarism and misrepresentation of facts.

5.2 Indulging in acts of violence, riotous or disorderly behaviour directed towards fellow students, faculty members or other employees of the institution/hostel in the campus or outside is considered to be a serious breach of discipline and will attract penalty.

5.3 Respect for Common Facilities: Care and respect for common facilities and utilities are an essential component of social responsibility. Any willful damage to University property must be made good by the persons concerned. Further, maintaining cleanliness of the classrooms and the entire campus is everyone’s responsibility.

5.4 Substance Abuse: Chewing of tobacco, betel nut and the likes, smoking and the use of other addictive substances and alcoholic drinks are strictly prohibited. These should not be brought into or used within the campus of the University. Violation of this norm will lead to stern action.

5.5 Use of Cell Phones: Cell phones may be used in the University lawns, canteens and other open areas. However, the use of cell phones in classrooms and labs are strictly prohibited except when used for teaching/learning purposes with the explicit permission of the teacher concerned. The cell phone of anyone found violating this rule shall be confiscated and his/her SIM card shall be taken away and retained in the University office for 7 days. If a person violates the norm for a second time, his/her mobile will be confiscated and retained in the University office till the end of the semester.

5.6 Use of Internet: The entire campus is wi-fi enabled and the students may use the Internet freely for educational purposes. Students may also use the Computing Centre for browsing the Net. However, the use of Internet to access unauthorized and objectionable websites is strictly prohibited.

5.7 All cases of indiscipline will be brought before the Students’ Disciplinary Committee and the decisions made by the Committee for dealing with such cases shall be final.

6. **Class Tests and Examinations**

6.1 The conduct of examinations will be governed by the norms of the University.

6.2 The Student Identity Card shall be the Admit Card for the class tests.

6.3 During class tests, all students are expected to enter the venue of the class test 15 minutes before the scheduled time of commencement. However, no one will be permitted into the examination hall after 15 minutes of the commencement of the class test and No one will be allowed to leave the examination hall until an hour has elapsed from the commencement of the class test.

6.4 No one is to leave the hall during examination for any purpose, except in case of an emergency.

6.5 Malpractices during class tests and examinations will not be tolerated and will attract stern action.

7. **Ragging**

Ragging and eve-teasing are activities which violate the dignity of a person and they will be met with zero tolerance. Anti-ragging norms have been given to each student at the time of admission and all students and parents have signed the anti-ragging affidavit. Any case of ragging and eve-teasing must be reported to the anti-ragging squad. All cases of violation of anti-ragging norms will be taken up by the anti-ragging Committee and punished according to the norms.

8. **Grievance Redressal**

The University has constituted a Grievance Redressal Cell to redress any genuine grievance students may have. Any student
having a genuine grievance may make a representation to the Grievance Redressal Cell through his/her mentor. The representation should be accompanied by all relevant documents in support of the genuineness of the grievance.

9. **School Association**

9.1 The School Association is an association of the representatives of the various stake holders of the School – students, staff, faculty and management. It is the responsibility of the School Association to take charge of organizing most of the co-curricular activities such as the annual festivals, quizzes, debates, competitions and social events.

9.2 A male and a female student are elected by the students of each class as “class representatives” to represent them in the School Association. Class representatives are expected to be outstanding students who are academically competent and having qualities of leadership.

10. **Participation in University Activities**

10.1 In order to provide opportunities for the holistic development of the human person, a large number of co-curricular and extra-curricular activities are designed and implemented under the banner of the University Association and student clubs. Some of the most important activities are D'VERVE & BOSCOSIADE (intra-University sports and cultural festival during University Week), PRAJYUKTTAM (the inter-University technical festival). All students are expected to take part actively in such activities to showcase their talents, to develop leadership qualities and to gain the experience of working in groups.

10.2 **Training and Placement Activities**: The training and Placement Cell of DBCET has been incorporated with the objective of minimizing the gap between industry and academia and giving the students training and exposure so that they can capitalize on every opportunity for placement. It is the prime responsibility of the cell to look after all matters concerning ‘Training to enhance employability’ and ‘guiding students for placement’. In the first two semesters, students are trained for communication skills development under the department of Humanities and Social Sciences, and personal development programmes under the department of campus ministry. From the third semester onwards, in every semester, students are given systematic training in aptitude tests, communication skills, group discussion, etc. They are also made to undergo mock HR and Technical Interviews. These activities of the training and placement cell find a place in the curriculum as Extra Academic Programmes (EAP) and all students are required to get a P grade for these activities by taking an active part in these activities regularly.

Other departments of the University offer customised services in training and placement of their students.

11. **Free Time**

Some hours without class may be available for some students during the day. Students are expected to use such ‘free time’ for visiting the library, meeting teachers and mentors, self-study, carrying out lab or project related activities, etc.

12. **Faculty Performance Feedback**

In order to improve the teaching and learning process in the University, students will be required to give feedback about the performance of their teachers from time-to-time. All students are expected to participate in the online feedback sessions concerning their teachers with sincerity and responsibility.

13. **Mentoring**

All students are assigned mentors from among the faculty members for their guidance. Directors of Schools in collaboration with the Heads of Departments will take care of assigning mentors. Mentors shall help the students to plan their courses of study, advise them on matters relating to academic performance and personality development, and help them to overcome various problems and difficulties faced by them. Although students should meet their mentors on a regular basis to get timely help, specific days have been set aside in the calendar for meeting mentors to ensure proper documentation of achievements, activities, shortcomings and problems faced by the students. Every student must meet the mentor during these days.

14. **Interaction Meet with Parents**

The University organises interaction meetings with parents once a year in which the parents are invited to interact with teachers and management to appraise themselves about the performance of their ward and also to offer their suggestions for the betterment of the institution. It is the responsibility of the students too to invite their parents to come and participate in the event and make the event meaningful.
FYUGP (1-8 Semesters)

- COMMON COURSES
- MAJOR COURSES (1-8 Semesters)
- MINOR COURSES (1-8 Semesters)
- INTERNSHIPS/PROJECTS 2/4/6/7/8 Semesters
- VALUE ADDED COURSES
- OTHER MANDATORY COURSES

- ABILITY ENHANCEMENT COURSES 1-4 Semesters
- INTRODUCTORY MULTIDISCIPLINARY COURSES 1-3 Semesters
- COMMON VALUE BASED COURSES 1-2 Semesters
- SKILL ENHANCEMENT COURSES 1-3 Semesters
## THE FOUR YEAR UNDER GRADUATE PROGRAMME STRUCTURE

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Category</th>
<th>Description</th>
<th>Credit</th>
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<tbody>
<tr>
<td>I</td>
<td>Semester 1</td>
<td>Major, Introductory level</td>
<td>Disciplinary Major course (Theory + Lab/ Theory)</td>
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<tr>
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<td>Minor</td>
<td>Choose Minor course from either Disciplinary or Intra-disciplinary related (Theory + Lab/ Theory)</td>
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<td>Multi-disciplinary</td>
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<tr>
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<td>Ability Enhancement</td>
<td>Language course - Communicative English-I /Communicative Hindi-I / Communicative Assamese-I</td>
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<td>I</td>
<td>Semester 1</td>
<td>Skill Enhancement</td>
<td>Hands-on training course</td>
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<tr>
<td>I</td>
<td>Semester 1</td>
<td>Common Value Based</td>
<td>Understanding India/ Digital and Technological Solutions/ Health and Wellness, Yoga Education, and Sports and Fitness/ Environmental Studies</td>
<td>1</td>
</tr>
<tr>
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<td>Common Value Added</td>
<td>Understanding India/ Digital and Technological Solutions/ Health and Wellness, Yoga Education, and Sports and Fitness/ Environmental Studies</td>
<td>1</td>
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<td>I</td>
<td>Semester 1</td>
<td>Community Engagement</td>
<td>Service Learning Theory</td>
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<td>Choose Minor course from either Disciplinary or Intra-disciplinary related (Theory + Lab/ Theory)</td>
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<tr>
<td>I</td>
<td>Semester 3</td>
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<td>Choose basic courses from the disciplines Commerce/Humanities/Science</td>
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<tr>
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<td>Semester 3</td>
<td>Ability Enhancement</td>
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<tr>
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<td>Hands-on training course</td>
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<td>Semester 4</td>
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<td>Disciplinary Major course (Theory + Lab/ Theory)</td>
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<td>I</td>
<td>Semester 4</td>
<td>Minor</td>
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<tr>
<td>I</td>
<td>Semester 4</td>
<td>Ability Enhancement</td>
<td>Communicative English-II /Communicative Hindi-II / Communicative Assamese-II</td>
<td>2</td>
</tr>
</tbody>
</table>

Exit option with UG Certificate (with the completion of courses and 4 credits in work based vocational courses offered during summer term or internship equal to a minimum of 44 credits)
### Exit option with UG Diploma (with the completion of courses additional 4 credit in skill based vocational courses offered during first year or second year summer term equal to a minimum of 84 credits)

| Semester 5 | Major | Disciplinary Major course (Theory + Lab/ Theory) | 5 |
| Semester 5 | Major | Disciplinary Major course (Theory + Lab/ Theory) | 5 |
| Semester 5 | Major | Disciplinary Major course (Theory + Lab/ Theory) | 4 |
| Semester 5 | Minor | Choose Minor course from either Disciplinary or Intra-disciplinary related (Theory + Lab/ Theory) | 4 |
| Semester 5 | Internship | Internship | 2 |
| **Total Credits** | | | **20** |

### Exit option with 3-year UG Degree (with the completion of courses equal to a minimum of 120 credits)

| Semester 7 | Major | Disciplinary Major course (Theory + Lab/ Theory) | 5 |
| Semester 7 | Major | Disciplinary Major course (Theory + Lab/ Theory) | 5 |
| Semester 7 | Minor | Choose Minor course from either Disciplinary or Intra-disciplinary related (Theory + Lab/ Theory) | 3 |
| Semester 7 | Research Methodology | Research Methodology | 2 |
| Semester 7 | Research Project/Dissertation | Dissertation Phase – I | 6 |
| **Total Credits** | | | **21** |

### Exit option with UG Degree (Honours) (with the completion of courses equal to a minimum of 160 credits)

| Semester 7 | Research Methodology | Research Methodology | 2 |
| Semester 7 | Research Project/Dissertation | Dissertation Phase – I | 18 |
| **Total Credits** | | | **20** |

| Semester 8 | Research Project/Dissertation | Dissertation Phase – II | 6 |
| **Total Credits** | | | **19** |

*Students will be awarded UG Degree (Honours) with Research in the relevant Discipline (with the completion of courses equal to a minimum of 160 credits)*
ABILITY ENHANCEMENT COURSES

INTRODUCTORY MULTI DISCIPLINARY COURSES

COMMON VALUE BASED COURSES

COMMUNITY ENGAGEMENT COURSES

VALUE ADDED COURSES

MANDATORY COURSES
## ABILITY ENHANCEMENT COURSES
(Compulsory for all Programmes)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>A E Course 1</td>
<td>AECE100T/AECE200T</td>
<td>Communicative English I</td>
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<td>2/4</td>
<td>A E Course 2</td>
<td>AECE101T/AECE201T</td>
<td>Communicative English II</td>
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<td>1/3</td>
<td>A E Course 3</td>
<td>ACH100T/AECH200T</td>
<td>Communicative Hindi I</td>
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<tr>
<td>2/4</td>
<td>A E Course 4</td>
<td>ACH101T/AECH201T</td>
<td>Communicative Hindi II</td>
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<td>1/3</td>
<td>A E Course 5</td>
<td>AECA100T/AECA200T</td>
<td>Communicative Assamese I</td>
<td>2</td>
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<td>AECA101T/AECA201T</td>
<td>Communicative Assamese II</td>
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<td>A E Course 7</td>
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<td>A E Course 8</td>
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<td>2/4</td>
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<td>AEGR101T/AEGR201T</td>
<td>Introduction to German Language – II</td>
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</table>

## MULTI DISCIPLINARY COURSES
(Choose Multidisciplinary Courses from the stream other than the stream which he/she has studied in class 12)

### AZARA CAMPUS

#### For students who studied in Science stream in class 12

<table>
<thead>
<tr>
<th>Semester</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Offered by the Department</th>
<th>Credits</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MD Course 1</td>
<td>CMBO108T</td>
<td>Business Organisation and Commercial Practices</td>
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<tr>
<td>1</td>
<td>MD Course 2</td>
<td>MTFB107T</td>
<td>Fundamentals of Business, Management &amp; Economics</td>
<td>Management</td>
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<tr>
<td>1</td>
<td>MD Course 3</td>
<td>CAOP108T</td>
<td>Office Productivity Tools</td>
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<td>Indian Economy</td>
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<td>MD Course 1</td>
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<td>Banking and Insurance</td>
<td>Commerce</td>
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<td>Emotional Intelligence</td>
<td>Management</td>
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#### For students who studied in Arts stream in class 12

<table>
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<tr>
<th>Semester</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Offered by the Department</th>
<th>Credits</th>
<th>Page No</th>
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<tbody>
<tr>
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<td>MD Course 1</td>
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<td>Business Organisation and Commercial Practices</td>
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<tr>
<td>1</td>
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<td>Office Productivity Tools</td>
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<td>Commerce</td>
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<tr>
<td>2</td>
<td>MD Course 2</td>
<td>BOBI111T</td>
<td>Biology</td>
<td>Basic Sciences</td>
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<tr>
<td>2</td>
<td>MD Course 3</td>
<td>CAPY108T</td>
<td>Python For Business Analytics</td>
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<td>CMBI110T</td>
<td>Banking and Insurance</td>
<td>Commerce</td>
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<tr>
<td>3</td>
<td>MD Course 2</td>
<td>PSNN106T</td>
<td>Nanoscience and Nanotechnology</td>
<td>Basic Sciences</td>
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<td>3</td>
<td>MD Course 3</td>
<td>CHFN115T</td>
<td>Food and Nutrition</td>
<td>Basic Sciences</td>
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#### For students who studied in Commerce stream in class 12

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<th>Category</th>
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<tr>
<td>1</td>
<td>MD Course 1</td>
<td>MTFB107T</td>
<td>Fundamentals of Business, Management &amp; Economics</td>
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### COURSE STRUCTURE

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<th>Offered by the Department</th>
<th>Credits</th>
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<td>Basic Mathematics</td>
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<td>Office Productivity Tools</td>
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<td>MTIE108T</td>
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<td>Nanoscience and Nanotechnology</td>
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<td>MD Course 2</td>
<td>CHFN115T</td>
<td>Food and Nutrition</td>
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#### TAPESIA CAMPUS

**For students who studied in Science stream in class 12**

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<th>Credits</th>
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<td>Community Psychology</td>
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**For students who studied in Arts/ Commerce stream in class 12**

<table>
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<tr>
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**BA Philosophy**

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### RESEARCH PROJECT / DISSERTATION

#### BCA (Honours)

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# SCHOOL OF COMMERCE AND MANAGEMENT

## DEPARTMENT OF MANAGEMENT

**PROGRAMME: BACHELOR OF BUSINESS ADMINISTRATION (BBA) (Honours/Honours with Research)**

### MAJOR COURSES

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## RESEARCH PROJECT / DISSERTATION

### BBA (Honours)

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### MINOR COURSES

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## Research Project/Dissertation

### BCOM (Honours)

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### BCOM (Honours) with Research

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# SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

## DEPARTMENT OF CHEMISTRY

**PROGRAMME:** BACHELOR OF SCIENCE (BSC) in CHEMISTRY (Honours/Honours with Research)

### MAJOR COURSES

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# SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

## DEPARTMENT OF MATHEMATICS

**PROGRAMME: BACHELOR OF SCIENCE (BSC) in MATHEMATICS (Honours/Honours with Research)**

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## SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

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## SCHOOL OF LIFE SCIENCES

## DEPARTMENT OF ZOOLOGY

### PROGRAMME: BACHELOR OF SCIENCE (BSC) in ZOOLOGY (Honours/Honours with Research)

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## SCHOOL OF HUMANITIES AND SOCIAL SCIENCES
### DEPARTMENT OF ECONOMICS

**PROGRAMME: BACHELOR OF ARTS (BA) in ECONOMICS (Honours/Honours with Research)**

### MAJOR COURSES

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# School of Humanities and Social Sciences

## Department of Education

**Programme: Bachelor of Arts (BA) in Education (Honours/Honours with Research)**

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**BA EDUCATION (Honours) with Research**

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**PROGRAMME: BACHELOR OF ARTS (BA) in MASS COMMUNICATION (Honours/Honours with Research)**

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**DEPARTMENT OF PSYCHOLOGY AND COUNSELLING**

**PROGRAMME: BACHELOR OF ARTS (BA) in PSYCHOLOGY (Honours/Honours with Research)**

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### COURSE STRUCTURE

#### INTERNSHIPS

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#### RESEARCH PROJECTS/DISSERTATIONS

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# Course Structure

**School of Humanities and Social Sciences**

**Department of Public Administration**

**Programme: Bachelor of Arts (BA) in Public Administration (Honours/Honours with Research)**

## Major Courses

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## Minor Courses (Human Rights –HR/International Relations -IR/Public Policy-PP/ History-HI)

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### SKILL ENHANCEMENT COURSES

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**BA PUBLIC ADMINISTRATION (Honours) with Research**

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SCHOOL OF HUMANITIES AND SOCIAL SCIENCES  
DEPARTMENT OF PHILOSOPHY  

PROGRAMME: BACHELOR OF ARTS (BA) in PHILOSOPHY (Honours) Minors in English and Psychology

MAJOR COURSES

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MINOR COURSES (IN ENGLISH AND PSYCHOLOGY)

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SKILL ENHANCEMENT COURSES

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INTERNERSHIPS (Conducted after 4th Semester and evaluated in 5th Semester)

| Semester | Category | Course Code | Course Name | Credits | Page No |

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### COURSE STRUCTURE

#### MINOR COURSES

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#### SKILL ENHANCEMENT COURSES

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#### RESEARCH PROJECT / DISSERTATION

**BSC HOSPITALITY AND HOTEL ADMINISTRATION (Honours) with Research**

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DETAILED SYLLABUS
ABILITY ENHANCEMENT COURSES

AECE100T/AECE200T: COMMUNICATIVE ENGLISH I
(2 credits – 30 hours) (L-T-P: 2-0-0)
Objective: The objective of this course is to equip the learners with the basic skills of effective communication in English language in all real life contexts, with area to enable fluency and clarity.

Course Outcomes
The course is intensely practice oriented and it specifically attempts to:
CO1: Familiarize the students with the basic tools of oral communication.
CO2: Teach the students to use grammar in meaningful contexts.
CO3: Enable the students to communicate in English confidently.

Module I: Essential grammar of English: An Introduction (10 hours)
Parts of speech; Basic sentence structures; Articles; Prepositions; Person and number; Tenses and their uses; Subject–verb agreement; Vocabulary building; Common idioms and phrases

Module II: Basic tools of oral communication in English (4 hours)
a. Syllables, stress–pattern and intonation
b. Consonants, vowels and diphthongs
c. Differences between spoken and written English

Module III: Functional English: Situational Conversation Practice (7 hours)
a. At the post office, bank, hotel
b. At the doctors’, at the chemists, in the library c) at the market, Tailors’, at the garage
c. In the kitchen, with a close friend, Ata wedding
d. Greetings, small talk, congratulations, condolences, offers, invitations

Module IV: Functional English: Structural Conversation Practice (6 hours)
Telephone conversation, Interviewing a film star; At a travel agent’s, An interview; Buying, Hiring a taxi, buying a motorcycle; Agreement, disagreement; Hypothetical conditions, likelihood; Public speaking: Speeches of great men; Interjection, exclamation, emotion emphasis; Expressions of hope, disappointment, surprise, concern, worry; Willingness, wish, intention; Commands, requests, advice, promise, threat.

Module V: Non-Detailed Study: Reading and comprehension (3 hours) Short stories and poems
a. The Blind Dog – R K Narayan
b. The Gift of the Magi- O Henry
c. The End of the Party-Graham Greene
d. Civility is all that Counts - SJ Duncan
e. The Herb Seller- Yengkhom Indira
f. Nothing Gold Can Stay- Robert Frost
g. Night of the Scorpion - Nissim Ezekiel

Suggested Readings
8. An Anthology of Short Stories prepared by Department of Humanities and Social Sciences, Assam Don Bosco University, for private circulation, 2014.

Mapping of COs with the syllabus

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COURSE STRUCTURE

AECE101T/ AECE201T: COMMUNICATIVE ENGLISH II
(2 credits – 30 hours) (L-T-P: 2-0-0)

Course Outcomes

CO1  :  Equip students with the competence of different forms of communications
CO2  :  Develop the study skills and communication skills necessary in formal and non-formal situations.
CO3  :  Prepare them to face interviews and group discussions

Module I: Basics of Business Communication (6 hours)
Effective communications—benefits, methods, barriers, flow Speaking, listening, non-verbal, telephonic communications
Use of English language in business—grammatical terms, subject-verb agreement, punctuation, some basic grammatical rules

Module II: Business Letters (5 hours)
a. Introduction—layout, structure, categories of business letter
b. Rules of good writing
c. Recruitment correspondence—application, CV, interview, offer, acceptance, etc.
d. Technical report writing

Module III: Telecommunication (3 hours)
a. Fax and e-mail
b. Internet, intranet, extranet

Module IV: Internal communication (5 hours)
a. Memos- structure, tone
b. Reports- formal, informal
c. Proposals
d. Meetings, minutes, agenda

Module V: Persuasive communication (4 hours)
a. Circulars, sales letters
b. Publicity materials- Public relations, news release, newsletters
c. Notice, advertisements, leaflets

Module VI: Visual and oral communications (4 hours)
a. Forms and questionnaires
b. Visual presentation—methods, charts, diagrams
c. Writing summaries
d. Oral presentation—reading and giving speech

Module VII: Non-Detailed Study: Reading and comprehension (3 hours) Short stories and poems
a. Engine Trouble – R K Narayan
b. The Mouse – H H Munro
c. The Rocking - Horse Winner – DH Lawrence
d. Travel the Road – Mamang Dai
e. Haflong Hills – Kallol Choudhury
f. Self-Portrait – A.K. Ramanujan
g. The Solitary Reaper – William Wordsworth

Suggested Readings
7. The Oxford Anthology of Writings from North-East India(Fiction) edited by Tilottoma Misra, OUP, 2011

Mapping COs with the syllabus

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AEC100T/AEC200T: COMMUNICATIVE HINDI I
(2 credits – 30 hours) (L-T-P: 2-0-0)

Course outcomes
On completion of this course successfully, students will be able to:

CO 1: Grasp the basic script of Devanagari for communicative usage (remembering)
CO 2: Learn the vocabulary, grammar and sentence formation for day to day communication in Hindi (understanding)
CO 3: Use the vocabulary, idiom and proverbs in communicative Hindi writing (applying)
CO 4: Understand Hindi used in common public places & offices as National Language (applying)

Module I: Introduction to Hindi language and pronunciation
a. Introduction to evolution of Hindi as National language of connectivity
b. Introduction to Hindi alphabet (Devanagri script) - vowels and consonants with their pronunciation
c. Basic greetings and expressions
- हिंदी भाषा का जीवन में उपयोग: परिचय-तर्क विशेषण
d. हिंदी बारह चारी (Devanagari script) का ज्ञान- स्वर , व्यंजन एवं उनका उच्चारण
e. सामान्य सम्बंध एवं उद्देश्य ज्ञान

Module II: Vocabulary building and basic sentence formation
a. Vocabulary building for daily use;
b. Basic sentence formation using simple verbs and nouns
c. Introduction to daily inter personal communications / asking questions/ daily use conversations
- दैनिक प्रयोग की शब्दावली एवं व्याकरण का ज्ञान
d. संज्ञा तथा क्रिया के उपयोग से सामान्य बातें की संरचना
e. दैनिक उपयोगी सम्बन्ध, व्यक्तिगत उपयोग का पता लगाना एवं सामान्य बोलचाल सम्बन्धी ज्ञान

Module III: Basic level conversational practice and grammar
a. Introduction to Hindi grammar: noun, pronoun, adjective, verb, adverb
b. Sentence formation using different tenses: present, past, future
c. Use of prepositions and conjunctions in sentences
d. Role-play exercises for different situations: shopping, ordering food, asking for directions, etc.
e. Group discussion and conversation practice for grammar, sentence formation and effective communication in Hindi
- हिंदी व्याकरण - संज्ञा, संवचन, विशेषण , क्रिया, क्रिया-विनियोग इत्यादि

- विभिन्न काल संवर्धन में व्याकरण विद्वान, वर्तमान, भविष्य एवं भूत काल
d. संबंध सूचक अव्यय/व्याख्यान शब्द एवं संबंधकोष/संबंधक शब्द - वाक्य संरचना में उनका उपयोग
e. अन्तर्वेश-, नाटक-/आलोचना गतिविधि / नाट्य रूपक का माध्यम में विभिन्न दैनिक परिस्थितियों के बारे में ज्ञान - दैनिक खान-पान सम्बन्धी, बाल-शिक्षा सम्बन्धी, पत्र-पत्रिका/शिक्षा सम्बन्धी इत्यादि

- सामूहिक परिचारिक पर बारे में ज्ञान एवं बारे हैं ज्ञान, बाल-शिक्षा एवं बाल-शिक्षा (मुद्दावरों का ज्ञान)

Module IV: Intermediate level vocabulary and grammar
a. Vocabulary building for intermediate level topics: travel, health, environment, etc.
b. Intermediate level sentence formation: complex sentences, conditional sentences, etc.
c. Idioms & proverbs and their usage in communication
- माध्यमिक स्तर के वार्ता समय की निमित्त जैसी प्रक्रियाः स्वास्थ्य, व्यायाम, विविध परिस्थितियों में उपयोगी शब्दावली का ज्ञान
d. माध्यमिक स्तर के वार्ता समय की निमित्त उपयोगी वाक्य संरचना का ज्ञान: संवर्धन, रचना वार्ता वाक्य इत्यादि
e. दैनिक बारेमें और उपयोग में अने बाली कहावतों एवं मुद्दावरों का ज्ञान

Module V: Advanced level conversation and writing practice
a. Advanced conversation practice on different professional topics;
b. Writing practice: Paragraph writing, message writing, letter writing, essay writing, etc.
- विभिन्न कार्यालय के क्षेत्रों में सम्बंधित उपयोगी वार्ता वाक्य का ज्ञान एवं अभ्यास
c. लेखन अभ्यास : पानि लेखन, सम्पादन, निबंध, न्युजेटिंग / वाक्यक्षण लेखन इत्यादि

Suggested Readings
COURSE STRUCTURE

5. Britannica blog(nd), Hindi language- history, variety, grammar and vocabulary, https://www.britannica.com/topic/Hindi-language

Mapping of COs

<table>
<thead>
<tr>
<th>COs</th>
<th>Module 1</th>
<th>Module 2</th>
<th>Module 3</th>
<th>Module 4</th>
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<td>CO 1</td>
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AECH101T/ AECH201T: COMMUNICATIVE HINDI II
(2 credits – 30 hours) [L-T-P: 2-0-0]

Course Outcomes

On completion of this course successfully, students will be able to:

CO 1: Conceptualize vocabulary used in professional sectors (remembering)
CO 2: Apply advance level grammatical concepts in communicative usage (applying)
CO 3: Understand the cultural and regional influences on communicative Hindi (understanding)
CO 4: Effectively use Hindi in public, professional and social platforms

Module I: Advanced vocabulary building
a. Review of concepts: Review of basic level Hindi vocabulary, pronunciation and sentence formation
b. Review of intermediate level vocabulary, conversation and grammar
c. Vocabulary building for advanced topics: politics, economics, technology, etc.
d. Understanding and usage of synonyms, antonyms, and homonyms words

Module II: Advanced grammar concepts
a. Advanced sentence formation: passive voice, direct and indirect speech, etc.
b. Use of conjunctions, interjections, and transitional words
c. Figures of speech (Alankar) and their effective usage in communicative Hindi

Module III: Conventional practice and Writing practice
a. Role-play exercises for advanced situations: negotiating, debating, expressing opinions, etc. Group discussion and conversation practice
b. Writing practice for advanced topics: newspaper articles, book/magazine articles, reports, etc.; rhetorical usage in Hindi writing

Module IV: Cultural and social influences on communication
a. Analytical understanding of Cultural and social aspects of communication in Hindi-speaking regions
b. Major communication styles: across generations, cultures and regions
c. Major Hindi Dialects of different regions of India

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Module V: Professional communication and specialized communication

a. Communication in professional contexts: Vocabulary building for professional use, Writing emails, letters and memos in Hindi.
b. Communication used in core business sectors for specific purposes: tourism, healthcare, education, etc.
c. Vocabulary building and sentence formation for specialized professional communication.
d. Role-play exercises for specialized communication scenarios viz. institutional, administrative, professional, legal, corporate and business communications etc.

Suggested Readings

1. Soorya prasad Dixit (2012), Sanchar Bhasha –Hindi, Lokbharti Prakashan
2. Hindi-B: Rachna Sagar (2019), Rachna Sagar publication
3. Omkar N.Koul (2008), Modern Hindi Grammar, Donwoody Press

Mapping of COs

<table>
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<tr>
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AECA1007/AECA2007: COMMUNICATIVE ASSAMESE I

(L-T-P: 2-0-0) (2 Credits: 30 hours)

Course Objectives

To give basic idea about the Assamese Language alphabets, wordings and also to make them learn about sentence formation, tense and writing skills of Assamese.

Course Outcomes

CO 1: Understand the basic concept of Assamese language.
CO 2: Remembering the conversational language.
CO 3: Analyse the reading skills of Assamese
CO 4: Apply the writing skills in daily life activities.

Module I: Introduction to Assamese language and pronunciation (8 Hours)

a. History and geography of Assam
b. Introduction to Assamese alphabet and pronunciation of vowels and consonants
c. Basic greetings and expressions

d. Module II: Vocabulary building and basic sentence formation (8 Hours)

e. Vocabulary building for daily use

f. Basic sentence formation using simple verbs and nouns

g. Introducing oneself and asking questions

Module III: Grammar Basics and Conversational Practice (6 Hours)

a. Introduction to Assamese grammar: noun, pronoun, adjective, verb, adverb

b. Sentence formation using different tenses: present, past, future

c. Use of prepositions and conjunctions

d. Role-play exercises for different situations: shopping, ordering food, asking for directions, etc.

e. Group discussion and conversation practice

Module IV: Intermediate level vocabulary and basic writing practice (8 Hours)

a. Vocabulary building for intermediate level topics: travel, health, environment, etc.

b. Intermediate level sentence formation: complex sentences, conditional sentences, etc.

c. Use of idioms and proverbs,

d. Advanced conversation practice on different topics

e. Writing practice: letter writing, essay writing, etc.

f. Project Phase-I : Group discussion, project identification

g. Case study along with group discussion.

Suggested Readings

1.) অসমীয়া ভাষার উত্তর আক আবস্যনি-ই-বিচার |

2.) যোগাযোগমূলক অসমীয়া ভাষা - লিখিক ডঃ হেমন্ত শর্মা |

3.) অসমীয়া বর্ণমালা আক দুর্দান্তব -

4.) অসমীয়া ব্যাকরণ লিখিক সতানাথ বরা |

5.) অসমীয়া কুমিল্পাঠ - কুবের পার্লিকেন |

6.) তাকনিব হাইহি- কুবের পার্লিকেন, শী বাবুল শর্মা |

AECA101T/AECA201T: COMMUNICATIVE ASSAMESE II

(2 credits – 30 hours) (L-T-P: 2-0-0)

Course Objectives

The objectives of this course is to provide Advance Writing Skill in Assamese Language, knowledge of Assamese grammar, Conversational practice, Cultural and Social Communication, Advance Grammar Concepts and finally to provide professional communication in Assamese.

Course Outcomes

CO 1: Understand the Advanced vocabulary buildings.

CO 2: Explain the Advance sentence formation in Assamese language.

CO 3: Evaluate the importance of Assamese culture professional communication.

Module I: Advanced vocabulary building (6 Hours)

a. Review of basic Assamese pronunciation and sentence formation

b. Review of intermediate level vocabulary and grammar

c. Vocabulary building for advanced topics: politics, economics, technology. etc.

d. Use of synonyms, antonyms, and homonyms

Module II: Advanced grammar concepts (8 hours)

a. Advanced sentence formation: passive voice, direct and indirect speech, etc.

b. Use of conjunctions, interjections, and transitional words

Module III: Conversational practice and Writing practice (8 Hours)

a. Role-play exercises for advanced situations: negotiating, debating, expressing opinions, etc.

b. Group discussion and conversation practice

c. Writing practice for advanced topics: newspaper articles, reports, etc.

d. Use of rhetorical devices in writing
Module IV: Cultural and social communication (8 hours)

- Cultural and social aspects of communication in Assam
- Differences in communication styles across generations and regions
- Professional communication and specialized communication
- Communication in professional contexts
- Vocabulary building for professional use
- Writing emails and memos in Assamese
- Communication for specific purposes: tourism, healthcare, education, etc.
- Vocabulary building and sentence formation for specialized communication
- Role-play exercises for specialized communication scenarios

Suggested Readings

1) সাধারণ আই-আমরা বাক্যাংশ আকার বর্ণ অ, এ, ই,এ২ আম্বু বর্ণ (হার্মন, হার্মন)।
2) পাঠ্যশীল- বাক্যাংশ আকার বর্ণ অ, ই এ এর বারে অসম বুক-নিবেদ

AEFR100T/AEFR200T: FRENCH BEGINNER LEVEL I
(2 credits – 30 hours) (L-T-P: 2-0-0)

Course objective
French Beginner level I is a course of 30 learning hours designed to help learners to acquire basic speaking, listening, writing and reading skills in French. The course introduces pronunciation, common vocabulary and basic grammar to learners with no previous knowledge of French language. This knowledge prepares students to effectively communicate in French on topics related to everyday situations. Students practice listening and speaking in real-life situations, learn to read short and practical texts in French, and gain an insight into francophone cultures. By the end of the session, learners are expected to be able to engage in some general, everyday types of conversation.

Course Outcomes
On completion of this course, students will be able to:
CO1: Recall, name and identify the vocabulary and phrases related to who, when, where and other key question words, explain and interpret their meanings and select appropriate response. (Remembering, analyzing, evaluating)
CO2: Use the vocabulary and sentence structures learned to converse and discuss on a range of topics related to everyday situations. (Understanding, applying)
CO3: Demonstrate a basic understanding of francophone countries’ cultures, describe and summarize basic cultural values. (Applying, understanding, evaluating)
CO4: Analyse cultural differences and choose appropriate ways to interact with speakers from Francophone countries. (Analysing, evaluating)
CO5: Design and compose meaningful situational dialogues and perform them; invent skits by using the language skills learned. (Creating)

Module I: Introduction to French phonetics and pronunciation drills (8 hours)

- Phonetic alphabet
- Vowels, semi-vowels and consonnants
- Silent letters
- Pronunciation rules

Module II: Everyday common phrases and basic sentence structures (16 hours)

- Greeting
- Self-introduction (nationality, profession, age, family)
- Making requests
- Talking about one’s likes and dislikes
- Making invitation
- Describing a personnel

Module III: Introduction to Francophone cultures (6 hours)

- French and its speakers
- Pop culture: music, movies, TV, dramas
- Lifestyles
Suggested Readings

Mapping of COs to Syllabus

<table>
<thead>
<tr>
<th>Course Outcome</th>
<th>Module 1</th>
<th>Module 2</th>
<th>Module 3</th>
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<tbody>
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<td>CO1</td>
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<td>CO5</td>
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</table>

AEFR101T/AEFR201T: FRENCH BEGINNER LEVEL II
(2 credits – 30 hours) (L-T-P: 2-0-0)

**Course objective**
French Beginner level II is a course of 30 learning hours designed to help learners having completed French Beginner Level 1 to acquire more advanced language skills in French language. These skills prepare students to effectively communicate in French on topics related to various daily situations. Students enhance listening and speaking abilities in real-life situations, learn to read and write practical texts in French, and gain deeper understanding of francophone cultures. By the end of the session, learners are expected to be able to engage in a variety of simple daily conversations, read and write short paragraphs in French.

**Course Outcomes**
On completion of this course, students will be able to:
CO1: Recall, name and identify the vocabulary and phrases related to who, when, where and other key question words, explain and interpret their meanings and select appropriate response. (Remembering, analyzing, evaluating)
CO2: Use the vocabulary and sentence structures learned to converse and discuss on a range of topics related to everyday situations. (Understanding, applying)
CO3: Demonstrate a deeper understanding of francophone countries’ cultures, describe and summarize basic cultural values. (Applying, understanding, evaluating)
CO4: Analyse cultural differences and choose appropriate ways to interact with speakers from Francophone countries. (Analysing, evaluating)
CO5: Design and compose meaningful situational dialogues and perform them; invent skits by using the language skills learned. (Creating)

**Module I: Pronunciation drills (8 hours)**
- a) Liaison and enchaînement
- b) Sound discrimination
- c) Distinction of grammatical gender
- d) Elision

**Module II: Daily conversation and grammatical structures (16 hours)**
- a) Shopping
- b) Expressing wishes and needs
- c) Asking and giving direction
- d) Telling time
- e) Describing intention in near-future tense
- f) Making an appointment

**Module III: Introduction to Francophone cultures (6 hours)**
- a) Tourism
- b) Arts and literature
- c) Lifestyles

Suggested Readings

Mapping of COs to Syllabus
AEGR100T/AEGR200T: Introduction to German Language I
(2 credits – 30 hours) (L-T-P: 2-0-0)

Course Objectives:
The course aims at covering the basics of German language. It also covers a few basic grammar topics and an application of grammar in day-to-day life that is in reading, writing, listening, and speaking. On the completion of the first semester, one can understand and use familiar, everyday expressions and very simple sentences, can introduce him/her and others as well as ask others about themselves – e.g., where they live, who they know and what they own – and can respond to questions of this nature.

Course Outcomes
Students will be able to acquire a working knowledge in basic German

Course Contents:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Greetings</td>
<td>Personal pronouns and verbs in the present tense</td>
</tr>
<tr>
<td>2  Introduce yourself/countries/occupations/Family</td>
<td>Artikel: der/die/das</td>
</tr>
<tr>
<td>3  The alphabet and the numbers</td>
<td>Verbs</td>
</tr>
<tr>
<td>4  Languages and countries</td>
<td>The negation</td>
</tr>
<tr>
<td>5  People and hobbies</td>
<td>Expression of time (am, um, von..bis)</td>
</tr>
<tr>
<td>6  In the city</td>
<td>Possessive Artikel</td>
</tr>
<tr>
<td>7  Food and drink and in the restaurant</td>
<td>Nominative and Accusative sentences, verbs and prepositions</td>
</tr>
<tr>
<td>8  Time and season</td>
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</tbody>
</table>

Suggested Reading
Netzwerk Deutsch als Fremdsprache A1, Textbook + Workbook by Stephanie Dengler

AEGR101T/AEGR201T: INTRODUCTION TO GERMAN LANGUAGE II
(2 credits – 30 hours) (L-T-P: 2-0-0)

Course Objectives:
The course aims at covering the basics of German language. It also covers a few basic grammar topics and an application of grammar in day-to-day life that is in reading, writing, listening, and speaking. On the completion of the first semester, one can understand and use familiar, everyday expressions and very simple sentences, can introduce him/her and others as well as ask others about themselves – e.g., where they live, who they know and what they own – and can respond to questions of this nature.

Course Outcomes
Students will be able to acquire a working knowledge in basic German

Course Contents:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Grammar</th>
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</thead>
<tbody>
<tr>
<td>1  Daily schedule and arranging appointments</td>
<td>Dative sentences, verbs, prepositions</td>
</tr>
<tr>
<td>2  In the office, different jobs, and leisure activity</td>
<td>Sentence connectives: conjunctions (und, oder, aber)</td>
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<tr>
<td>3  On the computer and emails</td>
<td>The group of nouns</td>
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<tr>
<td>4  Living and the home furnishings</td>
<td>Pronouns</td>
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</table>
## COURSE STRUCTURE

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<td>5</td>
<td>Clothes and the shopping</td>
<td>Adjectives</td>
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<tr>
<td>6</td>
<td>Health and body parts</td>
<td>Modal Verbs</td>
</tr>
<tr>
<td>7</td>
<td>Holiday, travel, and city tour</td>
<td>Past Tense</td>
</tr>
</tbody>
</table>

**Suggested Reading**

Netzwerk Deutsch als Fremdsprache A1, Textbook + Workbook by Stephanie Dengler
INTRODUCTORY MULTI DISCIPLINARY COURSES

BOBI111T: BIOLOGY (2-1-0)
(3 Credits: 45 Hours) (L-T-P: 2-1-0)

Course Outcomes
1. Recall the biological observations of 18th Century that lead to major discoveries? (Remembering)
2. Compare the two, three, four and five kingdom classifications. Highlight the criteria for classification (Understanding)
3. Apply thermodynamic principles to biological systems. (Applying)
4. Analyze biological processes at the reductionist level. (Analyzing)
5. Examine DNA as a genetic material in the molecular basis of information transfer (Evaluating)

Module 1: Introduction (4 lectures)
Importance of Biology: Fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft; Aspect of biology as an independent scientific discipline. History of Biology: Biological observations of the 18th Century; Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor.

Module 2: Classification (5 lectures)
Classification and its criteria: Morphological, Biochemical and Ecological; Hierarchy of Classifications, based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eukaryotes. (c) energy and Carbon utilization - Autotrophs, heterotrophs, lithotrophes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e)Habitata- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life; Organism from different based on classification for the study :1. E.coli, 2. S.cerevisiae, 3. D. Melanogaster, 4. C. elegans, 5. A. Thaliana, 6. M. Musculus

Module 3: Genetics and Information Transfer (13 lectures)
a) Mendel’s laws: Law of segregation and Law of independent assortment, Dominance, Recessiveness; Allele, Gene mapping, Gene interaction, Epistasis; Meiosis and Mitosis in heredity; Gene – mapping; Genetic disorders in humans; complementation in human genetics.
b) DNA as a genetic material; Structure of DNA- single stranded, double stranded and nucleosomes; Genetic code- Salient features; Gene - complementation and recombination.

Module 4: Biomolecules and Enzymes (14 lectures)
a) Biomolecules of life: Micromolecules and Macromolecules- sugars, starch and cellulose; Amino acids and proteins; Nucleotides and DNA/RNA; Two carbon units and lipids. Structure of proteins: Primary, Secondary, tertiary and Quaternary; Proteins as enzymes, transporters, receptors and structural elements.

Module 5: Metabolism (5 lectures)
Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergonic reactions. Key and its relation to standard free energy. Spontaneity. ATP as an energy currency; Glycolysis and Krebs cycle; Photosynthesis; Energy yielding and energy consuming reactions. Energy charge

Module 6: Microbiology (4 lectures)

Suggested Readings
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
4. Molecular Genetics (Second edition), Stent, G. S.; and Calendar, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

Mapping of COs to Syllabus

<table>
<thead>
<tr>
<th>Module 1</th>
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<th>Module 3</th>
<th>Module 4</th>
<th>Module 5</th>
<th>Module 6</th>
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</table>

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CMBO108T: BUSINESS ORGANISATION AND COMMERCIAL PRACTICES
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objectives:
The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of business organisations and fundamentals of marketing.

Course Outcomes:
On successful completion of the course, the Students will demonstrate:
CO 1: An understanding of the nature, objectives and social responsibilities of business
CO 2: An ability to describe the different forms of organisations
CO 3: An understanding of the basic concepts of management of organizations
CO 4: An understanding of fundamentals of marketing.
CO 5: An understanding of recent developments in marketing

Module I: Introduction to Business (10 hours)

Module II: Forms of Business Organization (10 hours)

Module III: Management of Organizations (10 hours)

Module IV: Fundamentals of Marketing (15)

Mapping of COs with Syllabus

<table>
<thead>
<tr>
<th>COs</th>
<th>Module I</th>
<th>Module II</th>
<th>Module III</th>
<th>Module IV</th>
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<tbody>
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<td>CO 4</td>
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</table>

Suggested Readings
2. Dr. S. C. Saxena - Business Administration & Management, Sahitya Bhawan.
7. Dr. I.M. Sahai, Dr PadmakarAsthana,’ Business Organisation & Administration’, SahityaBhawan Publications Agra.
8. Kotler, Philip; Keller, Kevin Lane; Koshy, Abraham, and MithileshwarJha, Marketing Management: A South Asian Perspective, Pearson Education.
CMAC109T: ACCOUNTANCY
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective:
To provide basic knowledge on introduction, principles and practices of accounting, accounting cycle, techniques used in accounting, Accounting Equation; Preparing journal entries, ledger accounts; Trial Balance and students’ skills in preparing Financial Statements and interpreting financial statements.

Course Outcome:
CO 1: Understanding accounting concepts, types, rules, principles and the importance of accounting information to the users.
CO 2: Recording of business transactions using the double-entry accounting, different types of transactions and preparation of ledger accounts and trial balance.
CO 3: Explain the process of preparing financial statements
CO 4: Analyse financial statements to evaluate the financial performance

Module: 1- Introduction: (15 hours)
Accounting: Meaning, objectives, types, concepts; accounting information and its need to different stakeholders; Accounting Equation: Components, double entry system.

Module: 2- Recording of Transactions: (10 hours)
Journal: meaning, types and preparation of journal entry; special purpose books, ledger, trial balance and adjustment entries.

Module: 3- Accounting Standard (10 hours)

Module: 4- Financial Statement: (10 hours)
Financial statement: its concepts, importance; income statement, position statement, statement of cash flow, interpretation of financial statements.

Suggested Readings:
1. Mike Piper, Accounting Made Simple, Simple Subjects, LLC
2. CA Dr KM Bansal and Dr Ritu Gupta, Basic Accounting, Taxxman Publication, edition 2022
3. CA Dr. P C Tulsian, Tushar & CA Bharat Tulsian, Accountancy S Chand CA Intermediate Tulsian’s
4. S. Virender, Accounting Made Easy

COs mapping to Syllabus

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CMBI110T: BANKING AND INSURANCE
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective:
To provide an introduction to the banking and insurance industry in India, its history, structure, and functions. To learn about the regulatory framework governing the industry, different types of financial products and services, and the impact of technology on banking and insurance services

Course outcomes:
CO 1: Remembering the concepts of banking and insurance industry in India
CO 2: Understanding the nature, types, functions, products and services of banking industry in India
CO 3: Understanding the nature, types, functions, products and services of insurance industry in India
CO 4: Apply the banking products and insurance products
CO 5: Analyse the best banking and insurance products and services in practice
Module: 1- Introduction (12 hours)
Banking Industry in India: History and evolutions, structure and functions, banking system in India, Types of banks, banking regulation act, principles of banking, nationalization of banking in India, Regulatory body of Banking Industry in India, non-banking institutions

Module: 2- Banking Products and services (13 hours)
Deposits: Deposits and Advances, Deposit Mobilization, Classification and Nature of Deposit Accounts, Advances, Lending Practice, Types of Advances. Investment Management: Nature of Bank Investment, Liquidity and Profitability, services: debit card, credit card, NEFT, RTGS, Demand Draft, IMPS. Locker, overdrafts, E-banking services: Internet banking, mobile banking, UPI, core banking services, banksasurrance, ECS, Nastro, Vastro, Mirror, Loro

Module: 3- Insurance Industry in India (10 hours)
Introduction: origin, meaning, concepts, importance, principles, features and types of insurance services in India; Regulatory framework

Module: 4- Insurance Products and Services (10 hours)
Life insurance products: concepts, key features, types of life insurance products; Non- Life insurance products: concepts, key features, importance, types of non-life insurance products.

Suggested Readings:
2. O P Agarwal, Banking & Insurance, Himalayan Publication
4. I.M. Pandey, Principles and Practice of Banking, Macmillian Publishers India
5. Banking Regulation Act & quot; by Taxmann, Taxmann Publications Pvt Ltd.
9. Ravi Subramanian, The Bankster & quot; Rupa Publications, India

| CoS mapping to Syllabus: |
|-------------------------|---------|---------|---------|
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| C03 | | H | M | |
| C04 | M | | L | |
| C05 | M | | | H |

MTFB107T: FUNDAMENTALS OF BUSINESS, MANAGEMENT AND ECONOMICS
(3 Credits: 45 hours) (L-T-P: 4-0-0)

Objective:
The objective of this course is to develop an understanding of the Principles and processes of business, management and economics.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Explain the concept and purpose of business and state its importance (Remembering)
CO 2: Describe the business services and emerging modes of business (Understanding)
CO 3: Construct the nature and significance of management (Applying)
CO 4: Classify the principles of management (Analysing)
CO 5: Compare the various principles of economics (Evaluating)

Major I: Nature and Purpose of Business (10 Hours)
Introduction; Types of human activities; concept and characteristics of business as an economic activity; objectives of business; role of profit in business; classification of business activities; industry: meaning and types; business risks; dimensions of business environment

Major II: Business Services and Emerging Modes of Business (9 Hours)
Meaning, characteristics and, features, nature of services; Various categories of business services; meaning and scope of e business; Resources required for successful implementation of e business; e business vs traditional business; outsourcing concept; BPOs and KPOs; Smart card and ATMs meaning and Utility
Major III: Nature and Significance of Management (8 Hours)
Understanding the concept of management; meaning of effectiveness and efficiency; objectives of management; importance of management; nature of management as a science, art and profession; roles of top, middle and lower levels of management;

Module IV: Principles of Management (8 Hours)
Concept and significance: management; Taylor’s scientific management: principles and techniques; Fayol’s principles of management; comparison of the contributions of Taylor and Fayol

Module V: Principles of Economics (10 Hours)
Introduction to microeconomics; Consumer’s equilibrium and demand; producer behaviour and supply; Forms of market and price determination under perfect competition with simple applications; Introductory macroeconomics; national income and related aggregates; money and banking; determination of income and employment; government budget and the economy; balance of payments

Suggested Readings
3. Amitai Etzioni: Modern Organizations. PHI, New Delhi; 2021

Mapping of COs with Syllabus

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MTIE108T: INDIAN ECONOMY
(3 Credits – 45 Hours) (L-T-P: 4-0-0)

Objective:
This course seeks to enable the student to grasp the major economic problems in India and their solution.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Define the features of the Indian Economy. (Remembering)
CO 2: Illustrate the policy regimes of the Indian Economy. (Understanding)
CO 3: Identify the growth, development and structural changes of the Indian economy over the years. (Applying)
CO 4: Compare the sectoral trends – growth, performance and issues. (Analysing)

Module I: Basic Issues in Economic Development (5 Hours)
Concept and Measures of Development and Underdevelopment; Human Development

Module II: Basic Features of the Indian Economy at Independence (5 Hours)
Composition of national income and occupational structure, the agrarian scene and industrial structure

Module III: Policy Regimes (8 Hours)
a. The evolution of planning and import substituting industrialization.
c. Monetary and Fiscal policies with their implications on economy

Module IV: Growth, Development and Structural Change (12 Hours)
a. The experience of Growth, Development and Structural Change in different phases of growth and policy regimes across sectors and regions.
b. The Institutional Framework: Patterns of assets ownership in agriculture and industry; Policies for restructuring agrarian relations and for regulating concentration of economic power;
d. Growth and Distribution; Unemployment and Poverty; Human Development; Environmental concerns.
e. Demographic Constraints: Interaction between population change and economic development.
Module V: Sectoral Trends and Issues (15 Hours)

a. **Agriculture Sector:** Agrarian growth and performance in different phases of policy regimes i.e. pre green revolution and the two phases of green revolution; Factors influencing productivity and growth; the role of technology and institutions; price policy, the public distribution system and food security.

b. **Industry and Services Sector:** Phases of Industrialisation – the rate and pattern of industrial growth across alternative policy regimes; Public sector – its role, performance and reforms; The small-scale sector; Role of Foreign capital.

c. **Financial Sector:** Structure, Performance and Reforms. Foreign Trade and balance of Payments: Structural Changes and Performance of India’s Foreign Trade and Balance of Payments; Trade Policy Debate; Export policies and performance; Macro Economic Stabilisation and Structural Adjustment; India and the WTO, Role of FDI, Capital account convertibility,

**Suggested Readings**

2. IC Dhirgara, *Indian Economics*, Sultan Chand & Sons

**Mapping of COs to Syllabus**

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**MTE1097: EMOTIONAL INTELLIGENCE**

(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

**Objective:**

To acquaint the students with the knowledge of emotional intelligence and its importance to personal and professional success.

**Course/Learning Outcomes**

At the end of the course students will be able to:

CO 1: Acquaint with the knowledge of emotional intelligence and its importance to personal and professional success. (Knowledge)

CO 2: Recognize four domains of Emotional Intelligence (Analyse)

CO 3: Employ the emotions for better decision making (Applying)

**Module I: Concept of Emotional Intelligence (10 Hours)**


b. Types of emotions, exposing the myths about emotion, physiological or bodily changes accompanying emotions, how emotions affect our thinking and actions.

c. Development of emotions and emotional maturity, Emotional Intelligence – concept, history, measurement of EI - Bar-On Emotional Quotient Inventory, emotional competency inventory, Emotional and social competency inventory, Mayer-Salovey-Caruso Emotional Intelligence Test, self-rated emotional intelligence scale.

**Module II: Intrapersonal Awareness (10 Hours)**

a. Working with EI - EI can be enhanced or developed, models of EI: Ability models, Trait models, Mixed model, development of EI

b. Emotional Self Awareness – Introduction, Meaning and Definition, Emotional Self-awareness and Success, development of emotional self-awareness


d. Self-confidence –Introduction, need and importance of self-confidence in one’s life.
Module III: Intrapersonal Management (15 Hours)

a. Emotional self-control—meaning and definition, emotional self-control and success
b. Developing or improving the ability of emotional self-control: stage1—identification or awareness about the parent emotional state, stage2—determining underlying causes responsible for the present emotional state, stage3—adopting measures for getting control of the emotional state
c. Stress Tolerance: Stress—meaning and definition, Factors responsible for inducing stress, Development of stress Tolerance
d. Assertiveness, Self—actualization and Optimism—concept, meaning and importance

Module IV: Interpersonal and Intrapersonal Awareness (10 Hours)

a. Interpersonal Awareness Introduction, awareness about others—meaning and definition, awareness about others and success, personal life, professional life, development of awareness about others, empathy and reality testing.
b. Interpersonal Management—Managing Interpersonal Relationships, Flexibility, Flexibility and success
c. Problem Solving—meaning, scientific method of problem solving, development of problem-solving ability.

Suggested Readings

Mapping of COs to syllabus

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MABM109T: BASIC MATHEMATICS
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

COURSE OUTCOMES:
At the end of this course students will be able to
CO 1: Demonstrate fundamental arithmetic and mathematical concepts and their applications. (Understanding).
CO 3: Develop the analytical skill and the problem-solving ability. (Creating)

Module I: (9 lectures)

Module II: (12 lectures)

Module III: (12 lectures)
Mathematical functions, graphs, Concepts of limit, Fundamental theorems of limits, computation of limits, continuity of a function.
Differentiation: Meaning and geometrical interpretation; Standard derivatives; Second and higher order derivatives
Applications of differentiation: Optimization of functions; Maxima and Minima involving second or higher order derivatives, L’Hospital Rule.

Module IV: (12 lectures)
Probability: Random experiments, sample space, events. Definitions of Probability, computation of probability, Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes’ theorem and its applications.
Ratio and proportions, partnership, time and work, time and distance, Average, permutation and combination, surds and indices, simple and compound interest. algebraic equations and solutions.

Suggested Readings
INTRODUCTORY MULTI DISCIPLINARY COURSES

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CAOP108T: OFFICE PRODUCTIVITY TOOLS
(3 Credit, 45 hours) (L-T-P: 1-2-0)

Objective:
This course will make the learners capable of handling all day-to-day office related work. The course will make the students to confidently write professional documents, do all analysis related works and present their outcome as well as any related matters in a professional way.

Course Outcomes:
After learning this course, the students will be able to:
1. Define the concepts of worksheet and workbook. (Remembering)
2. Explain the procedure of opening, closing and saving of workbooks. Outlining the technique of creating and saving of documents. (Understanding)
3. Making use of word processing for creating and saving of document. (Applying)
4. Appraising of PowerPoint in making the presentation. (Evaluating)

Module I: Spreadsheet Fundamentals (15 Lectures)
Introduction: Understanding the concept of spreadsheets and their relevance in business, Overview of popular spreadsheet software (e.g., Microsoft Excel, Google Sheets, etc.), Concept of worksheets and workbooks, creating, opening, closing and saving workbooks, Navigating the spreadsheet interface. Entering and formatting data, including numbers, text, and dates, using basic formulas and functions for calculations, Sorting and filtering data, Introduction to charts and graphs for data visualization, performing more advanced calculations using functions like SUMIF, COUNTIF, etc., Creating meaningful charts and graphs, Formatting techniques for improved visualization, Exporting and integrating spreadsheet data into presentations.

Module II: Essential Business Documentation (15 Lectures)
Introduction: Introduction to word processing software (e.g., Microsoft Word, Google Docs), Creating and saving your document, Formatting text, paragraphs, and pages; Working with fonts, styles, and alignment, working with paragraph formatting techniques using indents, tabs, alignment, spacing, bullets and numbering and creating borders; Page setup and sections: Setting page margins, orientation, headers and footers, endnotes and footnotes, creating section breaks and page borders; Working with tables: Creating tables, modifying table layout and design, inserting graphics in a table; Creating professional documents: reports, memos, letters, etc., Mail merge

Module III: Corporate Presentation (15 Lectures)
Introduction: Overview of presentation software (e.g., Microsoft PowerPoint, Google Slides); Creating a new presentation using a design template, creating and managing slides, using content placeholders, creating graphs, tables, diagrams, organization charts, inserting clip art and images. Previewing presentation in slide show, understanding master views, using title master, slide master, handout master and notes master, working with headers and footers, using hyperlinks. Animation and multimedia: Using and applying animation schemes, custom animation, understanding sound file formats and video types, adding music, sound and video clips. Final presentation: Applying transition to slides, using hidden slides. using custom shows, using on screen pen and adding and accessing notes during a presentation.

Suggested Readings
1. Rajaraman, V. Introduction to Information Technology, Second Edition.PHI.

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CAPY109T: PYTHON FOR BUSINESS ANALYTICS
(3 Credits – 45 Hours) (L-T-P: 1-2-0)

Objective
This course will introduce the students to relevant modules of Python programming which is an extremely versatile open source programming language for statistics, management, data science and business analysis. The course is designed to build up opportunities to understand the data analysis for business studies.

COURSE/LEARNING OUTCOMES (CO)
1. Explain the definition and usage of python programming for data analysis and problem solving (Remembering).
2. Understand why it is necessary to evaluate the data set through data visualization (Understanding).
3. Apply the knowledge and skills acquired during the course to write and test the python program for addressing day to day problem statement on data set. (Applying).

Module I - (12 hours)
Basic Syntax, data type, variables, operator, list, tuples, set, dictionaries, statements-If, if else, else if, loops, functions, dates, maths.

Module II (13 hours)

Module III (20 hours)
Data visualization for business dataset, Pie chart, bar chart, box plot, histogram, line graphs, scatter plot, Normal distribution, Binomial distribution, classification, Time series analysis, T-Test, Chi-square test, Train/Test, Confusion Matrix, perform statistical analysis using Python

Suggested Readings

Mapping of Cos to syllabus

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PSNN106T: NANOSCIENCE AND NANOTECHNOLOGY (3-0-0)

Course Outcomes
CO 1: Recognize basic concepts of nano science and underlying principles of nanomaterials. (Remembering)
CO 2: Build knowledge on fabrication processes of nano materials and devices in the nanoscale. (Understanding)
CO 3: Assess nano materials and devices in the nanoscale using various characterization tools. (Applying)
CO 4: Analyze nanomaterials for applications in various technologies (Analysis)

Module I: Basics of Nanotechnology (8 lectures)
Importance of Nanotechnology, History of Nanotechnology, Properties of Nanomaterials, Difference between Bulk and Nanomaterial, Molecular building blocks for nanostructure systems, Forces between atoms and molecules, Size effects, Fraction of Surface Atoms, Surface Energy and Surface Stress.
Module II: Physics of nanomaterials (10 lectures)
Atomic scale structure of nanomaterials; Concept of quantum confinement: 0D, 1D and 2D nanostructures; Schrodinger equation- Infinite potential well, Core-shell quantum dots. Electronic and optical characteristic properties of quantum dots; Nanophotonics, Plasmonics – plasmons and surface plasmons, SPR.

Module III: Synthesis/fabrication techniques of nanomaterials (12 lectures)
Top down approach, Lithography – electron beam and ion beam techniques, Etching – wet and dry etching, Bottom up approach - Solvent based and template based synthesis, other important synthesis methods like CVD, PVD etc.; Doping, Nucleation, Growth and Stability of colloidal nanoparticles, concept of self-assembly.

Module IV: Characterization methods (8 lectures)
Optical Microscopy, Transmission electron microscopy (TEM), Scanning electron microscopy (SEM), Atomic force microscopy (AFM).

Module V: Applications (7 lectures)
Different application of Nanotechnology, Micro and Nano electromechanical systems.

Suggested Readings:
3. Introduction to Nanotechnology, C. P. Poole, Jr. and Frank J. Owens, Wiley India Pvt. Ltd.

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PSRS107T: RADIATION AND SAFETY MEASUREMENTS
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

COURSE OUTCOMES
CO 1: Solve problems using basic concept of Atomic and Nuclear Physics. (Analysis)
CO 2: Explain the theories of interaction of radiation with matter. (Understanding)
CO 3: Explain the working principles and functioning of radiation detection devices. (Understanding)
CO 4: Analyse the various issues with Radiation Safety Management. (Analysis)

Module I: Basics of Atomic and Nuclear Physics (7 lectures)
Basic concept of atomic structure; X rays characteristic and production; concept of bremsstrahlung and auger electron, The composition of nucleus and its properties, mass number, isotopes of element, spin, binding energy, stable and unstable isotopes, law of radioactive decay, Mean life and half life, basic concept of alpha, beta and gamma decay, concept of cross section and kinematics of nuclear reactions, types of nuclear reaction, Fusion, fission.

Module II: Interaction of Radiation with Matter (7 lectures)

Module III: Radiation Detection and Monitoring Devices (8 lectures)
Radiation Quantities and Units: Basic idea of different units of activity, KERMA, exposure, mrad, rads, gy, rem, mrem, SV and mSV. absorbed dose, equivalent dose, effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived Air Concentration (DAC). Radiation detection: Basic concept and working principle of gas detectors (Ionization Chambers, Proportional Counter, Multi-Wire Proportional Counters (MWPC) and Geiger Muller Counter), Scintillation Detectors (Inorganic and Organic Scintillators), Solid States Detectors and Neutron Detectors, Thermo luminescent Dosimetry.
Module IV: Radiation Safety Management (8 lectures)

Suggested Readings
2. Radiation detection and measurements, G. F. Knoll.
3. Thermoluminescence Dosimetry, A. F. Mcknlay, Adam Hilger Ltd.
5. Fundamentals of Radiation Dosimetry, J. R. Greening, Adam Hilger Ltd.
8. NCRP, ICRP, ICRU, IAEA, AERB Publications.

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BOBA112T: BASIC BOTANY I
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcome
After the completion of the course the students will be able to:
CO 1: Demonstrate the understanding on the classification and diversity of different plant groups including Algae, Fungi & Lichens (Understanding)
CO 2: Illustrate the structure and reproduction of certain selected algae, fungi and lichens (Understanding)
CO 3: Demonstrate the understanding on morphology, anatomy and reproduction of Bryophytes, and Pteridophytes (Understanding)
CO 4: Identify the different economic importance of the Bryophytes and Pteridophytes (Applying)
CO 5: Recall aptitude about identifying different thallophytes including algae, fungi, lichens, bryophytes and Pteridophytes (Remembering)

Module I: Thallophytes (20 Hours)
General characteristics; Range of thallus organization and reproduction; classification of algae; morphology and life-cycles of: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Sargassum, Polysiphonia; economic importance of algae
Introduction-general characteristics, range of thallus organization, cell wall composition, nutrition, reproduction and classification of fungi; life cycle of Stemonitis (Myxomycota) Rhizopus (Zygomycota) Penicillium Ascomycota), Puccinia, Agaricus (Basidioymycota); Alternaria (Deutromycota)
Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza, endomycorrhiza and their significance

Module II: Bryophytes (10 Hours)
General characteristics, adaptations to land habit, classification, morphology, anatomy and reproduction of Riccia, Marchantia, Anthoceros and Funaria; alternation of generation, ecology and economic importance of bryophytes

Module III: Pteridophytes (15 Hours)
General characteristics, classification, early land plants (Rhynia); morphology, anatomy and reproduction of Psilotum, Selaginella, Equisetum and Pteris; apogamy and apospory heterosporic and seed habit, stelar evolution; Telome theory; ecological and economic importance of Pteridophytes

Suggested Readings
10. Vander-Poorteri 2009 Introduction to Bryophytes. COP

Mapping of COs to Syllabus

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BOBA113T: BASIC BOTANY II

(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcome

After the completion of the course the students will be able to:

CO 1: Illustrate the understanding on morphology and anatomy of Gymnosperms and Angiosperms (Understanding)

CO 2: Compare the adaptive and protective systems in Gymnosperms and Angiosperms (Evaluating)

CO 3: Interpret the reproductive structure and developmental changes in Gymnosperms and Angiosperms (Understanding)

CO 4: Identify the different economic importance of Gymnosperms (Applying)

Module I: Gymnosperms (10 Hours)

General characteristics, classification, morphology, anatomy and reproduction of Cycas, Pinus and Gnetum; Kinds of fossils, process of fossilization; Ecological and economic importance of gymnosperms

Module II: Angiosperm: Morphology and Anatomy (20 Hours)

Tissues: basic types; Stem: organization of stems; growth and differentiation; Leaves: external and internal structure of foliage leaves, initiation and development of leaves; modification in leaves; Roots: types, external and internal structure of roots, origin and development of lateral roots; vascular cambium; secondary xylem and phloem; bark; secondary growth in roots; anomalous forms of growth; periderm, secretory system; defensive mechanism in plants

Module III: Angiosperm: Reproduction and Embryology (15 Hours)

Asexual reproduction; sexual reproduction; Flowers structure; Anther wall: Structure and functions, microsporogenesis and microgametogenesis, structure of ovule, types, megasporogenesis and megagametogenesis, pollination and fertilization, types of endosperm, development, structure and functions of endosperm, embryo and its type, pattern of development of dicot and monocot embryo, fruit type and dispersal

Suggested Readings


Mapping of COs to Syllabus

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BOAB114T: APPLIED BOTANY
(2 Credits-30 Hours) (L-T-P: 2-0-1)
(Two Credits Theory and 1 credit lab)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Explain basic farming methods and advanced techniques (Understanding)
CO 2: Classify various GMOs (Understanding)
CO 3: Plan cuttings and graftings of horticulture and floriculture crops (Creating)

Module I: Agronomy (8 hours)

Module II: Plant tissue culture (7 hours)
Introduction and history of plant tissue culture, infrastructure and organisation of plant tissue culture laboratory, aseptic techniques, totipotency and micropropagation, callus culture, anther and pollen culture, embryo culture, organ culture, suspension culture, applications of plant tissue culture.

Module III: Plant Biotechnology (7 hours)
Definitions of biotechnology, aims of biotechnology, genetic engineering, tools of recombinant DNA technology, GMO, applications of biotechnology in medicine and agriculture.

Module IV: Horticulture and grafting technology (8 hours)
Scope and importance of horticulture, classification of horticultural crops, food and vegetable zones of India, vegetable gardens, nursery techniques and their management, types and use of growth regulators in horticulture, principles of organic farming, types and uses of grafting techniques.

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BOAB115L: APPLIED BOTANY LAB
(1 Credit-30 Hours) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Identify weeds and techniques for crop improvement (Analyzing)
CO 2: Develop nurseries (Applying)
CO 3: Plan cuttings and graftings of horticulture and floriculture crops (Creating)

Practical
Expt. 1: Identification of weeds in crop fields
Expt. 2: Identification of basic plant tissue culture equipments
Expt. 3: Development and maintenance of vegetable gardens
Expt. 4: Preparation of cuttings/Grafting of floriculture crops

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ZGNC110T: NUTRITION FOR COMMUNITY HEALTH
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Course Outcomes
CO 1: Understand the causes and consequences of nutrition problems in the society (Remembering and understanding).
CO 2: To understand and be familiar with various approaches of nutrition and health (Understanding).
CO 3: Apply the components of health and the role of nutrition. (Applying)
CO 4: Evaluate Develop ability to evaluate fitness and well-being through nutrition. (Analyzing)

Module-I: Food, Nutrition and Health: 10 Hours
Introduction, Food and its Functions, Meaning of Nutrition and Nutrients: Action, Interaction and Balance, Handling of Food and Nutrients by the Body, Social, Psychological and Economic Aspects of Nutrition, The Concept of Health: Physical Health, Mental Health, Social Health and Spiritual Health; Meaning of Nutritional Status; Interrelationship between Nutrition and Health

Module-II: The Macronutrients: 9 Hours
Carbohydrates, Protein Lipids and Water. Importance of Macronutrients for Health.

Module-III: The Micronutrients: 9 Hours

Module-IV: Planning Balanced Diets: 9 Hours
Concept of a Balanced Diet, Use of Recommended Dietary Intakes in Planning Balanced Diets, Guidelines for Planning Balanced Diets

Module-V: Malnutrition: 3 Hours
Concept of Malnutrition, Diseases related to Malnutritions.

Module-VI: Food Safety: 5 Hours
Food Contamination, Food Adulteration, Simple Tests to Detect Adulteration, Food Laws- Food Standards, Certification and Quality Control, Agencies Involved in Consumer Protection

Suggested Readings
1. Nutrition for Community; Shri Chakradhar Publication Pvt. Ltd
2. Fundamentals of Food and Nutrition, by Tejmeet Rekhi and Heena Yadav, Elite Publishing Houser

Mapping of Cos to syllabus

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ZGVB111T: VECTOR BORN DISEASES OF PUBLIC HEALTH IMPORTANCE
(3 Credits: 45 Hours) (L-T-P:3-0-0)

Course Outcomes
CO 1: Understand the individual components of vector-borne disease transmission. (Remembering and understanding).
CO 2: To understand and evaluate vector-borne pathogen control measures (Understanding).
CO 3: Explain the ecological components of vector-borne disease transmission (Analyzing)
CO 4: Demonstrate how vector biology is integral to our public health history. (Applying)

Module-I: Introduction to Vector Born Diseases: 5 Hours
Concept of Vectors, Vector borne diseases and Pathogens

Module-II: Vector Born Diseases caused by Mosquitoes: 15 Hours
Chikungunya, Dengue, Zika fever, Yellow fever, Filariasis, Malaria, West Nile fever, Japanese Encephalities- Causative vectors and Pathogens; Transmission, Symtoms, Control and Prevention.

Module-III: Vector Born Diseases caused by Flies: 10 Hours
Leishmaniasis, African Trypanosomiasis, Onchocerciasis (river blindness) - Causative Vectors and Pathogens; Transmission, Symtoms, Control and Prevention.
Module-IV: Vector Born Diseases caused by Ticks: 15 Hours
Lyme Disease, Anaplasmosis, Babesiosis, Ehrlichiosis, Powassan Virus Disease, Borrelia miyamotoi Disease, Borrelia mayonii Disease, Rocky Mountain Spotted Fever (RMSF)- Causative vectors and Pathogens; Transmission, Symptoms, Prevention and Control.

Suggested Readings
2. Venkitaraman: Economic Zoology, Sudarsana Publishers

Mapping of COs to Syllabus

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ZGIB112T: INTRODUCTION TO BIOLOGY OF INSECTA
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcomes
CO 1: To demonstrate the concepts of insect biology including basic systematics of insects and interpret the behavioural aspects of social insects. (Understanding)
CO 2: Illustrate the role of insects as vectors and pests. (Understanding)
CO 3: Develop an understanding of insect plant interactions. (Understanding)
CO 4: Acquire knowledge regarding morphology of insects and physiology of insect body systems. (Understanding)

Module I: Introduction (2 Hours)
General Features of Insects Distribution and Success of Insects on the Earth

Module II: Insect Taxonomy (5 Hours)
Basis of insect classification; Classification of insects up to orders

Module III: General Morphology of Insects (8 Hours)
External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat, Abdominal appendages and genitalia

Module IV: Physiology of Insects (20 Hours)
Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system Sensory receptors Growth and metamorphosis

Module V: Insect Society (2 Hours)
Group of social insects and their social life Social organization and social behaviour (w.r.t. any one example)

Module VI: Insect Plant Interaction (3 Hours)
Theory of coevolution, role of allelochemicals in host plant mediation Host-plant selection by phytophagous insects, Insects as plant pests

Module VII: Insects as Vectors (5 Hours)
Insects as mechanical and Biological vectors, Brief discussion on houseflies and mosquitoes as important insect vectors

Suggested Readings
1. A general text book of entomology, Imms , A. D., Chapman & Hall, UK
2. The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK
3. Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA
INTRODUCTORY MULTI DISCIPLINARY COURSES

5. The Insect Societies, Wilson, E. O., Harvard Univ. Press, UK
7. Physiological system in Insects, Klowden, M. J., Academic Press, USA
8. The Insects, An outline of Entomology, Gullan, P. J., and Cranston, P. S., Wiley Blackwell, UK
9. Insect Physiology and Biochemistry, Nation, J. L., CRC Press, USA

Mapping of COs to Syllabus

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EGDH107T: DIGITAL HUMANITIES
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcomes
CO 1: Define the key concepts in Digital Humanities (Remembering)
CO 2: Apply the use of key tools and applications of digital technologies pertinent to Digital Humanities. (Applying)
CO 3: Examine critically existing digital platforms based on features that can be used for data creation, curation and analysis within different fields such as literature, history, arts, and music. (Analyzing)

Module I: Digital Society and Humanities (5 lectures)
Digital Society - Concepts
The humanities: transitions - Oral, text-based practices, Post Humanism

Module II: Introduction to Digital Humanities (5 lectures)
The Evolution of Digital Humanities
Digital Humanities - Meaning, definitions and nature, Features and principles

Module III: Digital Libraries and Archiving (15 lectures)
Digital Libraries - Types
Archiving - Tools and techniques
Open Data - Need and application

Module IV: Computing and Human Technology Interaction (20 lectures)
Practice:
- Basic digital tools used to document data (such as PDF creators, audio-video tools and social media), in storage systems (shared drive, blogs, drop box, and websites)
Practice:
- Developing display various intersections of disciplines that Digital Humanities encompasses
- Developing skills for interactive interfaces on a digital platform (Practical application)
- Scientific communication (online publishing, e-correspondence)

Suggested Readings

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**MCCJ108T: BASICS OF COMMUNICATION AND JOURNALISM**

(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

**Course Outcomes**
- CO 1: Define the concept, meaning and functions of communication and news (Remembering)
- CO 2: Classify different types of news media (Understanding)
- CO 3: Apply the concepts and techniques of journalism in news reporting (Applying)
- CO 4: Analyse ethical issues in journalism (Analysing)
- CO 5: Explain the roles and responsibilities of media persons (Evaluating)
- CO 6: Elaborate, produce and edit new stories (Creating)

**Module 1: Introduction to Communication (20 Hours)**
Definition of Communication, nature and process of human communication, functions of communication, Forms of Communication, Levels and elements of Communication, Mass Communication and its process, Communication barriers, Normative Theories of the Press, Communication ethics, Media in Democracy, Media and the Public Sphere.

**Module 2: Understanding News (15 Lectures)**
Understanding Journalism, types of journalism, Meaning, definition, nature of News, News process: from the event to the reader, Hard and Soft news, basic components of a news story, Attribution, embargo, verification, balance and fairness, brevity, dateline, credit line, by-line.

**Module 3: Understanding the structure, construction of news and writing formats (20 Lectures)**
Organising a news story, 5W's and 1H, Inverted pyramid, Criteria for newsworthiness, principles of news selection, use of archives, sources of news, Language and principles of writing, types of journalistic writing.

**Suggested Readings**
1. An Introduction to Journalism, Carole Flemming and Emma Hemingway, 2006, Vistaar Publications
8. Writing Tools: 50 Essential Strategies for every writer, Peter Roy Clark, 2006, Little Brown

**Mapping of COs to Syllabus**

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MCFC109T: FASHION COMMUNICATION
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcomes
CO 1: Define fashion communication (Remembering)
CO 2: Understanding fashion communication technology (Understanding)
CO 3: Apply the key technologies used in promoting and distributing content for the online platform (Applying)
CO 4: Create media contents for video and promotion (Creating)

Module 1: Introduction to Communication and Design (15 Lectures)

Module 2: Fashion Communication and technology (15 Lectures)

Module 3: Publicity and promotion techniques (15 Lectures)
Creative advertising & media planning, publicity programme process, promotion and advertising in digital platform, Fashion public relation, Computer Applications in Fashion industry, Portfolio design.

Suggested Exercise
Create visuals, sound and text messages for mobile media, produce audio-video PSAs, Mobile News Report for different beats, Editing on Mobile Apps.

Suggested Readings:
1. Mobile Journalism. Al Jazeera Media Training and Development Centre, Maccise, Diana Larrea and Mara, Monstaser, E-book
2. Multimedia sound and video, Lozano, Jose, Pearson
5. Practising Convergence Journalism. An Introduction to Cross-media storytelling, Kolody, Janet, Routledge

Suggested Readings
3. The Beautiful Fall: Alicia Drake((1970)
5. Fashion Design Essentials: Jay Calderin ‘100 Principles of Fashion Design’
6. The Fundamentals of Digital Fashion Marketing: Clare Harris

Mapping of COs to Syllabus

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PCCP108T: COMMUNITY PSYCHOLOGY
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcomes
CO 1: Comprehend and discuss the concepts, approaches, models and strategies of community development (Understanding)
CO 2: Ability to apply knowledge and skills acquired in community psychology to address issues of human diversity, social justice, inclusion and community mental health (Applying)
CO 3: Ability to assess various concerns in a community and apply models and approaches for community development (Evaluating)
CO 4: Designing an intervention plan for community development and empowerment. (Creating)

Module 1: Introduction to Community Psychology (10 hours)
Definition of community psychology; types of communities; models
Module 2: Core values (12 hours)
Individual and family wellness; sense of community; respect for human diversity; social justice; empowerment and citizen participation; collaboration and community strengths

Module 3: Health promotion (11 hours)
Process of community organization for health promotion, importance, Community program for: child and maternal health, physical challenged and old age in the Indian context.

Module 4: Interventions (12 hours)
Community development and empowerment; case studies in Indian context.

Suggested Readings

Mapping of CO’s to Syllabus

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PCHW109T: PSYCHOLOGY OF HEALTH AND WELLBEING
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Outcomes
- Identifying and learning the importance of inner strength and human values which could help in maintenance of holistic health and gain insights into positive aspects of work. (Understanding)
- Interpreting variety of health enhancing factors, and their application in illness management. (Applying)
- Estimate the approximate health hazards and recommend the health enhancing behaviours. (Evaluating)
- Developing awareness about the various health hazards and suitable ways of dealing with such risks effectively at the community level. (Creating)

Module 1: Illness, Health and Wellbeing (12 hours)
Continuum and Models of health and illness- Bio-Medical, Biopsychosocial, holistic health; health and wellbeing

Module 2: Stress and Coping (11 hours)
Nature and sources of stress; Effects of stress on physical and mental health; Coping and stress management

Module 3: Health Management (12 hours)
Health-enhancing behaviours; Health compromising behaviours; Health Protective behaviours; Illness Management

Module 4: Promoting Human strengths and life enhancement (10 hours)
Classification of human strengths and virtues; cultivating inner strengths: Hope and optimism; Gainful Employment and Me/We Balance

Suggested Readings

Mapping of CO’s to Syllabus

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PCPM110T: PSYCHOLOGY AND MEDIA
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course outcomes
CO 1: Outline the effect of the media on underlying psychological processes and mechanisms (Understanding)
CO 2: Determine the impact of psychological processes on advertising and promotional activities (Applying)
CO 3: Analyse the influence of media on the perception and understanding of individuals (Analysing)
CO 4: Adapt approaches to media which would benefit the development of a health society (Creating)

Module 1: Media and User (10 hours)
Understanding mass media; Issues in Media psychology: Construction of reality, media and culture, Media and ethics, regulation.

Module 2: Media and advertising (10 hours)
Developing an effective advertising programme /media promotions/ campaign for social marketing. Case studies in the Indian context.

Module 3: Audio-Visual media (TV and movies) and Print media (15 hours)

Module 4: Interactive and emerging technologies (10 hours)
Virtual social media, interactive media, gaming, issues of internet addiction. Case studies in the Indian context.

Suggested Readings

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ENMB107T: MONEY AND BANKING
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Objective
This course is designed to understand the importance of money and banking in various economics. It aims to provide an introduction to understand the concept of money, theories of money supply and money demand and working of monetary
policy. It provides an insight into the banking system.

Course Outcomes
CO 1: Interpret the components of a financial system with respect to real economy linkages and financial market participants (Understanding)
CO 2: Identify the impact of central bank monetary policy on financial systems and the overall economy. (Applying)
CO 3: Analyze the development of financial markets and securities in response to market participant requirements. (Analyzing)
CO 4: Evaluate the different financial intermediation and risk management services that financial institutions provide and the need for governmental regulation. (Evaluating)

Module I: Money and Functions of Money (10 hours)
Concept of Money; Functions of Money; Theories of Demand for Money; Type of Money – M1, M2, M3, M4; Money multiplier theory.

Module II: Financial Institutions, Markets, Instruments and Financial Innovations (11 hours)
Meaning, types and role of Financial Markets and Institutions; Money and Capital Markets, their characteristics and functions; call money market, treasury bill market, commercial bill market including commercial paper and certificates of deposits; primary and secondary market for securities.

Module III: Interest Rates (10 hours)
Determination of Interest Rate; Sources of Interest Rate Differentials; Types of Interest Rate – Compound and Simple Interest Rate; Theories of Term Structure of Interest Rates; Interest Rates in India

Module IV: Banking System and Monetary policy (14 hours)
Indian Banking System; Banking Sector Reforms; Functions of Commercial Banks, Credit Creation System of Commercial Bank; The Evolution of Commercial Banks, Regional Rural Bank in India; NABARD; Functions and Goals of Central banks; Instruments of Monetary Control – Quantitative Control; Repo Rate; Reverse Repo Rate; CRR; SLR; Qualitative Control; Margin Requirements; Credit Rationing; Regulation of Consumer Credit; Moral Suasion; Publicity and Publication; Monetary Management in an Open Economy; Current Monetary Policy of India

Suggested Readings

Mapping of COs to Syllabus

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ENSM108T: INTRODUCTION TO STOCK MARKET
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Objective
This course will enhance the students with a comprehensive understanding of the workings of the stock market, including the market’s structure, trading and settlement procedures, processes, and related components, as well as the regulations that govern the stock market and the emerging challenges it faces. This course’s objective is to provide students with a comprehensive understanding of the workings of the stock market.

Course Outcomes
CO 1: Explain the Indian capital market and financial instruments. (Remembering & Understanding)
CO 2: Identify the different terms associated with the stock market in the action of buying and selling stocks. (Applying)
CO 3: Discuss stock market experience and learn to analyze risk and profitability. (Analyzing)
CO 4: Elaborate the possibility to evaluate and compare various financial securities and money market investment instruments. (Evaluating and Creating)
**Module I: The Stock Market and its Operation (15 Hours)**
Role and Structure of Money and Capital Market; Instruments of Capital Market – Share, Debentures, Equity and Bond; The Stock Market and its Operation; Stock Market Index – The BSE Sensex and the NSE Nifty; Role and working SEBI; Impact of SEBI on Capital Market in India; IDRA and its role in Financial Markets

**Module II: Terminology of Stock Market (10 Hours)**
Strike Price, Call Option, Put Option; Bull and Bear market; Beta, Delta, Bid, Blue chip stock; Board Lot, Odd Lot; Out of the Money (OTM), Stock split

**Module III: Trading of Stock (20 Hours)**
Recent development of stock exchange; Stock trading on BSE and NSE; Stock market trading mechanism; Online stock trading; OTC exchange; Commodity exchanges: evolution and history; overviews of derivatives in financial market, basic derivatives operation and trading; managing exchange rate, carbon markets, weather derivatives, ETFs – Purpose, Importance, types; risk management, commodity exposure, hedge accounting, currency futures

**Suggested Readings**

**Mapping of COs to Syllabus**

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**ENDED110T: ENTREPRENEURSHIP DEVELOPMENT**
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

**Course Outcomes**
CO 1: Students will get the knowledge of the term Entrepreneurship, and the qualities required to become an Entrepreneur. (Understanding)
CO 2: Will be introduced to various theories of entrepreneur and their applicability in real life (Apply)
CO 3: Will be introduce to various sources of financial assistance available to promote entrepreneur (Evaluating)
CO 4: The students will get some idea of various legal protections for innovation and develop the skill of decision making. (Creating)

**Module 1 Introduction (Hours 10)**
Meaning and Importance, Evolution of term Entrepreneurship, Factors influencing entrepreneurship; Characteristics of an entrepreneur; Types of entrepreneur; Barriers to entrepreneurship

**Module 2 Entrepreneurial Motivation (Hours 12)**
Motivation meaning; Maslow’s theory; Herjburg’s theory; McGregor’s Theory; Culture & Society; Risk taking behavior of entrepreneurs.

**Module 3 Entrepreneurial Creativity (Hours 8)**
Creativity and entrepreneurship and Stepsin Creativity; Innovation and inventions; Legal Protection of innovation Skills of an entrepreneur Decision making and Problem Solving

**Module 4 Organization Assistance (Hours 15)**
Industrial Park (Meaning, features, & examples); Special Economic Zone (Meaning, features & examples); Financial assistance by different agencies; MSME Act and Small Scale Industries; Environmental Clearance: National Small Industries Corporation (NSIC); Financial assistance to MSME; The Small Industries Development Bank of India (SIDBI); The State Small Industries Development Corporation (SSIDC) Export oriented units; Incentives and facilities to exports entrepreneurs; Export oriented zone; Export-Import Bank of India
### Suggested Readings

1. Arya Kumar, Entrepreneurship, Pearson, Delhi.
7. Peter F. Drucker, Innovation and Entrepreneurship.
8. A. Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges and Opportunities.

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### CHFN115T: Food and Nutrition (3-0-0)

**Course Outcomes**

CO 1: Revisit the relationship between food, nutrition and health. (Remembering)

CO 2: Explain the importance of nutritional diets, deficiency and management during the life cycle. (Understanding)

CO 3: Apply the knowledge of food chemistry for career development. (Applying)

**Module I: Food, nutrients and their needs (12 lectures)**

Basic idea of food, nutrition and health; functions of food, Nutritional Requirement during Infancy, maternal Childhood; Diet, Nutrition and Adolescence; Nutrition in the Elderly.

**Module II: Nutritional constituents (10 lectures)**

Sources and functions of (a) Carbohydrates; (b) Amino acids and proteins; (c) Lipids (d) Mineral; (e) Vitamins: A, D, E, K.

**Module III: Categories of food (10 lectures)**

Study of the following categories of food: (a) Cereals; (b) Pulses; (c) Fruits and vegetables; (d) Milk and milk products; (e) Egg, meat, poultry and fish; (f) Fats and oils.

**Module IV: Management of deficiencies/ Dietary goals (11 lectures)**

Causes, symptoms, treatments of certain important nutrient deficiencies, Food Preservation & Food Additives & Colorants, Social Health Issues – Smoking, Alcoholism, Drug Addiction, AIDS and AIDS Control Programs.

**Module V: Food perspectives (2 lectures)**

Career opportunity in food chemistry, food industry, Entrepreneur Development.

### Suggested Readings

1. Essential of food chemistry, JAGAT BAHADUR K.C. and BASANTA KUMAR RAI, Electronic library, DMC/NAAST/CCT.
4. Handbook of Food and Nutrition, M. Swaminathan, BAPPCO.

### Mapping of COs to Syllabus

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### CHEE116T: ENERGY AND ENVIRONMENT (3-0-0)

**Course Outcomes:**

1. Recall the concept of fuel petroleum chemistry as energy sources (Remembering)
2. Application of medicinal chemistry in daily life (Applying)
3. Analysis of the cause of pollution and their preventive measurements. (Analysing)
Module I: Importance of chemistry in energy and technology (15 Lectures)
Renewable and non-renewable source of energy, origin, composition and importance of petroleum, distillation and fractional distillation, refining of petroleum, Cracking and Reforming process, Applications of various fractions of crude oil, Petrol, Diesel, Kerosene, LPG, CNS, LNG, clean fuels, Octane number, Flash point, calorific value, knocking and anti-knocking properties of oil, use of hydrogen as fuel, sustainable energy source and future scope.

Module II: Pharmaceutical Chemistry (15 Lectures)
Definition of drug, Classification of drug, mechanism of drug action, mode of action of various types of drugs, natural and synthetic drug, importance of traditional herbs as medicine and their comparison with synthetic drug, lethal dose and toxicity of drug, preliminary concept of antibiotic, antiviral, anti-HIV, anti-cancer and antimalarial drugs.

Module III: Environmental pollution and management (15 Lectures)
Concept of pollution, causes of environmental pollution and their adverse effects, definition of air pollution, major air pollutants, their sources and influences, acid rain, photochemical smog, effects on organisms and on materials, water pollution major sources and impacts, eutrophication, water treatment processes, soil pollution, causes of soil pollution, soil salinity, sources of soil pollutants, major influences and remedial measures, radioactive pollution, Pollution Monitoring and Control, importance of waste management system, concept of reusability or recyclability in practical life for minimizing waste.

Suggested Readings:

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MDBM100T: BASICS IN MATHEMATICS
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Objectives
The objective of this course is to acquaint the students with reasoning skills especially numeracy skills to wade through every area of life. As the goal of education is defined as teaching the three R’s, namely, Reading, wRiting and aRithmetic, a student of philosophy is expected to possess basic knowledge in mathematical skills.

Course Outcomes
CO1: Defines the basic mathematical concepts (remembering)
CO2: Explains the basic mathematical operations (understanding)
CO3: Develops basic reasoning skills in mathematics (applying)
CO4: Solves the commonplace issues in commercial transactions (creating)

Module 1: Basic Arithmetic Skills I (10 hours)
Number system, arithmetical operations, numeral systems, KCF and LCM, Fractions, Decimals

Module 2: Basics in Arithmetic Skills II (15 hours)
Square roots, cube roots, exponents and powers, ratios and proportions, percentages, profit and loss, discount, simple and compound interest and measurements

Module 3: Basic Algebra (5 hours)
What is Algebra? Algebraic equations

Module 4: Basic Geometry (10 hours)
What is geometry? Circle, volume and surface areas of solids, angles and triangles, introduction to co-ordinate Geometry and graphs
Module 5: Basic Statistics (10 hours)
Data Interpretation: collection, mean, median, mode, range, etc.

Suggested Reading

Mapping of COs to Syllabus

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MDGA101T: BASICS IN ACCOUNTING
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Objectives
This multi-disciplinary course provides the students with hands-on training in various basic components of accounting, namely, heads of account, books of account, formation of societies and trusts, banking laws and practices and tally. It prepares the students to take up leadership and administrative roles in their future careers.

Course Outcomes
CO1: Explains the accounting concepts (understanding)
CO2: Simplifies the accounting procedures using the computer programme Tally (analysing)
CO3: Identifies the processes involved in the formation and management of societies and trusts (applying)
CO4: Appraises the banking laws and practices (evaluating)

Module 1: Concepts Explained (5 hours)
Module 2: Heads of Account and Books of Accounts (10 hours)
Module 3: Formation and Management of Societies/Trusts (10 hours)
Module 4: Banking Laws and Practices (10 hours)
Module 5: Tally in Accounting (10 hours)

Suggested Reading

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MDGA200T: INTRODUCTION TO GENERAL SCIENCE
(Credits: 3 Hours: 45) (L-T-P: 3-0-0)

Course Objectives
The main objective of the study of General Science is to understand the functional role of nature and explain it in a complete form. It helps to provide knowledge of the laws of nature after verifying them through experiments. Since Science is one of the most important channels of knowledge, studying subjects like Physics, Chemistry & Biology is important for the general understanding of things around us.
INTRODUCTORY MULTI DISCIPLINARY COURSES

Course Outcomes
CO1: Spells out a general understanding of things around us (remembering)
CO2: Explains the basic concepts in Science (understanding)
CO3: Examines basic topics in Biology, Chemistry and Physics (analysing)
CO4: Identifies the biological, chemical and physical characteristics of human beings, animals, plants and inorganic elements (applying)

Module 1: Biology (15 hours)
The science of life, classification of the animal kingdom, classification of the plant kingdom, cells, the composition of the human body, list of human diseases

Module 2: Chemistry (15 hours)
Matter and its states, atomic structure, molecule, the elements, radio-activity, minerals and ores, global warming: its causes and effects, greenhouse gas emission: its causes and effects

Module 3: Physics (15 hours)
Introduction, main branches of physics, the universe: galaxy, stars, sun and asteroids, light, motion and mechanics, electric current

Suggested Readings

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DETAILED SYLLABUS

COMMON VALUE BASED COURSES

CBES101T: ENVIRONMENTAL STUDIES
(1 credit: 15 hours)

Course Outcomes:
CO 1: Recall the multidisciplinary nature of environmental studies. (Remembering)
CO 2: Explain ecological processes of natural resources. (Understanding)
CO 3: Categorize different types of natural resources. (Analysing)
CO 4: Evaluate the global scale of environmental pollution. (Evaluating)

Module I: The Multidisciplinary Nature of Environmental Studies (1 lectures)
Definition, scope and importance, need for public awareness.

Module II: Natural Resources (2 lectures)
a. Different types of natural resources and associated problems - forest resources, water resources, mineral resources, food resources, energy resources and land resources.
b. Conservation of natural resources.

Module III: Ecosystems (2 lectures)
a. Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, food chains, food webs.
b. Structure of following ecosystems - forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems.

Module IV: Biodiversity and Its Conservation (2 lectures)
Types of biodiversity – genetic, species and ecosystem, value of biodiversity, global biodiversity, India as a mega-diversity nation, threats to biodiversity, conservation of biodiversity - in-situ and ex-situ conservation.

Module V: Environmental Pollution (3 lectures)
a. Definition, causes, effects and control measures of - air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards and e-pollution.
b. Solid waste management.
c. Disaster management.

Module VI: Social Issues and the Environment (3 lectures)
a. From unsustainable to sustainable development, urban problems related to energy, water conservation, rain water harvesting, climate change, global warming, acid rain, ozone layer depletion.
b. Environment protection act.
c. Introduction to environmental impact assessment.

Module VII: Human Population and the Environment (2 lectures)
Population growth and sex ratio; Population explosion - family welfare programme; Environment and human health; HIV/AIDS; Role of information technology in environment and human health.

Suggested Readings
2. Fundamentals of Environmental Studies, S. Somvanshi and R. Dhupper, S.K. Kataria and Sons Publisher.

Mapping of COs to Syllabus

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CBHY102T: HEALTH AND WELLNESS, YOGA EDUCATION, AND SPORTS AND FITNESS
(1 Credit: 15 hours)

Course Outcomes
CO 1: Explain the importance of healthy lifestyle (Understanding)
CO 2: Make use of Yoga, sports for health and fitness (Applying)

Module I: Health and Wellness (4 hours)
Meaning and importance of health and Wellness, components/dimensions of health and Wellness; Nutrition for health and wellness

Module II: Yoga (6 hours)
Introduction to Yoga, Asanas and Pranyamas

Module II: Sports and Fitness (5 hours)
Concept of Sports and fitness; Fitness activities for strength, Flexibility and Endurance; Indoor and Outdoor sports

Suggested Readings
2. Emily Oddo, ‘Yoga: For Beginners’, , White Flower Publishing, 2018
4. Dr. A. K. Uppal, Dr. P. P. Ranganathan, ‘Fitness, Wellness and Nutrition’, Friends Publications India. 2020
5. Fred Coalter, ‘Sport for Development: What game are we playing?’, Routledge. 2013

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CBDT103T: DIGITAL AND TECHNOLOGICAL SOLUTIONS
(1 credit: 15 hours)

Module 1: Computer Fundamentals and Office automation (8 Hours)

Module 2: Communication Systems and Digital Solutions (4 Hours)
Types of Communication Systems model and principles, Types of transmission media, Internet concepts, Web browsers, search engines, Email, Social networking and Netiquettes.

Module 3: Cyber Security and Emerging Technologies (4 Hours)
Introduction to emerging technologies, Internet of Things (IoT), Big Data Analytics, Cloud Computing, Virtual reality, Artificial Intelligence, Block Chain technology, 3D Printing, Robotic Process automation.

Suggested Readings
6. Rich & Knight, Artificial Intelligence, TMG, 3 e/d
7. Rachel Schutt, Cathy O’Neil, “Doing Data Science: Straight Talk from the Frontline” Schroff/O’Reilly


**CBU104T: UNDERSTANDING INDIA**

Credit – 1 (0-0-1) – 15 Hours

**Course Outcomes**

CO 1: At the end of this course, students will be able to explain the social, cultural and religious diversity of India and its impact on Indian psyche.

CO 2: At the end of this course, students will be able to evaluate the political and economic system of India.

**Module 1: India and its Diversity (18 hours)**

- Overview of India’s geography, diversity, demographics and development indicators
- A brief survey of India’s history, highlighting key events, personalities and movements that shaped its identity and destiny
- An exploration of India’s rich and varied cultural heritage, including its languages, religions, arts, literature and philosophy
- An overview of India’s social structure, institutions, norms and values, with a focus on issues such as caste, gender, class and ethnicity

**Module 2: Indian Political System (12 hours)**

- A study of India’s political system, institutions, parties and ideologies
- India’s role in regional and global affairs
- A review of India’s economic performance; the challenges and opportunities for growth;
- An overview of sectors such as agriculture, industry, services, and trade.
- A discussion of India’s environmental problems & the solutions for sustainable development
- A discussion on India’s journey towards a developed nation.

**Suggested Readings**

USIP001: STUDENT INDUCTION PROGRAM (P/NP)

The following list presents the topics covered in the Mandatory Student Induction Program conducted in the Assam Don Bosco University School of Technology:

1. Physical activity – Yoga and sports activity (indoor and outdoor)
2. Creative arts through Extra-curricular clubs e.g., music & singing, dance, drama, debating & quiz, art & craft, photography
3. Universal Human Values – group discussions on the following topics:
   a) Aspirations and family expectations
   b) Gratitude
   c) Competition and cooperation
   d) Competition and excellence
   e) Peer pressure
   f) Self-confidence
   g) Relationships in family
   h) Trust and respect
   i) Anger management
   j) Happiness and prosperity
   k) Dealing language barriers – tests on communication skill for future follow up.
   l) Sexual orientation / courting / sexual harassment
4. Literary exposure through Literary Club
5. Proficiency Modules – Psychological tests and orientation, introduction to Co-curricular clubs and innovations.
6. Lectures by eminent people – in-campus invited Guests and over SKYPE
7. Visit to local areas – visit to industry and institutions of repute
8. Familiarization to departments and common facilities
9. Mentoring system – introduction and assignment of mentors
10. Selection / election of Class Representatives for college association
11. Health check-up for all with documentation for future reference
12. Library Orientation, Introduction to ERP and e-Resources, filling up “Online anti-ragging affidavit” by all.
DEPARTMENT OF COMPUTER APPLICATIONS

PROGRAMME: BACHELOR OF COMPUTER APPLICATIONS (BCA)
DEGREE: BCA (HONOURS)/ BCA (HONOURS) WITH RESEARCH

VISION
Impart knowledge of Computer Applications to mould individuals into IT professionals, researchers, and entrepreneurs who are innovative, versatile and committed to society.

MISSION
• To prepare students for professional careers and higher studies by providing conducive teaching, learning, and research environment.
• To produce skilled individuals and entrepreneurs in emerging areas of technologies through academia-industry collaboration.
• To instill in individuals a sense of commitment to work for the betterment of society using technology.

PROGRAM OUTCOMES - BCA
PO 1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.
PO 3: Social Interaction: Elicit views of others, mediate disagreements, and help reach conclusions in group settings.
PO 4: Effective Citizenship: Demonstrate empathetic social concern and equity-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO 6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.
PO 8: Innovation and Entrepreneurship: Identify a timely opportunity and use innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAM SPECIFIC OUTCOMES – BCA
PSO 1: Knowledge of Computing Systems: An ability to understand the principles and workings of computer systems.
PSO 2: Project Development Skills: An ability to understand the structure and development methodologies of software systems.
PSO 3: Software Development Skills: Familiarity and practical competence with a broad range of programming languages and open-source platforms.
PSO 4: Research Skills: Ability to enhance research skills by utilizing standard research-based tools for analysis, design, and implementation of techniques for resolving real-life and/or social problems.

LIST OF COURSES -BCA

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
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### 3.6 Multimedia and Graphics

| 4.1 | CAOS204T: Operating System (Theory) |
| 4.2 | CAOS205L: Operating System (Lab) |
| 4.3 | CACA206T: Computer Organization and Architecture (Theory) |
| 4.4 | CACA207L: Computer Organization and Architecture (Lab) |
| 4.5 | CARD208T: Relational Database Management Systems (Theory) |
| 4.6 | CARD209L: Relational Database Management Systems (Lab) |
| 4.7 | CAWD211T: Basics of Web Designing (Theory) |
| 4.8 | CAWR212L: Basics of Web Designing (Lab) |
| 5.1 | CACN300T: Computer Network Fundamentals (Theory) |
| 5.2 | CACN301L: Computer Network Fundamentals (Lab) |
| 5.3 | CAWT302T: Web Technologies (Theory) |
| 5.4 | CAWT303L: Web Technologies (Lab) |
| 5.5 | CASE304T: Software Engineering (Theory) |
| 5.6 | CASE305L: Software Engineering (Lab) |
| 5.7 | CAPT310T: Basics of Python (Theory) |
| 5.8 | CAPT311L: Basics of Python (Lab) |
| 5.9 | Internship |
| 6.1 | CACC306T: Cloud Computing |
| 6.2 | CAAD307T: Android Application Development Fundamentals |
| 6.3 | CANS308T: Network Security |
| 6.4 | CAPW309P: Minor Project |
| 6.5 | CABS312T: Business Statistics |
| 7.1 A | CAPM400T: Python and Machine Learning (Theory) |
| 7.2 A | CAPM401L: Python and Machine Learning (Lab) |
| 7.3 A | CADA402T: Design and Analysis of Algorithm (Theory) |
| 7.4 A | CADA403L: Design and Analysis of Algorithm (Lab) |
| 7.5 A | CAA407T: Introduction to Artificial Intelligence |
| 7.6 A | CARM408T: Research Methodology |
| 7.7 A | Research Project/Dissertation |
| 7.8 A | Dissertation Phase – I |
| 8.1 A | CADS404T: Data Science (Theory) |
| 8.2 A | CADS405L: Data Science (Lab) |
| 8.3 A | CAOR406T: Operation Research |
| 8.4 A | CADV409T: Data Visualization |
| 8.5 A | Research Project/Dissertation |
| 8.6 A | Internship |

A: Honours, B: Honours with Research

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DEPARTMENT OF COMPUTER APPLICATIONS

DETAILED SYLLABUS

MAJOR COURSES

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CACL100T: COMPUTER PROGRAMMING IN C LANGUAGE
(2 credits – 30 hours) (L-T-P: 2-0-0)

Objective:
The objective of the course is to learn the concept of C programming language and to solve the problem statement using the C language.

COURSE / LEARNING OUTCOMES
At the end of this course, students will be able to:
CO 1: Define information based on the understanding of the concepts of C language’s syntax, data types, control statements, functions, pointers, arrays, structures and pointers in C. (Understanding)
CO 2: Solve problems using standard algorithms, translate pseudo-codes into C programs, and implement them. (Applying)
CO 3: Evaluate the data structure, function, data types, and algorithms used for searching, sorting, solving problem instances, etc. in terms of correctness and computation cost. (Evaluating)
CO 4: Combine the various concepts and ideas learned in C to plan, propose, and develop a product. (Creating)

Module I: Introduction to Algorithms and Programming Languages (8 hours)
Introduction to structured programming and problem-solving methods: algorithms, key features of algorithms, flowcharts, pseudocode, generation of programming languages, structured programming languages.
Overview of C: introduction to C, basic structure of a C program, compiling and executing C programs, comments, characteristics of a good program, character set, identifiers, keywords, data types, constants, and variables, I/O statements, operators, and expressions, precedence and associativity of operators, type conversion, and typecasting.
Module II: Decision Control Statements, Loops and Functions (8 hours)
Decision Control Statements and Loops: Introduction to Decision Control Statements, Conditional Branching statements, while loop, do-while loop, for loops, Nested Loops, Break and Continue Statements
C Functions: Need for functions, function declaration and definition, user defined and library functions, passing parameters to function, return statement, scope of variables, storage classes, recursive functions.

Module III: Arrays, Strings and Pointers (8 hours)
Arrays and Strings: One-dimensional arrays, passing array to function, multidimensional arrays and their applications, character arrays and string operations.
Pointers: Introduction to pointers, pointer expressions, dynamic memory allocation.

Module IV: Structures and Unions (6 hours)
Structures and Unions: Declaration of structures and simple implementation of structures, unions, enumerated data types.

Suggested Readings

Mapping of COs to Syllabus:

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<th>Course Outcomes</th>
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CACL101L: COMPUTER PROGRAMMING IN C LANGUAGE LAB
(2 credits – 30 hours) (L-T-P: 0-0-2)

Objective
The objective of the course is to learn how to solve problems using c programming language.

COURSE / LEARNING OUTCOMES
At the end of the Lab experiments students will be able to:
CO 1: Interpret information based on their understanding of the concepts of C language’s syntax, data types, control statements, functions, pointers, arrays, structures and pointers in C. (Understanding)
CO 2: Solve problems using standard algorithms and translate pseudo-codes into C programs and implement them. (Applying)
CO 3: Apply their analytical skills for choosing the right data structure, function, data types and develop logic to solve various instances of problems. (Analysing)

List of experiments:
1. Introduction to OS: Linux/Unix, Vi editor, file handling, directory structures, creating and editing simple C programs.
2. C programming using variables, assignment and simple arithmetic expressions
3. If else
4. Switch-case statements
5. Break, continue
6. Loops
7. Single and multidimensional arrays
8. Functions and recursion
9. Pointers, address operator, declaring pointers and operations on pointers

Suggested Readings

Mapping of COs to Syllabus:

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CADS102T: DATA STRUCTURES USING C
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of the course is to learn how to create data structures to represent a collection of similar data and solve problems using C language.

COURSE / LEARNING OUTCOMES
At the end of this course, students will be able to:

CO 1: Recall the basic C constructs and familiarize with basic C syntax, also define and outline the relationship between data and operations on these data using different data structures like arrays, linked list, stacks and queues, graphs and trees. (Remembering)

CO 2: Define C constructs for explaining and generalizing these data structures and choosing appropriate algorithms for efficient program design using C syntax. (Understanding)

CO 3: Compute and demonstrate these data structures and algorithms in different real world problem domain (Applying)

CO 4: Review the choice of data structure and algorithms based on the problem domain. (Evaluating).

Module I: Arrays and Lists (13 Hours)
Data Type, Abstract Data Type, Data Structure, Fundamental and Derived Data Types, Array as a data structure, Representation of arrays: single and multidimensional, Address calculation using column and row major ordering; insertion and deletion in arrays; use of arrays for matrix representation and manipulation (addition, multiplication).

Linked List as a data structure; operations on lists; singly linked list (with one or two external pointers), doubly linked list, circular list; use of linked lists for polynomial representation and manipulation (addition and multiplication), and sparse matrix representation and manipulation (inputting, adding, and displaying in matrix form).

Module II: Stacks and Queues (12 Hours)
Stacks and Queues as data structures; implementation of stacks and queues using arrays and linked lists; Circular Queue, Priority Queue; Application of stacks: Conversion of infix (containing arithmetic operators including exponential operator, and parenthesis) to postfix and prefix expressions; evaluation of postfix expression.

Module III: Trees and Graphs (10 Hours)
Binary Trees and General Trees, Representation of trees using linked lists, Binary tree traversal methods, recursive and non-recursive algorithms for traversal methods, Binary search trees (creation, insertion and deletion of a node), Height balanced (AVL) binary trees (construct and traverse an AVL tree), B-tree (construction and traversal of a B-tree of given order)

Introducing Graphs; Graph representation: Adjacency matrix, adjacency lists, incidence matrix; Traversal schemes: Depth first search, Breadth first search

Module IV: Searching and Sorting (10 Hours)
Linear and binary search, Indexed search; Hashing, Hash Functions (division method, mid square method, folding), Basic Sorting algorithms.

Suggested Readings

Mapping of COs to Syllabus:

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CADS103L: DATA STRUCTURES USING C Lab
(1 Credit – 15 hours) (L-T-P: 0-0-1)

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Recall the basic C constructs and familiarize with basic C syntax, also define and outline the relationship between data and operations on these data using different data structures like arrays, linked list, stacks and queues, graphs and trees. (Remembering)

CO 2: Define C constructs for explaining and generalizing these data structures and choosing appropriate algorithms for efficient program design using C syntax. (Understanding)

CO 3: Compute and demonstrate these data structures and algorithms in different real world problem domain (Applying)

CO 4: Review the choice of data structure and algorithms based on the problem domain. (Evaluating)

Solution of problems on-
1. Arrays
2. Stacks and Stack Application, Queues
3. Linked Lists, Circular and Doubly Linked Lists
4. Binary Trees
5. Searching and data modification: Linear search, Binary search, Hashing

Suggested Readings

Mapping of COs to Syllabus:

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CAIJ200T: INTRODUCTION TO JAVA PROGRAMMING
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The course is designed to impart the knowledge and skill required to solve real-world problems using an object-oriented approach utilizing Java language constructs. This course covers the two main parts of Java i.e. Java Language and Java Library (JDK 5).

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:

CO 1: Recall the knowledge of the structure and model of the Java programming language, (Remembering)

CO 2: Explain the use of Java programming language for various programming technologies (Understanding)

CO 3: Develop software in the Java programming language. (Applying)

CO 4: Analyse user requirements for software functionality required to decide whether the Java programming language can meet user requirements. (Analysing)

CO 5: Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (Evaluating)

CO 6: Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (Creating)

Module I: Java Fundamentals (16 hours)
Genesis, Java Philosophy, Java & Internet, Object-Oriented Programming features, Java Applet and Application, Java Environment and Java Development Kit (JDK) and Java Standard Library (JSL), Tokens, Expressions, Using Data Types, Declarations, Control Flow

Module II: Java Classes, Packages and Interfaces, Java Streams (14 hours)
1. Introduction, Classes, Working with Objects, Packages, Inheritance, Interfaces
2. Data Flow with Java Streams, Input Streams, Output Streams

Module III: Exception Handling in Java and Java threads (10 hours)
1. Introduction, Exception Methods, java.lang Exceptions
2. Introduction, Creating Threads, the Life Cycle of a Thread, Thread Methods, Using Threads, Synchronization of Threads

Module IV: Java Applets (10 hours)

Module V: Java AWT (10 hours)
Introduction, Swing Component and Container classes, Layout managers (Flow Layout, Grid Layout, Border Layout), Handling events, Adapter classes, Anonymous inner classes, Swing GUI components: JLabel, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JList, JComboBox, JScrollPane, JToolBar, JPopupMenu, JFrame, introduction to database connectivity with JDBC.

Suggested Readings
1. Deitel, H. M.; P. J. Deitel, Java: How to Program, New Delhi: Prentice Hall India
3. Moss, K., Java Servlets, New Delhi Tata McGraw-Hill
4. Russell, Java Programming for the absolute Beginner, New Delhi: Prentice-Hall India
5. Hanagan D., Java Examples in a Nutshell, New Delhi: O’ Reilly

Mapping of COs to Syllabus:

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CAIJ201L: Introduction to Java Programming Lab
(1 Credit – 15 hours) (L-T-P: 0-0-1)

COURSE / LEARNING OUTCOMES
At the end of the Lab experiments students will be able to:
CO 1: Identify classes, objects, members of a class and relationships among them needed for a specific problem. (Remembering/Evaluating)
CO 2: Write Java application programs using OOP principles and proper Program structuring. (Applying/Understanding)
CO 3: Demonstrate the concepts of polymorphism and inheritance. (Applying)
CO 4: Write Java programs to implement error handling techniques using exception handling. (Applying)
CO 5: Analyse the real world problems and solve using Java programming. (Analysing/Applying)

List of Experiments
1. Java Fundamentals using Data Types, Declarations, Control Flow
2. Java Classes and Java Packages
3. Java Interfaces and Java Streams
4. Java Exception Handling
5. Java Threads
6. Java Applets
7. Java AWT

E-resource for learning
Java, www.spoken-tutorial.org

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CALD202T: DIGITAL LOGIC DESIGN
(3 credits–45 hours) (L-T-P) (2-1-0)

Objectives
This course covers the basic concepts of digital logic. The course includes the fundamental concepts of Boolean algebra and its application for circuit analysis, multilevel gates networks, flip-flops, counters logic devices and synchronous and asynchronous sequential logic and digital integrated circuits.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: To solve conversion among different number systems (Applying)
CO 2: Apply the knowledge of Boolean algebra, Karnaugh-map or tabulation method to minimise Boolean expressions. (Applying)
CO 3: Design and analyse a given combinational/ sequential circuit and determine the corresponding truth table/ state table. (Analysing)

Module I: Number Systems (6 Hours)
Binary, Octal, & Hexadecimal Number Systems and Their Conversions, Representation of Signed Numbers-Floating Point Number, Binary Arithmetic, Representation-of BCD-ASCII-Excess 3 -Gray Code —Error Detecting and Correcting Codes.

Module II: Boolean Algebra, Simplification of Boolean Functions (13 Hours)
Boolean Algebra: Various Boolean operations; Postulates, Theorems, Duality, Boolean functions, Canonical forms, Representation of Boolean expressions using truth tables, logic gates. Boolean expressions minimization using Karnaugh map, Realization of canonical forms from Karnaugh map, Don’t Care Conditions - problems using Don’t care conditions, benefit of using Don’t care conditions. Tabulation method/Quine- Mc Kluskey method, prime implicants.

Module III: Combinational Logic and Sequential Logic (26 Hours)
Digital devices: Logic gates, wired-logic, 8 non-degenerate forms of NOR and NAND, multilevel NAND and NOR gates, buffer, 3-state buffer, high impedance state, Realization of other logic functions using NAND/NOR gates. Drawing logic diagrams for different types of Boolean expression derived from truth tables; A brief introduction to Combinational and sequential circuits. Difference between Combinational and sequential circuits; Arithmetic circuits: Half-adder, Full-adder, Binary Adder, Binary Parallel Adder, BCD Adder, Binary Adder-Subtractor, Half-subtractor, Binary Incrementer, carry propagation, look ahead carry, carry generator, magnitude comparator; Encoders, Decoders, Multiplexers, Demultiplexers Flip-flops: Different types of flip-flops, Flip-flop excitation tables, characteristic equations, truth tables, Triggering of Flip-flops. Registers: Registers (Register with Parallel Load), Shift registers
Counters: Asynchronous counters, Synchronous counters; Binary Counter with Par-allel Load, binary Ripple Counter, BCD ripple counter, synchronous binary counter, binary count-up-down counter, BCD synchronous counter.

Suggested Readings

Mapping of COs to Syllabus

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CALD203L: DIGITAL LOGIC DESIGN LAB
(1 Credit – 15 hours) (L-T-P: 0-0-1)

COURSE / LEARNING OUTCOMES
At the end of the experiments students will be able to:
CO 1: Explain the working of the various logic gates. (Understanding)
CO 2: Experiment with different logic gates to solve any given problem. (Applying)
CO 3: Analyse a given logic circuit and point out errors in it. (Analysing)
CO 4: Evaluate the output of a logic circuit for given inputs. (Evaluating)

List of experiments-
1. Study of the Truth tables of logic gates
2. Realization of half/full adder and half/full adder subtractor
3. Verify truth table of multiplexer and demultiplexer
4. Verify truth table of one bit and four bit comparators
5. Verify truth table of flip-flops
6. Simulation with VDHL
7. Adders
8. Subtractors
9. Logic gates
10. MUX and DEMUX

Suggested books:

Mapping of COs to Syllabus:

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CAOS204T: OPERATING SYSTEMS
(3 Credits – 45 hours) (L-T-P: 2-1-0)

Objective
To provide the basic functionalities and services provided by an operating system. This subject provides an overview of process management, memory management, deadlock, file system, input-output systems and protection and security. It gives knowledge of existing common operating systems like UNIX, Linux and Windows.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Define the basic concepts of operating systems and terminology related to operating systems such as processes, threads, files, semaphores, IPC abstractions, shared memory regions. (Remembering)
CO 2: Analyze important algorithms such as Process scheduling and memory management algorithms. (Analysing)
CO 3: Categorize the operating system’s resource management techniques, deadlock management techniques, memory management techniques. (Analysing)
CO 4: Discuss and examine the importance of File and I/O system management in operating systems. (Evaluating)

Module I: Introduction to Operating systems (5 Hours)

Module II: Process Management (10 Hours)

Module III: Process Synchronization and Deadlock (12 Hours)
Process Synchronization-the Critical Section Problem, Classical Problems of Synchronization, Semaphores. Deadlocks - Definition of a Deadlock, System model, Characterization, Deadlock Handling-Prevention, Avoidance, Detection and Recovery (Banker’s Algorithms and Resource Request Algorithm

Module IV: Memory Management (10 Hours)

Module V: File and I/O System Management (8 Hours)

Suggested Readings
2. Tannenbaum,” Modern Operating Systems”, PHI
5. Mandik and Donovan, Operating Systems, Mcgraw Hill.

Mapping of COs to Syllabus

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CAOS205L: OPERATING SYSTEMS LAB
(2 CREDIT-30 Hours) (L-T-P) (0-0-2)

COURSE / LEARNING OUTCOMES
At the end of Introduction to Operating Systems Lab students will be able to:
CO 1: Experiment with fork() system call to create a new process.
CO 2: Infer the concepts related to shell programming and their significance. (Understanding)
CO 3: Experiment with various scheduling algorithms (FCFS, SJF and Round Robin). (Applying)
CO 4: Examine the results obtained from page replacement algorithms-(FIFO, LRU), and understand the underlying principles and working of space management concepts. (Analysing)

List of experiments-
1. Programs using fork system calls.
2. Shell programming.
3. Programs to simulate process scheduling- FCFS, SJF and Round Robin.
4. Programs to simulate page replacement algorithms-FIFO, LRU.
5. Programs to simulate free space management.

E-resource for learning:
Linux-Ubuntu, www.spoken-tutorial.org

Mapping of COs to Syllabus

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CAC206T: COMPUTER ORGANIZATION AND ARCHITECTURE
(3 Credits – 45 hours) (L-T-P: 3-1-0)

Objective
This course aims to provide the student with the concepts and basic knowledge necessary to understand the organisation and architecture of computing systems.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Recognize and define the basic components and design of a computer, including CPU, memories, and input/output units. (Remembering)
CO 2: Identify and classify the major components of a CPU and discuss, review the operations intrinsic to it. (Understanding)
CO 3: Discover the parameters of performance improvement and use them in predicting the issues in instruction cycle. (Applying)
CO 4: Analyse the mapping techniques of different memory units; instruction sets interpret the different performance trade-offs between them. (Analysing)
CO 5: Summarize the concepts adhered to the principles and architectures of a digital computer system to design and develop new improvised systems. (Create)

Module I: Control Unit (10 Hours)

a. Major Components of a CPU; General Register Organization; Stack Organization (Register Stack, Memory Stack, Reverse Polish Notation); Characteristics of Complex Instruction Set Computer (CISC) and Reduced Instruction Set Computer (RISC)
b. Microoperations, Control Function, Role of Three-State Bus Buffers in Memory Transfers; Arithmetic Microoperations, Logic Microoperations, Shift Microoperations; Microprogrammed Control and Hardwired Control; Control Memory, Control Word, Microinstruction, Microprogram, Mapping of Instructions; Instruction Formats (Three-Address Instructions, Two-Address Instructions and Zero-Address Instructions); Addressing modes.

Module II: Parallel Processing and Multiprocessors (12 Hours)

a. Parallel Processing: Flynn’s Classification of computers; Pipelining, Data Dependency, Handling of Branch Instructions, Delayed Load, Delayed Branch; Vector Processing, Supercomputers; Array Processors.
b. Multiprocessors: Tightly Coupled, Loosely Coupled;

Module III: Memory Organization (10 Hours)
Hardware Organization for Associative Memory; Mapping methods for Cache Memory (Associative Mapping, Direct Mapping, Set-Associative Mapping), Write Through, Write Back, Cache Initialization, Cache Coherence; Virtual Memory, Memory management hardware.

Module IV: Input-Output Organization (13 Hours)
Input Output Interface, I/O Bus, Memory Bus, Isolated I/O, Memory-Mapped I/O; Asynchronous Data Transfer, Strobe Control, Handshaking; Modes of Transfer- viz. Direct Memory Access, Programmed I/O, and Interrupt-Initiated I/O; Priority Interrupt (Daisy-Chain Priority, Parallel Priority Interrupt, Priority Encoder); Input-Output Processor; Serial Communication (Character-Oriented Protocol and Bit-Oriented Protocol).

Suggested Readings

Mapping of COs to Syllabus:

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CACA207L: COMPUTER ORGANISATION AND ARCHITECTURE LAB
(2 credits – 30 hours) (L-T-P: 0-0-2)

Objective
This course aims to provide the student with the concepts and basic knowledge necessary to develop the organization and architecture of computing systems.

COURSE / LEARNING OUTCOMES
At the end of the Lab experiments students will be able to:
CO 1: Recall different OPcodes and syntax used in 8086 (Remembering).
CO 2: Illustrate the syntax of 8086 assembly language (Understanding).
CO 3: Choose the appropriate method to Categorize different types of OPcodes and write an 8086 assembly program (Evaluating).

Module 1
Dismantling and assembling a PC along with study of connections, ports, chipsets, SMPS etc.

Module 2
Assembly language programming using IA32(gcc), Introduction of gcc assembly programming, Verification of Instruction Set, Arithmetic operations

Module 3
Addition, Subtraction, Multiplication and Division of two 8-bit numbers.
Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

Module 4
Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

Suggested Readings

Mapping of COs to Syllabus

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CARD208T: RELATIONAL DATABASE MANAGEMENT SYSTEMS
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objectives of this course are to give students an in-depth understanding of the relational model for establishing fundamental skills with SQL and the operation of an RDBMS. The course also provides concepts of data modeling, design, and management for solving real problems.

COURSE / LEARNING OUTCOMES:
At the end of this course, students will be able to:

CO 1: Define the terminologies and features related to database systems and also describe the main functions and benefits of each of the database systems. (Remembering)

CO 2: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. (Understanding)

CO 3: Master sound design principles for the logical design of databases, including the E-R model, EER model, and schema diagrams. (Evaluating)

CO 4: Transform an information model into a relational database schema and use the various types of query languages to implement and use the schema using a DBMS. (Applying)

CO 5: Analyze the concepts used for transaction processing and also the issues and techniques related to concurrency and recovery management. (Analyzing)

Module I (10 hours)
a. Database System – Database, Database System, DBMS, Advantages of using the database system, Functionalities of the database, Data Independence, Data Abstraction
b. Data models - Entity Relationship (ER), Enhanced Entity Relationship (EER), Mapping ER Model to Relational data model, Hierarchical and Network data models, Object Oriented and Object-Relational Data Models

Module II (15 hours)
a. SQL Queries - Relation Query Languages, SQL data types, Data Definition Language (DDL) commands, Data Manipulation Language (DML) commands, Data Retrieval commands, Single-row and Group functions, Multi-table querying (Joins and Subqueries)
b. Query Languages - Relational Algebra, Tuple and Domain Relational Calculus, Relational Database Design: Domain and Data dependency, Armstrong’s Axioms, Normal Forms, Dependency Preservation, Lossless design.

Module III (8 hours)
a. Normalization: Concepts of Normalization and Denormalization, First Normal Form, Second Normal Form, Third Normal Form, Fourth Normal Form, and Fifth Normal Form
b. Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Query Optimization Algorithms

Module IV (12 hours)
b. Advanced topics: Web Databases, Distributed Databases, Data Warehouse, and Data Mining.

Suggested Readings

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CARD209L: RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB
(1 credit – 15 hours) (L-T-P:0-0-1)

Objective
The objectives for this course are to give students an in-depth understanding of the relational model for establishing fundamental skills with SQL and the operation of an RDBMS. The course also provides concepts of data modelling, design and management for solving realistic problems.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Infer database language commands to create simple database
CO 2: Analyze the database using queries to retrieve records
CO 3: Applying PL/SQL for processing database

Module I: SQL Queries (10 hours)
SQL Queries: Data Definition Language (DDL) commands – CREATE, DROP, ALTER and RENAME; Data Manipulation Language (DML) commands – INSERT, UPDATE, and DELETE; Data Retrieval command – SELECT, Single-row Functions – String functions, Numeric Functions, Date-Time Functions, General Functions, Data Type Conversion Functions; Group functions -SUM, AVG, MIN, MAX, COUNT, Multi-table querying (Joins and Subqueries)

Module II: PL/SQL Programming (5 hours)
PL/SQL Programming: PL/SQL Block Structure – DECLARE, BEGIN, END, EXCEPTION, SQL Within PL/SQL, Loops and Decision making statements, Cursor Types – Implicit and Explicit cursors

Suggested Readings

Mapping of COs to Syllabus

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CACN300T: COMPUTER NETWORK FUNDAMENTALS  
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to make the students understand basic terminologies of computer networks along with their types, mode of communication, models, transmission media, connecting devices. It also emphasizes to make the students aware about network security and basic conception of the World Wide Web.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Define the basic concepts of Computer Networks, its goals and network related terminologies. (Remembering)
CO 2: Explain the concepts of Analog and Digital signals, Electromagnetic spectrum and related concepts on various architecture used in computer networks. (Understanding)
CO 3: Experiment with various Networks concepts such as Types of networks, Topologies, Transmission media. (Applying)
CO 4: Comprehend Network Security Devices, Digital Signature and Internet Basics for designing the network with a suitable topology and network types. (Creating)

Module I (15 Hours)
Computer Network: Definition, Goals, Applications, Structure, Components, Topology, Types of Topology, Types of Networks (LAN, MAN, WAN, Internet), Broadcast and Point-To-Point Networks, Communications Types (Synchronous, Asynchronous), Modes of Communication, Topology, Client/Server architecture, Network Models, Design issues of the layer, Protocol Hierarchy, ISO-OSI Reference Model (Functions of each layer), Terminology, SAP, Connection Oriented and connectionless services, Peer Entities, TCP/IP model, Layers, Ports, Protocol Stack, Comparison of ISO-OSI and TCP/IP Model

Module II (15 Hours)

Module III (15 Hours)

Suggested Readings:

Mapping of COs to Syllabus

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CACN301L: COMPUTER NETWORK FUNDAMENTALS LAB  
(2 credits – 30 hours) (L-T-P: 0-0-2)

COURSE / LEARNING OUTCOMES
At the end of this course, students will be able to:
CO 1: Implement various commands and evaluate the significance of socket programming used in networking. (Understanding)
CO 2: Make client-server communication with optimum algorithm and topology. (Creating)
CO 3: Make a distinctive comparison of various routing algorithms to select the optimum network path for data transfer. (Analysing)
List of Experiments
1. Basic Networking Commands and troubleshooting.
2. Introduction and implementation of LAN Trainer for various topologies and protocols simulation.
3. Programs using TCP Sockets (like date and time server and client, echo server and client, file transfer, etc.)
4. Programs using UDP Sockets (like simple DNS, file transfer, etc.)
5. Program to implement Remote Command Execution.
6. Create HTTP socket for web page upload and download.
7. Perform a case study on the following routing algorithms to select the optimum network path for data transfer.
   a. Shortest path routing
   b. Flooding
   c. Distance vector

Mapping of COs to Syllabus

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CAWT302T: WEB TECHNOLOGIES
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The course provides an introduction to the fundamentals and basic requirements of web technologies. After completion of this course, students should be able to design and implement a website on their own by including client-side and server-side technologies.

COURSE / LEARNING OUTCOMES

On successful completion of the course students will be able to:
CO 1: Recall the various Internet related terminologies and examine the history and growth of Internet. (Remembering)
CO 2: Identify and differentiate the various services provided by the internet. (Understanding)
CO 3: Experiment with various mark-up languages and style sheets to design a static website. (Applying)
CO 4: Experiment with various scripting languages to design a dynamic website. (Applying)
CO 5: Develop and create a website using standard tools and technologies. (Creating)

Module I: Basic Internet-related Terms and Static Web Development (13 Hours)
Basics of Internet – History of Internet and WWW, W3C Recommendations, Internet Connectivity (Dial-up, Leased Line, DSL, WiFi, and VSAT); Requirements for Internet Connectivity; Search Engines, Various Internet Services; Web Portal; Different types of browsers (IE, Firefox, Chrome); URLs, Domain names
Static Web Development: Introduction to XHTML; HTML vs. XHTML, XHTML comments; Basic Tags-XHTML, HEAD, TITLE, BODY; Paragraph Tag, Horizontal Rule Tag, Headings Tags, Blockquote Tag, Lists, Linking, Images, Tables, FONT Tag, PRE, DIV and SPAN tags; other different formatting tags; Forms; Frames

Module II: CSS and XML (12 Hours)
Cascading Style Sheets: Types of Style Sheets-Inline, Embedded, and External; CSS Background properties, text and font properties, Use of CSS for positioning elements, Background, and Text flow, CSS Box Model, CSS Borders and Outlines, Style class and Pseudo-class
XML: Introduction to XML; Structuring Data; XML Namespaces; Document Type Definitions and Schemas; XML Parser; Document Object Model; Extensible Stylesheet Language (XSL)

Module III: Website Design Considerations and JavaScript (12 Hours)
Website Design Considerations: Planning to design a website, sitemaps, top-down vs. bottom-up approach, Creating a Compatible website for different color depths, resolutions, and browser considerations
DHTML: Introduction to DHTML and JavaScript, Data types, operators, variables, input and output statements, Built-in functions, Arrays, IF statement, Switch statement, Looping statements, JavaScript Form Validation, Events in JavaScript

Module IV: Web Servers and PHP (8 Hours)
1. Web servers: Need of a web server; System Architecture of a Web server; HTTP Request Types; Client-side Scripting versus Server-side Scripting; Accessing Web servers; Various web servers- Microsoft IIS, Apache, NGINX, LAMP, WAMP
2. PHP: Introduction to PHP; PHP Data Types; Control Structures; Functions; Strings; Arrays
Suggested Readings

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CAWT303L: WEB TECHNOLOGIES LAB
(2 CREDIT - 30 HOURS)

Objective
The course provides an introduction to the fundamentals and basic requirements of web technologies. After completion of this course, students should be able to design and implement a website on their own by including client-side and server-side technologies.

COURSE/LEARNING OUTCOMES
At the end of the experiments, students will be able to
CO 1: Experiment with various mark-up languages and style sheets to design a static web site (Applying)
CO 2: Develop and create a dynamic website using scripting languages. (Creating)
CO 3: Summarize and validate a practical solution towards a web application development and also deploy a website of their own. (Evaluating)

Module I: Static Web Designing (10 Hours)
Web Designing: Creating static websites involving various XHTML elements
Cascading Style Sheets: Designing web pages that use CSS for standard formatting

Module II: Dynamic Web Designing (5 Hours)
JavaScript: Designing websites that use JavaScript for creating interactive web pages
PHP: Designing websites that use PHP as server-side scripting language to connect and access the web server

Suggested Readings

Mapping of COs to Syllabus:

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CASE304T: SOFTWARE ENGINEERING
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
To provide the ability to analyse a scenario and produce a problem statement. The learners will be able to produce a conceptual solution which includes sample prototypes, domain models, and user stories. The learners will be able to describe the attributes and activities involved in software development process models and testing.

COURSE/LEARNING OUTCOMES
At the end of this course, students will be able to:
CO 1: Relate and examine the life cycle models of software. (Remembering)
CO 2: Interpret and differentiate various software life cycle models(Understanding)
CO 3: Experiment with different software architectures and identify the best feasible one (Applying)
CO 4: Analyse and design the software requirement specification and formulate an effort estimation plan (Analysing)
CO 5: Develop and create various design diagrams and find solutions to problems. (Creating)

Module I (15 Hours)

Module II (15 Hours)
Process Models: How software is built. The fundamental design concept for data, architectural and procedural designs, Conceptual solutions, Agile concept and User stories. Domain modeling with UML diagrams-Class diagram, Use cases etc, Object oriented design paradigm; Creation of technical design document, The relationship between design and implementation, Coding the procedural design, Good coding style and review of correctness and readability.

Module III (15 Hours)
Strategies of software testing. Types of testing, functional testing, validation and verifications, Test Case Design, Maintenance as part of software evaluation, techniques and procedures for maintenance, Introduction to configuration Management, The concept of CASE, green engineering.

Suggested Readings:
3. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Syllabus
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CASE305L: SOFTWARE ENGINEERING LAB
(1 Credit – 15 hours) (L-T-P: 0-0-1)

COURSE / LEARNING OUTCOMES
At the end of the Lab experiments students will be able to:
CO 1: Implement the software engineering process to develop any software project and formulate an effort estimation plan. (Understanding)
CO 2: Apply software design patterns. (Applying)
CO 3: Maintain the software project by using maintenance plan. (Creating)

Module I (5 Hours)
Identifying the requirements from problem statements.
Estimation of project metrics. Modelling Data Flow Diagrams

Module II (3 Hours)
Development of User stories.
Identifying domain classes from the problem statements

Module III (7 Hours)
Modeling UML use case diagram & capturing use case scenarios
Class diagram, Activity diagram etc.
Designing test suite and testing.

Suggested Readings:
1.   Lab using IBM RSA tools
2.   Virtual lab Weblink: http://vlabs.iitkgp.ernet.in/se/

Mapping of COs to Syllabus

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CACC306T: CLOUD COMPUTING
(4 credits-60Hours) (L-T-P: 4-0-0)

Objective
This course is designed to enable students
- To get acquaint with the latest computational model, i.e. cloud computing
- To understand the basic foundational elements of cloud computing
- To study details of Data storage in cloud, big data file handling and parallel computing basics
- To get familiarized with popular cloud platforms and applications

COURSE / LEARNING OUTCOMES
On successful completion of the course students will be able to:
CO 1: Recall and identify the various cloud service models. (Remembering)
CO 2: Understand the basic concepts of Big Data and interpret using Hadoop. (Understanding).
CO 3: Identify and relate security issues with respect to cloud environment. (Applying)
CO 4: Analyse the Quality of Service rendered by various cloud service providers. (Analysis)

Module I: Introduction and Cloud Service Models (15 Hours)

Module II: Cloud data handling (18 Hours)
Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The Map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Map-reduce.

Module III: Security Issues (15 Hours)

Module IV: Quality of Service (QoS) in Cloud (12 Hours)
Issues in cloud computing, implementing real-time application over cloud platform, Issues in Inter cloud environments, Dependability, Dita migration, streaming in cloud, Quality of Service (QoS) monitoring in cloud computing environment, taking virtualization into cloud, develop an application on cloud platform and deploy.

Suggested Readings:

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CAAD307T: ANDROID APPLICATION DEVELOPMENT FUNDAMENTALS
(4 credits-60 Hours) (L-T-P: 4-0-0)

Objective
This course is designed to enable students to get a complete understanding of the development of android applications. On completion of this course, students will be able to design, develop, debug and deploy various real-time applications.

COURSE / LEARNING OUTCOMES
CO 1: Interpret the android architecture and configure the development environment (Understanding)
CO 2: Design and build user defined app with different types of menus and views (Applying)
CO 3: Make use of AsyncTask for accomplishing different background task (Applying)
CO 4: Create SQLite database and use views to interact with the database and publishing of application (Creating)

Module I: Get started (10 Hours)

Module II: User experience (13 Hours)

Module III: Working in the background (15 Hours)
Background Tasks: AsyncTask and AsyncTaskLoader, Connect to the Internet, Broadcast Receivers, Services, Triggering, scheduling and optimizing background tasks: Notifications, Scheduling Alarms, Transferring Data Efficiently

Module IV: All about data (22 Hours)
Preferences and Settings: Storing Data, Shared Preferences, App Settings b) Storing data using SQLite: SQLite Primer, SQLite Database, Sharing data with content providers: Share Data Through Content Providers d) Loading data using loaders: Loaders. Permissions, Performance and Security, Firebase and AdMob, Publish

Suggested Readings
3. Slide decks & Videos of lectures for reference provided by Google.

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CANS308T: Network Security
(4 credits – 60 hours) (L-T-P:4-0-0)

Objective
The objective of the course is to learn the network security attacks, system vulnerabilities and strategies that can be deployed to increase the efficiency of the network service.

COURSE / LEARNING OUTCOMES
CO 1: Recall and identify the different security attacks, requirements, mechanisms and services in the practical field. (Remembering)
CO 2: Recognize and summarize the core principles of cryptography and cryptanalysis available today, including symmetric and asymmetric encryption, hashing, and digital signatures. (Understanding)
CO 3: Identify and relate themselves with the different vulnerabilities, a system in a network can have. (Applying)
CO 4: Inference and predict the issues of securing computer and information systems. (Analyzing)
CO 5: Construct how malicious code functions, relate the vulnerabilities that make proliferation possible and rewrite methods and practices available for alleviation. (Creating)

Module 1 (18 hours)
Security Attacks ( Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

Module 2 (18 hours)

Module 3 (12 hours)

Module 4 (12 hours)

Suggested Readings

Mapping of COs to Syllabus

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CAPW309P: MINOR PROJECT
(4 credits – 60 hours) (L-T-P: 0-0-4)

Objective
This course aims to provide the student with various practical knowledge on different problem specific system deployment techniques and analysis.

COURSE / LEARNING OUTCOMES
At the end of the Lab experiments students will be able to:
CO 1: Recall different processes involved in software development life cycle (Remembering).
CO 2: Understanding the problem statement and related literature study (Understanding).
CO 3: Analyse end user requirements for identifying system functionality metrics and decide whether developed system can meet end user requirements. (Analysing)
CO 4: Choose an engineering approach to solving problems, starting from the acquired knowledge to visual interpretation. (Evaluating)
CO 5: Propose the use of certain technologies by implementing them in different programming languages to solve the problem statement (Creating).

Module 1
Feasibility study of the problem statement and solution, evaluation of existing system, finding the limitation of existing system.

Module 2
Literature study, identification of software and hardware requirement, schedule feasibility, economic and operational feasibility, identification software development metrics.

Module 3
Evaluate Design diagrams for solving the problem statement. Identify deployment strategy.

Module 4
Develop algorithms and implement them using programming languages. Resolve and implement the problem statement through proposed software model and system architecture.

Module 5
Prepare a report to highlight the problem statement, design diagram, technologies deployed, and references used to resolve end user’s requirement.

Suggested Readings:
2. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Syllabus

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CAPM400T: PYTHON AND MACHINE LEARNING
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The course is intended to give the students an insight into python programming language and its application extended to machine learning techniques in different problems of applications.

COURSE/LEARNING OUTCOMES
At the end of the Python and Machine Learning Lab students will be able to:
1. Understand python basics, data types, flow controls, sequences and functions. (Remembering).
2. Understand the file operations, function programming, data handling using Python and its libraries. (Understanding).
3. Build machine learning programs for designing self-learning solutions to different problems in the real world. (Applying)
4. Experiment with different learning techniques & parameters and conclude the pros and cons of each with respect to different problem domains. (Analysing)
Module I (15 hours)
Introduction to python, Python basics: Data types and variables, data type conversions, command line argument, data input, Flow control: if, if_elif_else statement, while loop, for loop, break & continue, Python sequences: Range, String, List, Tuple, Dictionary, Set, Shallow and deep copy, Functions and modules: Function, Pass arguments, Arguments with default values and arbitrary arguments, local and global variables, returning single and multiple values from functions, python modules, import statement for importing modules.

Module II (15 hours)
File operations handling: Reading, writing, manipulations, Exception handling: try, except, finally, raise exception, user defined exception, Python class & objects: Constructors, creating objects, Destructors, Inheritance, Overriding, Overloading, Data hiding, Functional programming: Iterators, Generators, lambda construct, Comprehensions, Map reduce and filter. NumPy: selecting data using slicing, numerical processing with multidimensional array, 2D plotting with matplotlib Pandas: Loading from CSV and other structured formats, 1D and 2D data structures-Series and DataFrame, Normalizing data, dealing with missing data.

Module III (15 hours)

Suggested Reading
1. Python Cookbook-by Alex Martelli, Anna Martelli Ravenscroft, and David Ascher
4. Suggested web links: To be provided as and when required for a particular module/topic.

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CAPM401L: PYTHON AND MACHINE LEARNING LAB
(2 Credits – 30 hours) (L-T-P: 0-0-2)

Objective
The course is intended to give students hands-on experience on Python and building machine learning systems using Python.

COURSE/LEARNING OUTCOMES
At the end of the Python and Machine Learning Lab students will be able to:
1. Understand Python basics, data types, flow controls, sequences and functions. (Remembering).
2. Understand the file operations, function programming, data handling using Python and its libraries. (Understanding).
3. Build machine learning programs for designing self-learning solutions to different problems in the real world. (Applying)
4. Experiment with different learning techniques & parameters and conclude the pros and cons of each with respect to different problem domains. (Analysing)

List of Experiments
1. Installation of PyCharm and Jupyter. Making the Machine learning environment ready.
2. Practice of loops, iterators, string operations, file handling and classes in Python.
3. Use of Numpy and Pandas for data reading and preprocessing - standard dataset as an example.
4. Writing program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using the standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

Suggested Reading
1. Python Cookbook—by Alex Martelli, Anna Martelli Ravenscroft, and David Ascher
4. Suggested web links: To be provided as and when required for a particular module/topic.

### Mapping of COs to Syllabus

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### CADA402T: DESIGN AND ANALYSIS OF ALGORITHM
(3 Credits – 45 hours) (L-T-P: 2-1-0)

**Objective**

To create analytical skills, to enable the students to design algorithms for various applications and to Analyse the algorithms with the objective to introduce mathematical aspects, design and analysis of algorithms.

**COURSE / LEARNING OUTCOMES**

At the end of this course students will be able to:

1. Define algorithms, importance of analysis of an algorithm and their asymptotic bounds and relate the different types of problem and their solutions. (Remembering)
2. Explain different design strategies such as brute force, divide and conquer, dynamic programming, greedy and backtracking used for the design of algorithms. (Understanding)
3. Compare and analyse different design strategies of algorithms. (Analysing)
4. Assess various algorithms in terms of correctness, computation cost and memory space used. (Evaluating)

**Module I (11 hours)**


**Module II (12 hours)**


**Module III (12 hours)**


**Module IV (10 hours)**


**Suggested Readings**


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CAD403L: DESIGN AND ANALYSIS OF ALGORITHMS LAB
(2 Credits – 30 hours) (L-T-P: 0-0-2)

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
1. Define algorithms, importance of analysis of an algorithm and their asymptotic bounds and relate the different types of problem and their solutions. (Remembering)
2. Explain different design strategies such as brute force, divide and conquer, dynamic programming, greedy and backtracking used for the design of algorithms. (Understanding)
3. Compare and analyse different design strategies. (Analysing)
4. Assess various algorithms in terms of correctness, computation cost and memory space used. (Evaluating)

List of experiments:
1. Prove that Bubble sort algorithm has time complexity (n^2) by showing the graph notation.
2. Implement the Dynamic programming technique and Analyse the algorithm showing the graph notation.
3. Implement the Greedy programming technique and Analyse the algorithm showing the graph notation.
4. Implement the Divide and Conquer technique and Analyse the algorithm showing the graph notation.
5. Design a small file compressor and decompressor by using Huffman coding technique

Suggested Readings

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CADS404T: DATA SCIENCE
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to introduce to the students the fundamental concepts, tools and techniques needed for dealing with various facets of Data Science practice. Being a data scientist mainly requires an integrated skill set such as mathematics, statistics, machine learning, databases, deep learning, along with other branches of computer science. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.

COURSE / LEARNING OUTCOMES
At the end of this course, students will demonstrate the ability to:
1. Understand the basic concepts and technologies related to Data Science. (Understanding)
2. Interpret data findings effectively to any audience, orally, visually, and in written formats. (Understanding)
3. Obtain, clean/process, and transform data and analyze the transformed data using an ethically responsible approach (Applying and Analyzing)
4. Apply statistical analysis, machine learning and/or deep learning tools and methodologies to solve data science tasks. (Remembering)
5. Formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges (Creating)

Module I: Introduction to Data Science, Preprocessing, and Data Visualization (12 Hours)
Introduction to Data Science and Data Preprocessing: Why Learn Data Science, Data Analytics Life Cycle, Types of Data Analysis, Introduction to Data Preprocessing, Data Types and Forms, Possible Data Error Types, Various Data Preprocessing Operations.
Data Plotting and Visualization: Introduction to Data Visualization, Basic Data Visualization Tools - Histograms, Bar Charts, Scatter Plots, Line Charts, Pie Charts, Box Plots, Bubble Plots, Heat Map; Advanced Data Visualization Tools - Wordclouds, Waffle Charts, Choropleth Map
Module II: Machine Learning and Deep Learning (20 Hours)

**Machine Learning for Data Science:** Overview of Machine Learning, Types of Machine Learning, Regression Methods (linear and logistic), KNN Classification, K-means Clustering

**Deep Learning for Data Science:** Introduction to TensorFlow, Pytorch, Deep Learning Primitives, Activation Functions, Artificial Neural Network, Convolutional Neural Network

Module III: Statistical Data Analysis and Business Analytics (13 Hours)

**Statistical Data Analysis:** Role of Statistics in Data Science, Kinds of Statistics, Descriptive Statistics (Measures of Frequency, Central Tendency, Dispersion, and Position), z-Test, Probability Theory

**Business Analytics:** An Overview of Business Analytics, The Business Analytics Life Cycle, Basic Tools Used in Business Analytics, Customer Analytics, and Employee Analytics

Suggested Readings

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**CADS405L: DATA SCIENCE LAB**
(2 credits – 30 hours) (L-T-P: 0-0-2)

Objective

*The objective of this course is to make the students learn to extract valuable information for use in strategic decision making, product development, trend analysis, and forecasting. Through the practical approaches, quantitative modeling and data analysis techniques can be applied to find the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques. This course will thoroughly introduce students to the rapidly growing field of Data Science and equip them with some of its basic principles and tools for data analysis and decision making.*

COURSE / LEARNING OUTCOMES

At the end of this course students will be able to:
1. Apply data visualisation for presenting the output after an in-depth analysis of the given problem
2. Utilise data preprocessing techniques to prepare data for further analysis
3. Apply standard machine learning and deep learning algorithms to solve real-life problems

Module I: Introduction to Data Preprocessing, and Data Visualization (15 Hours)

**Data Preprocessing Operations using Python** - Data Cleaning, Data Integration, Data Transformation, Data Reduction, and Data Discretization

**Data Plotting and Visualization** – Plotting Basic Data Visualization Tools - Histograms, Bar Charts, Scatter Plots, Line Charts, Pie Charts, Box Plots, Bubble Plots, Heat Map; Advanced Data Visualization Tools - Wordclouds, Waffle Charts, Choropleth Map

Module II: Statistical Data Analysis, Machine Learning and Deep Learning (25 Hours)

**Statistical Data Analysis using Python:** Applying Descriptive Statistics (Measures of Frequency, Central Tendency, Dispersion, and Position), z-Test, Bayesian Probability

**Machine Learning and Deep Learning using Python:** Applying linear and logistic regression, KNN Classification, K-means Clustering, Artificial Neural Network, Convolutional Neural Network

Suggested Readings
CAOR406T: OPERATIONS RESEARCH
(5 credits - 75 hours) (L-T-P: 5-0-0)

Objective
Operations Research can be described as a scientific approach to the solution of problems in the management of complex systems. In a rapidly changing environment, an understanding is sought which will facilitate the choice and the implementation of more effective solutions which, typically, may involve complex interactions among people, materials and money.

Module I: Introduction to Linear Programming (20 hours)
Introduction to linear programming - formulation, graphical method, Simplex method and its applications, initial feasible solution, optimality test, Big M method and Two-Phase method.

Module II: Special Topics in Linear Programming (19 hours)
Duality in linear programming, the dual simplex method, the revised simplex method, sensitivity analysis of linear programming, Goal programming, and Integer programming.

Module III: The Transportation Model and The Assignment Model (18 hours)
a. Formulation and solution of Transportation Model, North-west Corner method, Vogel’s approximation method, stepping stone method, modified distribution method, degeneracy in Transportation problem, least me transportation problems,
b. Mathematical representation and solution of assignment model, Hungarian method.

Module IV: Sequencing Problem, Replacement Analysis and Queueing Model (18 hours)
Assumptions in sequencing problem, processing of n jobs through one machine, two machines and three machines, processing of two jobs through m machines. Replacement of items whose maintenance and repair cost increase with me, i) ignoring changes in the value of money, ii) value of money changes with me; replacement of items that fail suddenly. Introduction to Queueing Model.

Suggested Readings
1. C. Mohan, “Optimization Techniques” New Age
4. Taha “ Operation Research an introduction” Pearson
7. Pablo Pedvegal “Introduction to Optimisation” New Age.

Mapping of COs to Syllabus:

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## MINOR COURSES

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**CALE104T: CYBER LAW AND ETHICS**  
(4 credits – 60 hours) (L-T-P: 4-D-O)

**Objective**  
The course aims to learn about the different cyber threats, law and ethics that are associated with cyberspace.

**COURSE/LEARNING OUTCOMES:**  
At the end of the course, students will be able to:  
CO 1: Identify knowledge related to the constitution and its legal issues in cyberspace. (Remembering)  
CO 2: Explain the different cybercrimes, and the related cyber laws. (Understanding)  
CO 3: Demonstrate the different perspectives of professional ethics and responsibilities of engineers. (Understand)  
CO 4: Illustrate the concepts behind Cyber Torts, Intellectual Property Rights and describe the concepts in connection to dispute resolution in cyberspace. (Analyzing)

**Module I (14 Hours)**  

**Module II (18 Hours)**  
Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000, Internet Censorship. Cybercrimes and enforcement agencies, Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal...
Ethics. Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of Ethics as defined in the website of Institution of Engineers (India): Profession, Professionalism, and Professional Responsibility. Clash of Ethics, Conflicts of Interest. Responsibilities in Engineering Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering

Module III (14 Hours)

Module IV (14 Hours)

Suggested Readings
2. Constitution of India, Professional Ethics and Human Rights Shubham Singles, Charles E. Haries, and et al Cengage Learning India 2018

Mapping of COs to Syllabus

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CAET105T: E-COMMERCE TECHNOLOGY
(4 CREDITS- 60 HOURS) (L-T-P: 4-0-0)

Objectives
To enable the student to become familiar with the mechanism for conducting business transactions through electronic means, buildup knowledge on electronic business, online marketing and make the students to devise marketing strategies for concerns engaged in ecommerce and understand the current status of e-business.

COURSE/LEARNING OUTCOMES:
After learning this course, the students will be able to:
CO 1: Interpret the basic concepts and technologies used in the field of E-Commerce. (Remembering)
CO 2: Explain the different regulatory provisions relating to E-Commerce. (Understanding)
CO 3: Develop processes of developing and implementing information systems. (Applying)
CO 4: Define the ethical, social, and security issues of information systems. (Analysing)
CO 5: Evaluate the various online business transactions (Evaluating)

Module I: Introduction (12 Hours)
E – Commerce: Meaning, definition, features, functions of E-Commerce, Scope, Benefits and limitations of E-Commerce – The Internet and India – E-commerce opportunities and challenges for IndustriesTechnology used in E-commerce: The dynamics of world wide web and internet (meaning, evolution and features); Designing, building and launching e-commerce website (A systematic approach involving decisions regarding selection of hardware, software, outsourcing vs. in-house development of a website)

Module II: Electronic Data Interchange (12 Hours)
Module III: E-payment System (12 Hours)
E-payment Systems: Digital payment Requirements, Digital Token-based E-payment systems, Benefits to Buyers, Benefits to Sellers, Credit card as E-payment system, Mobile payments, smart card cash payment system, Micropayment system, E-Cash, Risk and e-Payment Systems, Designing e-Payment Systems, E-Retailing, E services.


Module IV: Security and Encryption: (12 Hours)

Module V: IT Act 2000 and Cyber Crimes (12 Hours)
IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes

Suggested Readings
1. Joseph P. T., E-Commerce – An Indian Perspective
5. Joseph P T, E-Commerce: An Indian Perspective, PHILearning
8. Madan Sushila, E-Commerce, Taxmann

Mapping of COs to Syllabus

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CAER210T: ENTERPRISE RESOURCE PLANNING
(4 CREDITS – 60 HOURS) (L-T-P: 4-0-0)

Objective
To help the student understand the conceptual elements of ERP and its theory and implementation. This is especially poignant in view of large number of organizations implementing ERP applications in recent years. The student will appreciate the impact that ERP brings into the daily operations of firms with respect to their productivity, integration, communication, etc.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Recall the conceptual elements of ERP. (Remembering)
CO 2: Demonstrate the influence of ERP in Large Organizations. (Understanding)
CO 3: Identify the impact of ERP into the daily operations of firms with respect to their productivity, integration, communication etc. (Applying)
CO 4: Analyse the practical side of ERP implementation with different vendors. (Analysing)
CO 5: Discuss and evaluate the best practices of ERP with various case studies and real time examples. (Creating, Evaluating)

Module I: ERP Basics (15 hours)
Evolution and structure of ERP, ERP concepts, growth of the ERP market, conceptual model of ERP, 2-tier and 3-tier architecture, elements in ERP architecture, advantages/benefits of ERP, overview of an enterprise, integrated management information, business modelling, integrated data model ERP and related technologies: Business Process Reengineering (BPR), Management Information Systems (MIS), Decision Support Systems (DSS), Data Warehousing, Data Mining, Online Analytical Processing (OLAP), Supply Chain Management.
Module II: ERP Modules (10 hours)
Item types in ERP, Manufacturing, distribution and Financial requirements, item control module in ERP, Finance module, Manufacturing and Production Planning module, Sales and Distribution module, Plant Maintenance module, Quality Management module, Materials Management module, Capital Requirement Planning module, Purchase Control module, Human Resources modules; concept of Bill of materials, concept of formula management.

Module III: Profiling ERP Vendors (10 hours)
PeopleSoft: Accounting and control, Treasury Management, Performance Management, Sales and Logistics, Procurement.

Module IV: ERP Implementation Lifecycle (10 hours)
Elements of implementation methodology, Pre-evaluation Screening, Package evaluation, project planning phase, Gap Analysis, Business Process Re-engineering, configuration, Implementation team training, testing, product migration and support, Problems in ERP implementation, cost of ERP.

Module V Best Practices in ERP (15 hours)
Concept of Best Practices, concept of Customer Order Decoupling Point (CODP), Demand Management – Sales and Operations Planning, ERP scenario in India, future directions in ERP. Case studies should also be introduced to highlight situations where ERP projects are implemented, and the success stories/benefits/difficulties of these implementations.

Suggested Readings
5. Kent Sandoe, Enterprise Integration, John Wiley and Sons

Mapping of COs to Modules

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CAWD211T: BASICS OF WEB DESIGNING
(3 Credit – 45 Hours) (L-T-P: 3-0-0)

Objective
The objective of the course is to familiarize the students with a discussion on Internet and its growth. It also provides the students a study on the basic services provided by the Internet. A familiarization on the markup languages and scripting language are also being discussed to make the student competent to design websites.

COURSE/LEARNING OUTCOMES
On successful completion of the course students will be able to:
CO 1: Recall the various Internet related terminologies and examine the history and growth of Internet. (Remembering)
CO 2: Identify and differentiate the various services provided by the internet. (Understanding)
CO 3: Experiment with various mark-up languages and style sheets to design a static website. (Applying)
CO 4: Experiment with various scripting languages to design a dynamic website. (Applying)
CO 5: Develop and create a website using standard tools and technologies. (Creating)

Module I: Basics of Internet and XHTML (15 Hours)
Basics of Internet: History of the Internet and the World Wide Web; W3C; Levels of Internet Connectivity; Requirements for Internet Connectivity; Search Engines, Various Internet Services, Web Portal; Different types of browsers; URLs, Domain names, HTTP and URL
XHTML: Basic HTML Tags – html, head, title, body, paragraph, headings, horizontal, break, image, table, lists, links, and forms. Introduction to XHTML; HTML vs. XHTML, XHTML comments;
Module II: Cascading Style Sheets and JavaScript (18 Hours)

Cascading Style Sheets: Types of Style Sheets - Inline, Embedded, and External; CSS Text properties, font properties, and Background properties; CSS Borders and Outlines, CSS Box Model, Style class and Pseudo-class

JavaScript: Client-side scripting, Introduction to JavaScript, Simple JavaScript code, JavaScript variables, functions, conditions and loops

Module III: Website Design Considerations and Web Servers (12 Hours)

Website Design Considerations: Planning to design a website, use of sitemaps, Creating a compatible website for different color depths, resolutions, and browser considerations, validating a website

Web servers: Need of a web server; System Architecture of a Web server; HTTP Request Types; Client-side Scripting versus Server-side Scripting; Accessing Web servers; Various web servers- Microsoft IIS, Apache, NGINX, LAMP, WAMP, MAMP, XAMPP

Suggested Readings
1. Steven Holzner，“HTML Black Book”，Dremtech Press
2. Web Technologies, Black Book, Dreamtech Press
4. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson

Mapping of COs to Modules

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CAWR212L: BASICS OF WEB DESIGNING LAB
(1 Credit - 15 Hours) (L-T-P: 0-0-1)

Objective
The course provides an introduction to the fundamentals and basic requirements of web technologies. After completion of this course, students should be able to design and implement a website on their own by including client-side and server-side technologies.

COURSE/LEARNING OUTCOMES
At the end of the experiments, students will be able to
CO 1: Experiment with various mark-up languages and style sheets to design a static web site (Applying)
CO 2: Develop and create a dynamic website using scripting language. (Creating)
CO 3: Summarize and validate a practical solution towards a web application development and also deploy a website of their own. (Evaluating)

Module I: Static Web Designing (10 Hours)
Web Designing: Creating static websites involving various XHTML elements.
Using Style Sheets: Designing web pages that use CSS for standard formatting

Module II: Dynamic Web Designing (5 Hours)
JavaScript: Designing websites that use JavaScript for creating interactive web pages

Suggested Readings
CAPT310T: BASICS OF PYTHON
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective:
The objective of the course is to provide learners with a solid foundation in the fundamentals of the Python programming language. The course aims to equip students with the knowledge and skills necessary to write simple Python programs and understand the core concepts and principles of Python programming.

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Learn the syntax, semantics and OOP concepts of Python Programming Language.
CO 2: Comprehend the flow control logic in Python
CO 3: Use Python functions to facilitate code reuse and manipulate strings.
CO 4: Illustrate the process of exception handling, structuring the data using lists, tuples and dictionaries.

Module I: Introduction to Python (8 hours)
What is Python? and history of Python, Unique features of Python, Install Python and Environment Setup, Python Identifiers, Keywords and Indentation, Comments and document interlude in Python, Command line arguments, Getting User Input, Python Data Types, variables

Module II: Control Statements (8 hours)
if-else, if-elif-else, while loop, for loop, break, continue, assert, pass, return
List, Ranges & Tuples in Python
Lists in Python, Understanding Iterators, Generators, Comprehensions and Lambda Expressions, Generators and Yield, Next and Ranges, Understanding and using Ranges, Ordered Sets with tuples
Python Dictionaries and Sets
Introduction to the section, Python Dictionaries, More on Dictionaries, Sets, Python Sets Examples

Module III: Input and Output in Python (8 hours)
Reading and writing text files, writing Text Files, appending to Files and Challenge, Writing Binary Files Manually, Using Pickle to Write Binary Files
Python built in function, Python user defined functions, Python packages functions, Defining and calling Function, The anonymous Functions, Loops and statement in Python, Python Modules & Packages

Module IV: OOP concept in Python (6 hours)
Overview of OOP, The self-variable, Constructor, Namespaces, Creating Classes and Objects, Inheritance, Types of Methods, Instance Methods, Static Methods, Class Methods, Accessing attributes, Built-In Class Attributes, Destroying Objects, Abstract classes and Interfaces, Abstract Methods and Abstract class, Interface in Python, Abstract classes and Interfaces

Suggested Readings

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CAPT311L: BASICS OF PYTHON LAB
(2 Credits- 30 Hours) (L-T-P: 0-0-2)

Objective
The objective of the course is to provide learners with a solid foundation in the practical knowledge of Python programming language. The course aims to equip students with the knowledge and skills necessary to write simple Python programs and understand the core concepts and principles of Python programming.

COURSE / LEARNING OUTCOMES
At the end of the lab experiments, students will be able to learn
CO 1: Writing programs in python, Understanding the basic structure of Python programming.
CO 2: Understanding the built-in libraries
CO 3: Implementing the concepts of OOPs in Python

Lists of experiments:
1. if-else, if-elif-else, while loop, for loop, break, continue, assert, pass, return
2. List, Ranges & Tuples in Python
3. Python Dictionaries and Sets
4. Reading and writing text files, writing Text Files, appending to Files and Challenge, Writing Binary Files Manually, Using Pickle to Write Binary Files
5. Constructor, Namespaces, Creating Classes and Objects

Suggested Readings

Mapping of COs to Syllabus

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CABS312T: BUSINESS STATISTICS
(4 Credit – 60 Hours) (L-T-P: 2-0-0)

COURSE / LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Recall the key terminology, concepts tools and techniques used in business statistical analysis (Remembering)
CO 2: Understand the use of Graph Theory, Probability and Time-series analysis for management decisions. (Understanding)
CO 3: Apply differential and inferential statistics to solve problems related to statistical analysis (Applying)
CO 4: Apply correlation and regression analysis to solve problems related to statistical analysis (Applying)

Objectives
The main objective of this course is to familiarize the students with basic concepts of Statistics in Business and an in-depth learning of the various statistical techniques. The aim of this course is to impart knowledge to students to improve their logical reasoning ability and interpretation of various business results. The course makes an effort to acquaint the students with the emerging issues in business, trade, and commerce regarding analyzing business facts.

Unit I: Introduction to Statistics, Frequency Distribution, and Graphs (12 Hours)
Introduction to Statistics: Statistics as a Subject of Study, Information and Data, Census data vs. Sample data, Methods of statistical data collection, Statistical Variables: Qualitative and Quantitative
Frequency Distribution and Graphs: Frequency, Stem and Leaf Display, Frequency Distributions, Data Grouping - Discrete and Continuous, Introduction to Graphs, Graph for Qualitative variables, Graph for Quantitative variables, Various types of graphs and diagrams: pictographs, bar diagram, scatter diagram, histogram, pie chart, frequency curve and frequency polygon
Unit II: Descriptive and Inferential Statistics (18 Hours)

**Descriptive Statistics:** Measures of Central Tendency (Median, Mode, Arithmetic Mean, Geometric Mean, Harmonic Mean), Measures of Dispersion, Range, Co-efficient of Range, Quartiles, Inter-Quartile Range and Quartile Deviation, Standard Deviation, Skewness and Kurtosis; Co-efficient of Skewness: Karl Pearson’s Coefficient

**Inferential Statistics:** Hypothesis Testing, Parametric vs. Non-Parametric tests, Parametric Tests (z-test, t-test, Chi-Square test, and F-test)

Unit III: Correlation and Regression Analysis (15 Hours)

**Correlation Analysis:** Introduction to Correlation, Karl Pearson’s product moment Co-efficient of Correlation, Positive, negative and zero correlation, Correlation through Scatter diagrams, Interpretation of Correlation Co-efficient, Simple and Multiple Correlation;

**Regression Analysis:** Regression and the criterion for the Line of Best Fit, Linear Regression, Logistic Regression, Polynomial Regression

Unit IV: Probability and Probability Distributions (15 Hours)

**Probability and Probability Distributions:** Sample space and Events, Simple and Compound Events, Probability and Probability distributions: Normal Distribution, Binomial and Poisson Distribution

**Time-Series Analysis:** Definition, Overview of Time-Series Analysis, Components of Time-Series, Time-Series Forecasting Models using Stochastic Models (AR, MA, ARMA and ARIMA)

Recommended Books:

Mapping of COs to Modules

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**CAAI407T: INTRODUCTION TO ARTIFICIAL INTELLIGENCE (L-T-P: 3-0-0)**

(3 credits- 45 hours) (L-T-P: 3-0-0)

**Objective**

The course aims to familiarise the students with concepts of Artificial Intelligence, search techniques and knowledge representation issues. This course also aims to equip the students with knowledge of fuzzy logic and its uses for artificial intelligence, game playing and natural language processing.

**COURSE / LEARNING OUTCOMES**

At the end of the lab experiments, students will be able to learn

CO 1: Define artificial intelligence and the different techniques of artificial intelligence. (Remembering)

CO 2: Understand the components of AI agents and different problem-solving techniques, various applications of AI techniques in intelligent agents, expert systems, and artificial neural networks. (Understanding)

CO 3: Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation, and learning. (Applying)

CO 4: Analyze and examine the different approaches to Knowledge Representation, reasoning, problem-solving etc. (Analyzing)

**Module I (15 Hours)**

What is AI (Artificial Intelligence)? The foundation of AI problems, the history of AI, the underlying Assumption, and AI techniques Intelligent Agents: Agents and Environments, nature of environments, the structure of Agents Problem-solving Agents, State Space Search & Heuristic Search Techniques, Local Search and Optimization, Adversarial Search, Constrained Satisfaction Problem.

**Module II (12 Hours)**


Module III (10 Hours)

Module IV (8 Hours)

Suggested Readings

Mapping of COs to Modules

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CARM408T: RESEARCH METHODOLOGY
(2 CREDITS-30 HOURS) (L-T-P: 2-0-0)

Objective
This course is designed to provide students with the necessary skills and knowledge to determine the information necessary to address an identified research problem (basic or applied) and, using this understanding, develop and use an actionable research proposal. In this process, the students will gain an understanding of relevant approaches and elements of undertaking a research enquiry specifically to provide insights into solving a relevant problem.

COURSE/LEARNING OUTCOMES
At the end of the course students will be able to:
CO 1: Define and tell why research and its methodology are important. (Remembering)
CO 2: Explain the use of methodology in understanding the process of research. (Understanding)
CO 3: Identify the sources of data and apply various data collecting and sampling techniques. (Applying)
CO 4: Justify the use of data preprocessing techniques before analysing data. (Evaluating)
CO 5: Apply statistical analysis to classify, analyse and draw inferences from data. (Analysing/Applying)

Module I: Introduction to Research (15 Hours)
Concept and nature, objectives, criteria of a good research, types of research; features of a good research design; research problem: definition, Components, selection and formulation of research problem; preparation and presentation of research proposal; types of data, methods of data collection; sampling process; determination of sample size; Report Writing: Essentials of report writing, report format

Module II: Processing and Analysis of Data (15 Hours)

Suggested Readings
1. Kothari C.R , Research Methodology: Methods and Techniques, New Age International,
4. Saunders M , Philip Lewis and Adrian Thornhill, Research Methodology for business students, Pearson Education
Mapping of COs to Modules

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CADV409T: DATA VISUALIZATION
(3 Credits – 45 hours) (L-T-P: 3-1-0)

Objectives:
- Develop skills to both design and visualizations.
- Understand visualization for correlation analysis, distribution analysis and multivariate analysis.
- Understand the components involved in visualization design.
- Understand the type of data impacts the type of visualization.

COURSE/LEARNING OUTCOMES
On successful completion of the course students will be able to:
CO 1: Develop familiarity with the design process to develop visualization methods and visualization systems. (Remembering)
CO 2: Understand the fundamental design principles and different types of data visualization. (Understanding)
CO 3: Apply existing visualization tools and techniques to analyze basic datasets. (Applying)
CO 4: Design and develop various data visualization methods for a given problem. (Creating)

Module I (10 hours)

Module II (10 hours)
Basic Plotting - Line plot, Bar plot, Pie Chart, Scatter Plot, Histogram, Stacked Bar Charts, Sub Plots, Matplotlib, Seaborn, Plotly, Seaborn Styles. Applied Visualizations - Box plot, Density Plot, Area Chart, Heat map, Tree map, Graph Networks. Interactive Visualizations and Animation - Dynamic charts, Dynamic maps, Animation types- 2D, 3D, Motion Animation, Animation Principles, Altair Package, Statistical Visualizations.

Module III (13 hours)
Distribution analysis, describing distributions, distribution patterns, distribution displays, distribution analysis best practices, correlation analysis, describing correlations, correlation patterns, correlation displays, correlation analysis techniques and best practices, multivariate analysis, multivariate patterns, multivariate displays, multivariate analysis techniques and best practices.

Module IV (12 hours)

Suggested Readings:
2. Claus O. Wilke, Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, O’Reilly, 2019
SKILL ENHANCEMENT COURSES

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<td>Computer Fundamentals</td>
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<td>Hardware and Server Maintenance</td>
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<td>CAMG313L</td>
<td>Multimedia and Graphics</td>
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CACF106L: COMPUTER FUNDAMENTALS
(3 credits – 45 hours) (L-T-P:0-0-3)

COURSE OUTCOMES
CO 1: List the various Unix commands and explain their usage. (Remembering and Understanding)
CO 2: Make use of word processor, power point presentation, to create personal, academic and business documents following current professional and industry standards. (Applying)
CO 3: Design spreadsheets to perform calculations, display data, conduct analysis, and explore what-if scenarios. Design professional reports and presentations required for official work (Creating)

Module I: Word Processing
a) Word Processing Basics: introduction to office software; introduction to word processing software; features and area of use; menus and commands; toolbars and buttons; shortcut menus, wizards and templates; creating a new document; different page views and layouts; applying various text enhancements; working with styles, text attributes; paragraph and page formatting; text editing using various features; bullets, numbering, auto formatting, printing and various print options
b) Advanced word processing features: spell check, thesaurus, find and replace; headers and footers; inserting - page numbers, pictures, files, auto texts, symbols etc.; working with columns, tabs and indents; creation and working with tables including conversion to and from text; margins and space management in document; adding references and graphics; mail merge, envelopes and mailing labels. importing and exporting to and from various formats.

Module II: Spreadsheet
Introduction and area of use; concepts of workbook and worksheets; using wizards; various data types; using different features with data, cell and texts; inserting, removing, and resizing columns and rows; working with data and ranges; different views of worksheets; column freezing, labels, hiding, splitting, etc.; using different features with data and text; use of formulas, calculations, and functions; cell formatting, including borders and shading; working with different chart types; printing of workbook and worksheets with various options.

Module III: Presentation
Introduction and area of use; creating a new presentation; working with presentation; using wizards; slides and its different views; inserting, deleting and copying of slides; working with notes, handouts, columns and lists; adding graphics, sounds and movies to a slide; working with objects; designing and presentation of a slide show; printing presentations, notes, handouts with print options.

Module IV: UNIX Commands
Basic Unix commands (log in, create/delete files/directories, listing files/directories, changing permission of files/directories etc.), file related commands, process related commands, i/o redirection and piping, vi editor, gedit

Suggested Readings
1. Manuals of the Office Software
2. A. Mansoor, I.T. Tools and Applications, Pragya Publications, Matura
3. Yashwant Kanetkar, UNIX Shell Programming

Mapping of COs to Syllabus

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CAHS213L: HARDWARE AND SERVER MAINTENANCE
(3 credits – 45 hours) (L-T-P:0-1-2)

COURSE/LEARNING OUTCOMES:
CO 1: To understand the different components of computer hardware and their functions.
CO 2: To be able to identify and explain the various types of servers and their uses and to appreciate the importance of hardware and server maintenance in ensuring the smooth operation of computer systems.
CO 3: To learn basic hardware components and be able to install and configure operating systems on servers and monitor the performance of servers and tune them for optimal performance.
CO 4: To understand data backup and disaster recovery procedures and implement them effectively and learn about server virtualization, cloud computing, and high availability.

Module I: Introduction to Hardware and Server Maintenance: (5 hours)
Overview of computer hardware components, Types of servers and their uses, Importance of hardware and server maintenance

Module II: Basic Computer Hardware Components: (10 hours)
Processor and memory, Motherboard and BIOS, Power supply and cooling, Hard drives and solid-state drives, Input/Output (I/O) devices

Module III: Servers: (15 hours)
Web servers, Database servers, File servers, Mail servers, Virtual servers. Operating system installation and configuration, Network configuration, Security updates and patches, Performance monitoring and tuning, Data backup and disaster recovery

Module IV: Advanced Topics in Hardware and Server Maintenance (20 hours)
Server virtualization, Cloud computing, High availability and redundancy, Storage area networks (SAN), Network-attached storage (NAS) Documentation and asset management, Preventive maintenance, Disaster planning and recovery, Compliance and regulatory requirements

Module V: Practical, Case Studies and Hands-On Labs (10 hours)
• Hands-on experience with hardware and server maintenance tasks
• Case studies of real-world hardware and server maintenance scenarios
• Independent research on a topic related to hardware and server maintenance
• Presentation of findings and recommendations

Suggested Reading:
1. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy
2. "Operating System Concepts" by Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne
3. "Essential System Administration: Tools and Techniques for Linux and Unix Administration" by AEleen Frisch
5. "Linux Server Hacks: 100 Industrial-Strength Tips and Tools" by Nicholas D. Wells
6. "Data Center Fundamentals" by José Manuel Moreno Pérez and Jorge Bañuelos García
9. "The Cloud Adoption Playbook: Proven Strategies for Transforming Your Organization with the Cloud" by Ryan O'Hara

Mapping of COs to Syllabus

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CAMG313L: MULTIMEDIA AND GRAPHICS
(3 Credits – 45 Hours) (L-T-P:0-0-3)

Objective
This course will introduce the students to relevant modules of multimedia and graphics using technical education tools. The course is designed to build up opportunities to understand graphic design, illustration, image manipulation, video editing, and
visual effects and experiment with the creativity and conceptualizing ability designing trends as solutions for representation of different aspects of social interaction.

COURSE/LEARNING OUTCOMES

CO 1: List the feature of multimedia tools for representation of design aspects (Remembering)

CO 2: Explain the technique for multimedia design for content development. (Understanding)

CO 3: Experiment with different editing process to solve problem statement. (Applying)

CO 4: Design prototype to represent any real-life scenario using multimedia techniques. (Creating)

Module I (15 hours):
Text, Font, Faces, animating Text, hyper text, sound – MIDI, audio editing, digitization of sound, audio filtering

Module II (15 hours):
Modelling, Lighting & Texturing, Character Rigging, Movie Merchandising, Video Editing & Compositing,

Module III (15 hours):
Portfolio Developments, Matte Painting, GNU Image Manipulation Program (GIMP)

Suggested Reading:
1. Fazreil Amreen, Instant GIMP Starter, PACKT Publishing
2. Jan Smith, Roman Joos GIMP for Absolute Beginners, Apress

Mapping of Cos to Syllabus:

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### INTERNSHIPS

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CAIN107I/ CAIN108I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 Credits: 120 hours)

CAIN314I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits-60 Hours)

**Objectives**
The Summer Internship gives students an opportunity to apply the theories and principles that they have learnt in classroom courses to real-life industry work situations. During the internship, students can explore career interests, develop professional skills, learn how community organizations work and expand their clinical and interpersonal skills.

**COURSE/ LEARNING OUTCOMES**
At the end of the internship, students will be able to:
CO 1: Relate theory and practical with real life examples. (Remembering)
CO 2: Explain the technical processes involved in the industry. (Understanding)
CO 3: Identify the importance of learning the computer technology. (Applying)
CO 4: Analyse application of computer technology into the practical field. (Analysing)
CO 5: Discuss the actual technological advancements in the industry. (Creating)

**GUIDELINES:**
The students should follow the following instruction and guidelines during the course of the internship:
- The internship should be for a minimum duration of 80 hours which can be extended up to any limit depending upon the convenience and requirement of the student and the organisation respectively.
- The students have to undergo the internship during the Summer/Winter Break.
- The students can undergo an internship at any organisation which is recognised or registered, as applicable, of their choice but the work must be related to computer technology.
- After the completion of the internship, the students must submit the Internship Report which should include the Internship Diary as an Annexure to the Report. The format of the Internship Report and Internship Diary should be in accordance with the one prescribed by the Department.
- There would be a Seminar Presentation (PPT) and Viva-Voce Examination based on which the students would be evaluated for the internship. The Internship report would also be a part of the evaluation.

**STRUCTURE OF INTERNSHIP**
The Internship Report must comprise the following:
a. Recommendation Letter from the Department.
b. Completion Certificate from the Organisation where the student has worked as an intern.
c. Internship Diary as per the prescribed format.
d. Organisation details (Address, E-mail, Contact Number) including name, contact number and e-mail of the supervisor is mandatory. This should be included as a part of the Internship Diary according to the prescribed format.

The Contents of the Report must include:
a. Introduction.
b. Objectives of the Internship.
c. About the Organisation (Sector, Activities, Operations).
d. Description of the work.
e. Learning Outcomes.

The Assessment for the internship must have the following components:
- Internship Report: 20 Marks
- Internship Diary: 20 Marks
- Seminar Presentation: 30 Marks
- Viva-Voce Examination: 30 Mark
BCA (Honours) with Research

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<td>8</td>
<td>Research Project/Dissertation</td>
<td>CADI411P</td>
<td>Dissertation Phase II</td>
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BCA (Honours)

CADI410P: DISSERTATION-I
(6 credits – 180 hours) (L-T-P: 0-0-6)

Objective
This course aims to provide the student with various practical and research based knowledge on different problem specific statement, system deployment techniques and analysis.

COURSE / LEARNING OUTCOMES
At the end of the research project students will be able to:

1. Recall different process involved in software development life cycle (Remembering).
2. Understanding the research problem statement and related literature study (Understanding).
3. Analyse end user requirements for identifying system functionality metrics and decide whether developed system can solve the research problem. (Analysing)
4. Choose an engineering approach to solving problems, starting from the acquired knowledge to visual interpretation. (Evaluating)
5. Propose the use of certain technologies by implementing them in different programming languages to solve the research problem statement (Creating).

Module I: (12 hours)
Research methodology and types, Identification of research problem statement, finding the limitation of existing system

Module II: (12 hours)
Literature study, Identification of software and hardware requirement, schedule feasibility, economic and operational feasibility, identification software development metrics, Identification of development platform, planning for experimental arrangement

Module III: (8 hours)
Prepare Design diagrams/flowchart etc. (as applicable), Identify deployment strategy, identify probable outcome and observation.

Module IV: (15 hours)
Resolve and Implement the problem statement through proposed software model and system architecture. Write a paper based on overall evaluation and findings during case studies / research project activities.

Module V: (13 hours)
Prepare a report to highlight the problem statement, design diagram, technologies deployed and references used to resolve end users requirement. Submit a research paper for participation in national/international conferences for a peer review by external editorial committee.

Suggested Readings:
3. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Syllabus

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CADI411P: DISSERTATION-II

(6 credits – 180 hours) (L-T-P: 0-0-6)

Objective
This course aims to provide the student with various practical and research-based knowledge on different problem-specific statements, system deployment techniques, and analysis.

COURSE / LEARNING OUTCOMES
At the end of the research project, students will be able to:
1. Understanding the research problem statement and related literature study (Understanding).
2. Analyse end-user requirements for identifying system functionality metrics and decide whether the developed system can solve the research problem. (Analysing)
3. Choose an engineering approach to solving problems, starting from the acquired knowledge to visual interpretation. (Evaluating)
4. Solve problems using standard algorithms along with the presentation of probable findings and recommendations (Applying)
5. Propose the use of certain technologies by implementing them in different programming languages to solve the research problem statement (Creating).

Module I: (12 hours)
Research methodology and types, Identification of problem statement, literature study for a solution, evaluation of the existing system, finding the limitation of the existing system.

Module II: (12 hours)
Comparative Literature review on recent trends for research problem solving, identification of software and hardware requirement, schedule feasibility, economic and operational feasibility, identification of software development metrics, Identification of development platform, and planning for experimental arrangement.

Module III: (8 hours)
Prepare Design diagrams/flowcharts etc. (as applicable), design test cases, develop a test bed for solving the problem statement, identify deployment strategy, and identify probable outcomes and observation.

Module IV: (15 hours)
Develop algorithms and implement using programming languages.
Resolve and implement the problem statement through proposed software model and system architecture.
Write a paper based on overall evaluation and findings during case studies / research project activities.

Module V: (13 hours)
Prepare a report to highlight the problem statement, design diagram, technologies deployed and references used to resolve end users requirement.
Submit a research paper for participation in conference/books/letter/journal for a peer review by external editorial committee.

Suggested Readings
3. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Modules

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BCA (Honours) with Research

CAD412P: DISSERTATION- I  
(18 Credits - 540 Hours) (L-T-P: 0-0-18)

Objective
During this phase, the student will start a research project applying the knowledge acquired during the first two semesters and incorporating the recent trends in the chosen area. It should include phases of analyses and design, implementation and reporting. This project is to be executed individually within or outside the campus. The mode and components of evaluation and the weightages attached to them shall be published by the Department during the semester.

COURSE / LEARNING OUTCOMES:
At the end of the research work, students will be able to-
1. Plan and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic relevant to environment and society. (Applying)
2. Systematically identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply appropriate techniques and draw appropriate conclusions. (Applying and understanding)
3. Systematically analyse and critically evaluate the relevant information sources. (Analysing and evaluating)
4. Formulate a methodology for the problem statement. (Creation).

Module I: Introduction (30 Hours)
Formulation of the problem statement, research question.

Module II: Literature Review (60 Hours)
Literature review, study of the existing systems and their limitations, and comparative study.

Module III: Requirement Analysis and Feasibility Study (60 Hours)
Requirement analysis: Identification of software and hardware requirement, Feasibility study: schedule feasibility, economic and operational feasibility, identification software development metrics, Identification of the development platform, planning for experimental arrangements

Module IV: Design, Dataset Preparation and Methodology Design (60 hours)
Data collection: Dataset collection, dataset description, dataset preprocessing
Prepare Design diagrams/flowchart etc. (as applicable), Identify the deployment strategy, the probable outcome, and the observation. Design a methodology for the given problem statement.

Module V: Documentation (60)
Project report, presentation
Submit a research paper for participation in national/international conferences or journals (peer reviewed) for peer review by an external editorial committee.

Suggested Readings:
3. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Modules

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CAD413P: DISSERTATION- II  
(20 Credits - 600 Hours) (L-T-P: 0-0-20)

Objective
During this phase, the student will carry forward and complete the work that they started in Phase I. It is expected that the student will publish at least one research paper in a well-known journal to augment their work during this phase. Published papers will carry extra weight during evaluation. The mode and components of evaluation and the weights attached to them shall be published by the Department at the beginning of the semester.
COURSE / LEARNING OUTCOMES:
At the end of the research work, students will be able to-
1. Apply the algorithm formulated in Phase I for model implementation (Application).
2. Compare the results with the existing system to identify its accuracy (Analysis).
3. Evaluate and summarize the outcome which is expected from the research (Evaluating).
4. Create an outcome based on the methodology implemented (Creation).

Module I: Implementation (80 hours)
Implement the proposed methodology using a suitable platform and tools.

Module II: Comparative Analysis (80 hours)
Detailed analysis of the standard techniques applied for decision making.

Module III: Training, Testing and Performance evaluation (60 hours)
Train and test the designed model with the prepared dataset. Apply evaluation metrics to analyze performance and the accuracy of results.

Module IV: Documentation (80 hours)
Project report, presentation
Submit a research paper for participation in national/international conferences for peer review by external editorial committee.

Suggested Readings:
3. Rajib Mall, Fundamentals of Software Engineering, PHI.

Mapping of COs to Modules

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DEPARTMENT OF MANAGEMENT

PROGRAMME: BACHELOR OF BUSINESS ADMINISTRATION

DEGREE: BBA (HONOURS)/ BBA (HONOURS) WITH RESEARCH

VISION:
The BBA curriculum strives to grow into a significant position in Management education to create graduates in the field of business and management to become future business leaders, entrepreneurs who are socially responsible professionals capable of adapting into the dynamic corporate world having a globally acceptable vision.

MISSION:
- To focus on imparting the highest quality education with a strong foundation of management concepts for students to excel and enhance their skills.
- To develop a strong industry-academia interface for project based learning, internships and placements
- To create academic excellence at par with International standards in order to make the students accepted worldwide as managers.

Programme Outcomes (PO)
On successfully completing the program the student will be able to:
PO 1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO 3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO 4: Ethical and responsible citizen: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them. Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 6: Leadership, Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Programme Specific Outcomes (PSO)
On the successful completion of B.B.A., the students will be able to:
PSO 1: Knowledge of Marketing, HR, Finance and Aviation management: Comprehend the various concepts, processes and significance; to develop an insight and analytical abilities and also to develop the ability to provide solutions for effective decision making in practical business problems
PSO 2: Development of managerial skills: To provide an opportunity for gaining practical understanding of the workplace and develop various leadership and interpersonal skills through internship training and also to make the students industry ready and to enhance critical thinking skills in understanding business challenges related to global business.
PSO 3: Entrepreneurship development skills: To promote entrepreneurial skills by understanding the fundamentals of new business ventures.

Mapping of Courses with POs/PSOs

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### Detailed Syllabus

#### Major Courses

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<th>Semester</th>
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<td>Management Process, Principles and Practices</td>
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**MTMP100T: MANAGEMENT PROCESS AND PRINCIPLES**

(4 credits-60 Hours) (L-T-P: 4-0-0)

**Objective(s)**

The objective of this course is to develop an understanding of the Principles and processes of management covering the basic management functions and challenges in the emerging perspective.

**Course/Learning Outcomes**

At the end of the course students will be able to:

CO 1: Define the meaning of MPP. (Remembering)

CO 2: Explain the theory of planning and control. (Understanding)

CO 3: Determine the organisational process. (Applying)

**Module I: Introduction to MPP (15 Hours)**

Introduction: Concept, Nature, Process and Significance of Management; Managerial Roles (Mintzberg); Development of Management Thought- Classical, Neo -classical, Behavioural and Management Science Approach, System and Contingency Approaches.

**Module II: Planning & Control (15 Hours)**

Planning and Control: Concept, Process and Types; Planning Tools- Forecasting and Scheduling; Decision -making concept and process; Bounded rationality; Management by objectives; Corporate Planning- Environment analysis and Diagnosis

**Module III: Organising (15 Hours)**

Organising: Concept, nature, process and significance; Authority and Responsibility relationships Delegation, Decentralisation; Departmentation basis and formats (Project and Matrix); Formal and Informal Organisation; Changing patterns in Organisation structures in the Knowledge economy. Directing-Motivating and Leading People at work.

**Module IV: Communication and Decision Making (15 Hours)**

Role of communication; Communication media and technology, communication networks - formal vs. informal; barriers to effective communication; communication skills; persuasion in communication; active listening; participative decision making techniques; group vs. the individual; the decision making process

**Suggested Readings**

4. Amitai Etzioni: Modern Organizations. PHI, New Delhi; 2021

Mapping of COs with Syllabus

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MTHB101T: FUNDAMENTALS OF HUMAN RESOURCES MANAGEMENT & ORGANISATION BEHAVIOUR
(Credits: 4-60 hours) (L-T-P: 4-0-0)

Objective(s)
The objective of this paper is to provide the students an insight into the various fundamental concepts of human resource management and organizational behaviour and its relation to other activities in an organization.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Define the nature and scope of HRM and OB and its significance (Remembering)
CO 2: Describe the importance of HRM and the procurement functions (Understanding)
CO 3: Explain the cognitive processes and dynamics of organizational behavior (Applying)
CO 4: Analyse the concepts of perception, learning and motivation (Analyzing)
CO 5: Evaluate the change and organisational development and stress management (Evaluating)

Module I: Importance of Human Resource Management (12 Hours)
Meaning, Nature and Scope, Functions and Role of HR Manager; Advisory and service function to other department; HRM function planning; objectives and policies, organizing the HRM department

Module II: Procurement and Development Functions: (12 Hours)
Job Analysis, Job description, job specification, staffing functions: recruitment, selection, interview, training, placement and induction

Module III: Introduction to the basics of Organisation Behaviour (12 Hours)
Nature and scope of OB, Challenges and opportunities for OB, Organization Goals, Models of OB, Impact of Global and Cultural diversity on Organisation Behaviour

Module IV: Cognitive processes of organizational behavior (12 Hours)
Concept, Personality, Perception and its role in individual decision making, Learning, Motivation: Hierarchy of needs theory, Theory X and Y, Motivation Hygiene theory, Vroom’s expectancy theory.

Module V: Behavior Dynamics (12 Hours)
Interpersonal behavior, Communication, Leadership: Its Theories and prevailing leadership styles in Indian Organizations. Group Behavior: Definition and classification of Groups, Types of Group Structures, Group decision making, Teams Vs Groups

Suggested Readings

Mapping of COs with Syllabus

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MTMM200T: MARKETING MANAGEMENT
(Credits: 4 - 60 hours) (L-T-P: 4-0-0)

Objective(s)
The Objective of the course is to introduce the students to the domain of marketing and to its practical applications.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Enumerate the fundamentals of marketing management. (Understanding)
CO 2: Assess the marketing environment. (Analyse)
CO 3: Analysing market segmentation. (Analysis)
CO 4: Examine pricing strategy and distribution channels. (Analysis)
CO 5: Importance of communication in marketing (Creating)

Module I: Fundamentals of Marketing (8 Hours)

Module II: Marketing Environment (10 Hours)
Analysis of marketing environment: Macro and Micro components and their impact on marketing decisions, Macro & Micro environment of Marketing – Industry & Competitor analysis, Developing strategies.

Module III: Market Segmentation and Product Overview (13 Hours)

Module IV: Pricing and Distribution Strategies (14 Hours)

Module V: Marketing Communication Mix (15 Hours)
Marketing Communication, Integrated Marketing Communication, Promotional Mix Components- Advertising Vs Promotion, Advertising Vs Publicity, Sales Promotion, Public Relations, Personal Selling and Direct Marketing, Digital Marketing Emerging issues in marketing, Ethical issues, Green marketing, Consumerism, CSR in marketing, Payment related issues in the cashless era.

Suggested Readings

Mapping of COs to syllabus

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MTAI201T: INTRODUCTION TO AVIATION INDUSTRY
(4 credits-60 Hours) (L-T-P: 4-0-0)

Objective(s)
The Objective of the course is to introduce the students to the domain of Aviation Industry and its different facets.

Course/Learning Outcomes
At the end of this course students will be able to:
CO1: demonstration of aviation industry (Understanding)
CO2: assessing the essentials of Aviation industry. (Evaluating)
CO3: assessing the organisational structure of aviation industry (Evaluating)
CO4: categorise the airport services. (Analysis)
CO5: evaluating the safety and security (Evaluating)

Module I: Introduction (10 Hours)
Airline Industry – Scope, Types. Scheduled and Non-Scheduled Flights; Air Cargo Transport – Economic and Social impact; Regulatory Bodies; Key Performance indicators

Module II: Fundamentals of Aviation Industry (12 Hours)
Airline Profitability, Main Industry, Characteristics of Passenger airlines, Service Industry – Characteristics

Module III: Organisational Structure (12 Hours)
Airline Alliances, Development of commercial airlines, Deregulation – Impact of Deregulated Airline industry, Organizational Structure, Types of Airline Personnel, Flight crew and Cabin Crew Training, Organizational Culture.

Module IV: Airport and services (12 Hours)

Module V: Safety and Security (14 Hours)
Air Safety and Security, Role of Regulatory Agencies, Airside Safety, Culture of Safety, Issues in Air safety, Accident and Incident Investigation, Future of Airline Industry

Suggested Readings
2. Dr Richard Shevell, Fundamentals of Aviation and Aerospace, published by CRC Press in 2018

Mapping of COs to Syllabus

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MTFM202T: FUNDAMENTALS OF FINANCIAL MANAGEMENT
(5 credits- 75 hours) (L-T-P: 5-0-0)

Objective(s)
This course aims to provide students with an understanding of fundamental concepts of business finance.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Explain the objectives & scope of financial management in context of business (Remembering)
CO 2: Explain various aspects of financial environment (Understanding)
CO 3: Apply the concept of time value of money (Applying)
CO 4: Evaluate investment opportunities using the capital budgeting process (Evaluating)

Module I: Introduction (15 Hours)
Meaning of finance; Basic areas of finance; Finance functions; Finance in the organization structure of a firm; Forms of business organizations; Goals of financial management; relationship with other functions; Career in finance.

Module II: Financial Environment: Markets, Institutions, Interest Rates and Taxes (20 Hours)
Financial markets: concept and types; Financial Institutions: concept, role in funds transfer, and types; Interest rates: level of Interest rate, determinants of market interest rates, the term structure of interest rate and yield curve: Taxes: corporate tax, marginal tax and average tax.

Module III: Time Value of Money (20 Hours)
Future Value: Single period, multiple period; Present Value: single period and multiple period; Future Value and Present value for multiple cash flows; Present value of an annuity; Future value of an annuity; Perpetuities: present value; Effective annual rate.

Module IV: Capital Investment Decisions (20 Hours)
Concept of investment decisions; Generating investment project proposal; Process of Capital budgeting decision; Classification of capital projects; Project cash flows; Incremental cash flows, sunk costs, opportunity costs, net working capital, financing costs and other issues; Net present value, payback method, internal rate of return.

Suggested Readings
4. Basic Financial Management, Khan and Jain, McGraw Hill Education

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MTCB203T: CONSUMER BEHAVIOUR
(5 credits- 75 hours) (L-T-P: 5-0-0)

Objective(s)
The objective of the course is to make the students understand the different concepts of consumer behavior, role of social and cultural settings on consumer behavior and consumer buying process.

Course/ Learning Outcomes:
At the end of this course students will be able to:
CO 1: Define the consumer behaviour. (Remembering)
CO 2: Explain the models of consumer decision process. (Understanding)
CO 3: Apply the factors influencing consumer behavior in developing marketing strategies, identify purchase decision and post purchase behaviour in varied marketing situations (Applying)
CO 4: Analyse market segmentation and segmentation of consumer markets, (Analysing)
CO 5: Assess the positioning strategies on buying behaviour. (Evaluating)

Module I: Contemporary Dimensions of Consumer Behaviour (15 Hours)

Module II: Implications Social and Cultural Settings on Consumer Behaviour (15 Hours)

Module III: Consumer Buying Process (15 Hours)
Stages of Consumer Buying Process, Purchase Decision and Post Purchase Behaviour, Traditional and Contemporary Models of Consumer Behaviour; Case study

Module IV: Advertising as a communication process (20 Hours)
a) Advertising as a tool of communication; Meaning, nature and importance of advertising; Types of advertising; Advertising objectives. Audience analysis; Setting of advertising budget: Determinants and major methods.
b) Major media types-their characteristics, internet as an advertising media, merits and demerits; Factors influencing media choice; media selection, media scheduling, Advertising through the Internet-media devices
Module V: Evaluating communication and sales effects (10 Hours)
Evaluating communication and sales effects; Pre- and Post-testing techniques

Suggested Readings
5. Schiffman, Kanuk L L., S Ramesh Kumar, Consumer Behaviour, 10th edition, Pearson

Mapping of COs to Syllabus

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MTMD204T: BUSINESS MATHEMATICS & STATISTICS FOR DECISION MAKING
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The objective of this course is to familiarize students with the applications of mathematics and statistical techniques in business decision-making

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Apply matrices in business and economic models (Applying)
CO 2: Illustrate the use of differentiation in business and economic models. (Applying)
CO 3: Identify the methods of calculating interest rates (Applying)
CO 4: Summarize data sets using descriptive statistics (Understanding)
CO 5: Analyse the relationship between two variables (Analysing)
CO 6: Determine the trend and seasonality in time series data (Evaluating)

Part – A: Business Mathematics

Module I: Matrices (7 Hours)
Definition of a matrix. Types of matrices; Algebra of matrices. Calculation of values of determinants up to third order; Adjoint of a matrix; Finding inverse of a matrix through adjoint; Applications of matrices to solution of simple business and economic problems

Module II: Differential Calculus (13 Hours)
Mathematical functions and their types – linear, quadratic, polynomial; Concepts of limit and continuity of a function; Concept of differentiation; Rules of differentiation – simple standard forms. Applications of differentiation – elasticity of demand and supply; Maxima and Minima of functions (involving second or third order derivatives) relating to cost, revenue and profit.

Module III: Basic Mathematics of Finance (5 Hours)
Simple and compound interest Rates of interest – nominal, effective and continuous – their interrelationships; Compounding and discounting of a sum using different types of rates

Part – B: Business Statistics

Module IV: Uni-variate Analysis (15 Hours)
Measures of Central Tendency including arithmetic mean, geometric mean and harmonic mean: properties and applications; mode and median. Partition values - quartiles, deciles, and percentiles. Measures of Variation: absolute and relative. Range, quartile deviation and mean deviation; Variance and Standard deviation: calculation and properties.

Module V: Bi-variate Analysis (10 Hours)
Simple Linear Correlation Analysis: Meaning, and measurement. Karl Pearson’s co-efficient and Spearman’s rank correlation Simple Linear Regression Analysis: Regression equations and estimation. Relationship between Co-relation and regression coefficients
Module VI: Time-based Data: Index Numbers and Time-Series Analysis (10 Hours)
Meaning and uses of index numbers; Construction of index numbers: Aggregative and average of relatives – simple and weighted, Tests of adequacy of index numbers, Construction of consumer price indices. Components of time series; additive and multiplicative models; Trend analysis: Finding trend by moving average method and Fitting of linear trend line using principle of least squares.

Suggested Readings
4. J.K. Thukral, Mathematics for Business Studies, Mayur Publications

Mapping of COs to Syllabus

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MTME300T: MANAGERIAL ECONOMICS
(5 credits-75 Hours) (L-T-P: 5-0-0)

Objective(s)
The purpose of this course is to apply micro economic concepts and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives. Simple geometry and basic concepts of mathematics will be used in the course of teaching.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the mechanics of supply and demand in allocating goods and services and resources (Remembering)
CO 2: Illustrate how changes in demand and supply affect markets (Understanding)
CO 3: Apply the choices made by a rational consumer (Applying)
CO 4: Interpret the relationships between production and costs (Evaluating)
CO 5: Discuss key characteristics and consequences of different forms of markets (Creating)

Module I (20 Hours)
Demand, Supply and Market equilibrium: individual demand, market demand, individual supply, market supply, market equilibrium; Elasticity of demand and supply : Price elasticity of demand, income elasticity of demand, cross price elasticity of demand, elasticity of supply;
Theory of consumer behavior : cardinal utility theory, ordinal utility theory(indifference curves, budget line, consumer choice, price effect, substitution effect, income effect for normal, inferior and giffen goods), revealed preference theory.

Module II (15 Hours)
Producer and optimal production choice: optimizing behavior in short run( geometry of product curves, law of diminishing marginal productivity, three stages of production), optimizing behavior in long run (isoquants, iso-cost line, optimal combination of resources) Costs and scale : traditional theory of cost ( short run and long run, geometry of cost curves, envelope curves), modern theory of cost (short run and long run), economies of scale, economies of scope.

Module III (20 Hours)
Theory of firm and market organization : perfect competition (basic features, short run equilibrium of firm/industry, long run equilibrium of firm/industry, effect of changes in demand, cost and imposition of taxes); monopoly (basic features, short run equilibrium, long run equilibrium, effect of changes in demand, cost and imposition of taxes, comparison with
perfect competition, welfare cost of monopoly), price discrimination; monopolistic competition (basic features, demand and cost, short run equilibrium, long run equilibrium, excess capacity); oligopoly (Cournot’s model, kinked demand curve model, dominant price leadership model, prisoner’s dilemma

**Module IV (20 Hours)**

Factor Market: demand for a factor by a firm under marginal productivity theory (perfect competition in the product market, monopoly in the product market), market demand for a factor, supply of labour, market supply of labour, factor market equilibrium.

**Suggested Readings**

**Mapping of COs to Modules**

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**MTEG301T: BUSINESS ETHICS AND CORPORATE GOVERNANCE**

(Credits: 5-75 hours) (L-T-P: 5-0-0)

**Objective(s)**

The objective of this paper is to make the students aware about the importance of ethics in the business, practices of good governance to encourage moral imagination and heightening sensitivity towards the ethical dimension of managerial problems.

**Course/Learning Outcomes**

At the end of this course the students will be able to:

- **CO 1**: Define Business Ethics and best practices of business ethics (Remembering)
- **CO 2**: Explain the various Corporate Social Responsibilities (Understanding)
- **CO 3**: Plan the need and importance of corporate and professional responsibility (Applying)
- **CO 4**: Analyse the corporate governance frameworks (Analyzing)

**Module I: Business Ethics (15 Hours)**

Business ethics: Introduction, Meaning of ethics, Types of business, ethical issues, why ethical problems occur in business, Ethical dilemmas and principles in business, Case Study: Personal companies like Tata related to Ethics in Business in Indian context

**Module II: Corporate Governance (20 Hours)**

Corporate governance: concept, need to improve corporate governance standards, Features of good governance, Corporate governance abuses, Role played by regulators to improve corporate governance. Different Approaches to Corporate Governance, Leadership and Corporate Governance, Rights and Privileges of shareholders; Investor’s Problem and protection; Board of Directors; Role, Duties and Responsibilities of Auditors, Bank and Corporate Governance. Case Study: International experience- UK scenario (Cadbury committee; US scenario(Tread way commission, Blue ribbon committee); Indian experience- Imperatives, CII code of best practices, Kumar Mangalam Birla, Narayan Murthy committee report.

**Module III: Moral issues in business (20 Hours)**

Moral issues in business: Importance of moral issues and reasoning, Principles of moral reasoning, Quality of work life, implications of moral issues in different functional areas of business like finance, HR and marketing. Whistle blowing: Kinds of Whistle blowing, Marketing truth and advertising: Marketing, Advertising, Truth and advertising, Allocation of moral responsibility in advertising Trade secrets, corporate disclosure, insider trading: Trade secrets, corporate disclosure, insider trading Accounting, finance Affirmative action, Ethics and Environment

**Module IV: Corporate Social Responsibility (20 Hours)**

Corporate Social Responsibility: Meaning, Evolution of Corporate Social Responsibility, Limits of Corporate Social Responsibility, Voluntary Responsibility Vs. Legal requirements, Profit maximization vs. social Responsibility, Socially Responsive Management: Strategies of response, formulating socially responsive strategies, Implementing social responsiveness, Financial incentives for
social responsibility, Role of self regulation in discharge of social responsibility.
Case studies on Indian companies like Tata, Godrej etc related to Corporate Social Responsibility

Suggested Readings
4. Tom L. Beauchamp and Norman E. Bowie, Ethical Theory and Business
5. Jill Solomon, Corporate Governance and Accountability

Mapping of COs to Modules

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MTPO302T: PRODUCTION AND OPERATIONS MANAGEMENT
(4 credits- 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course aims at acquainting the students with the functions of production and operations management and basic issues and tools of managing production and operation functions of an organization. The course also intends to provide the students a system theoretic view on project management and helps develop an understanding on why today’s organizations are cultivating a formal project management process to gain competitive advantage.

COURSE/LEARNING OUTCOMES
At the end of this course students will be able to:
CO 1: Define a production system. (Remembering)
CO 2: Explain the tools and techniques to measure work study, motion study. (Understanding)
CO 3: Demonstrate the procedure for product development and design. (Applying)
CO 4: Compute project completion time and Analyse and evaluate project risk management techniques. (Evaluating)

Module I: Introduction and Work Study (15 Hours)
Introduction to Production and operations management- Meaning and scope, subdivisions of work study Method/Motion, study and work measurement

Module II: Plant Location and layout (15 Hours)
- Objectives, Locational factors, Economics of plant location
- Meaning, objectives and types of plant layout and their relevance to mass, batch and job-order production systems.
- Systematic Layout Planning (SLP) procedure

Module III: Product design and Development and PPC (15 Hours)
- Meaning of product, Product life cycle (PLC) and Product mix
- Decisions to be taken during product development and design
- Procedure for product development and design
- Value of a product – its meaning, Value Analysis (VA) – its objectives, procedure and example, Simplification and Standardization.
- Meaning and Objectives of PPC, Effects of types of production

Module IV: Project Management (15 Hours)
- Project management framework, Project management processes, Cost and Time management, Project integration management, Project risk management, Project Quality management, Project communication management.

Suggested Readings
1. Adam, Ebert, Production and Operations Management, PHI.
2. R. Panneerselvam, Production and Operations Management, PHI.

Mapping of COs to Modules
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**MTPM303T: BUSINESS POLICY & STRATEGIC MANAGEMENT**  
(4 Credits-60 Hours) (L-T-P: 4-0-0)

**Objective(s)**  
This course is designed to enhance knowledge on business policy and strategy adopted for managing the business. It will help a student to get broad exposure to understand the business policy and strategic management adopted by different business for their smooth running and facing the competition.

**Course/Learning Outcomes**  
At the end of the course students will be able to:  
CO1: develop an understanding of underlying concepts, tools, frameworks, issues and challenges (Remembering)  
CO2: achieve development of an understanding of the increasing competition (Understanding)  
CO3: explain the different circumstances & situations arising from ever changing strategic situation (Analysising)

**Module I: Introduction to Business Strategy and Formulation (15 Hours)**  
Introduction & Concept of Strategy, Corporate Policy as a field of study, Nature. Importance, purpose and objective of business policy, Chief Executive job, roles and responsibilities of board of Directors, An overview of strategic management, its nature and process, Formulation of strategy, Environment, environment scanning, environment appraisal, Identifying corporate competence & resource.

**Module II: Introduction to Strategic Management (15 Hours)**  
Corporate Strategy, Persona1 and Ethical Values, Business ethics, Industry structure, Reconciling divergent values, Modification of values, moral components of corporate strategy, community considerations and corporate social responsibility (CSR).

**Module III: Strategic Management Process (15 Hours)**  
Corporate portfolio analysis, competitor & SWOT analysis, strategic audit & choice, strategic plan, routes to sustainable competitive advantage (SCA)

**Module IV: Strategic Planning and Implementation (15 Hours)**  
Strategy Implementation, Structural implementation, organisational design and change, behavioural implementation, leadership, corporate culture. corporate politics and use of power, functional implementation - financial, marketing. Operation personnel (HR) policies and their integration, strategic evaluation and control

**Suggested Readings**  
2. David, Fred R (2005), Strategic Management Concepts & Cases, PHI.  

**Mapping of COs with Modules**

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**MTFI304T: FINANCIAL MARKETS AND INSTITUTIONS**  
(4 credits – 60 Hours) (L-T-P: 4-0-0)

**Objective(s)**  
The objective of this paper is to introduce students to the different aspects and components of financial institutions and financial markets and also to introduce them with the emerging application of technologies in the system. The study of the course will enable them to take rational decisions in the growing financial environment.

**Course/Learning Outcomes**
At the end of this course students will be able to:

CO 1: Describe the Indian banking system (Understanding)
CO 2: Explain the role of regulatory bodies in regulating the system (Understanding)
CO 3: Analyze the operative system of financial markets in India (Analyzing)
CO 4: Evaluate the types of debt instruments and their characteristics. (Evaluating)
CO 5: Elaborate the links between the theories of financial markets (Creating)

Module I: Structure of Indian Financial System (12 Hours)
An overview of the Indian financial system, financial sector reforms: context, need and objectives; major reforms in the last decade; competition; deregulation; capital requirements; issues in financial reforms and restructuring; future agenda of reforms; Regulation of Banks, NBFCs & FIs, Salient provisions of banking regulation act and RBI Act; Role of RBI as a central banker; Products offered by Banks and FIs: Retail banking and corporate banking products. Universal Banking: need, importance, trends and RBI guidelines.

Module II: Emerging Technologies in Indian Financial System (12 Hours)
Core banking solution (CBS); RTGS, IMPS and internet banking, mobile banking, NBFCs and its types; comparison between Banks and NBFCs; payment bankers such as PayTM, Google Pay etc

Module III: Introduction to Financial Markets in India (12 Hours)

Module IV: Secondary Market in India (12 Hours)
Introduction to Stock Markets, Regional and Modern Stock Exchanges, International Stock Exchanges, Comparison between NSE and BSE, Raising of funds in International Markets; Indian Stock Indices and their construction, Factors influencing the movement of stock markets, indicators of maturity of stock markets, Major instruments traded in stock markets, Myths attached to Investing in Stock Markets. Trading of securities on a stock exchange; Selection of broker, capital and margin requirements of a broker, DEMAT System

Module V: Money Markets & Debt Markets in India (12 Hours)

Suggested Readings
2. Bharati V. Pathak, Indian Financial System, Pearson

Mapping of COs to Modules

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MTCL305T: CORPORATE AND BUSINESS LAW
(4 credits-60 Hours) (L-T-P: 4:0:0)

Objective(s)
The objective of this paper is to introduce students to the different aspects of Corporate and Business Law. To introduce them with the relevance and applications of the different laws

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: define what a company is and how it is formed. (Remembering)
CO 2: explain the concepts related to the essential documents of companies (Understanding)
CO 3: explain the knowledge regarding administration of a company (Applying)
CO 4: Identify the legal provisions in the partnership business and its Act. (Analysing)

Module I: Introduction (12 Hours)
Introduction of Companies Act, 2013, meaning and characteristics of a company; types of companies including one person company, small company, and dormant company; association not for profit; illegal association; lifting of corporate veil; Registration and Incorporation of company, on-line filing of documents, promoters, their legal position, pre-incorporation contract; on-line registration of a company, Tribunal courts like NCLT, NCLAT etc

Module II: Documents of Companies (12 Hours)
Memorandum of association, Doctrine of ultra vires, Articles of association, Doctrine of constructive notice and indoor management, prospectus-shelf and red herring prospectus, misstatement in prospectus, book-building; issue, allotment and forfeiture of share, transmission of shares, buyback and provisions regarding buyback; issue of bonus shares.

Module III: Administration and Management of Company (12 Hours)
Classification of directors, women directors, independent director, small shareholder’s director; disqualifications, director identity number (DIN); appointment; Legal positions, powers and duties; removal of directors; Key managerial personnel, managing director, manager;
Meetings: Meetings of shareholders and board of directors; Types of meetings, Convening and conduct of meetings, Requisites of a valid meeting, postal ballot, meeting through video conferencing, e-voting.
Committees of Board of Directors- Audit Committee, Nomination and Remuneration Committee, Stakeholders Relationship Committee, Corporate Social Responsibility Committee

Module IV: The Indian Contract Act, 1872 (12 Hours)
1. Proposal- its communication, acceptance and revocation; Agreement vis-à-vis contract, void agreement & voidable contract
2. Consideration – essential elements, exception to rule- No consideration no contract; privity of contract and consideration
3. Capacity to contract; free consent – coercion, undue influence, misrepresentation, fraud; Mistake – of fact and of law
4. Legality of object – agreements opposed to public policy and in restraint of marriage, trade & legal proceedings; Contingent contracts
5. Performance of contract–liability of joint promisor; Consequences of breach of contract–liquidated damages and penalty
6. Quasi contract; Indemnity guarantee–surety’s liability
7. Bailment–Duties and liabilities of bailor and bailee, bailment of pledges;
8. Agency–types of agency, agents duty to principal and vice-versa, ratification and revocation of agent’s authority

Module V: The Partnership Act, 1932 (12 Hours)
a) Nature of Partnership; Relation of partners-inter se; Relation of partners to third parties; Incoming and outgoing partners
b) Dissolution of Firm; Registration of Firms-effect of non-registration

Suggested Readings
1. Chadha, Reena & Chadha, Sumant; Corporate Laws, Scholar Publishing House, New Delhi

Mapping of COs to Modules

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MTMP306P: MINOR PROJECT – 1
(4 Credits – 120 hours)

Objective(s)
The objective of the minor project-1 is to give students an idea of research. In which they need to undertake a field survey for collecting data. Further they need to analyse the data and present a report on the topic in which they have conducted research. The evaluation will be done on the basis of the project report, presentation and viva-voce examination.
Guidelines Related To Project:
The entire project will be carried out in one phase in the particular semester

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the different types of research project. (Remembering)
CO 2: Explain the various steps of designing research project (Understanding)
CO 3: Build questionnaire and schedules (Applying)
CO 4: Assess the data for analysis (Analyzing)
CO 5: Appraise the findings in the report (Evaluating)
CO 6: Design a research project report (Creating)

Module I: Contents of the Report
Introduction
Brief Review of Literature
Research Methodology
Data Analysis and Interpretation
Findings, suggestions and conclusion

MTCF400T: CORPORATE FINANCE
(5 Credits - 75 hours) (L-T-P: 5-0-0)

Objective(s)
To acquaint students with the techniques of financial management and their applications for business decision making.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the strategic objectives of the organisation for finance function. (Remembering)
CO 2: Explain the different sources of corporate finance (Understanding)
CO 3: Interpret the impact of risk and cost of capital impact on investment appraisal. (Applying)
CO 4: Analyze the factors impacting the cost of capital (Analyzing)
CO 5: Evaluate a corporation’s capital structure (Evaluating)

Module I: Nature of Financial Management (20 Hours)
Nature of Financial Management: Finance and related disciplines; Scope of Financial Management; Profit Maximization, Wealth Maximization - Traditional and Modern Approach; Functions of finance – Finance Decision, Investment Decision, Dividend Decision; Objectives of Financial Management; Organisation of finance function; Concept of Time Value of Money, present value, future value, and annuity.

Module II: Long -term investment decisions (20 Hours)
Long -term investment decisions: Capital Budgeting - Principles and Techniques; Nature and meaning of capital budgeting; Estimation of relevant cash flows and terminal value; Evaluation techniques - Accounting Rate of Return, Net Present Value, Internal Rate of Return & MIRR. Concept and Measurement of Cost of Capital: Explicit and implicit costs; Measurement of cost of capital; Cost of debt; Cost of perpetual debt; Cost of Equity Share; Cost of Preference Share; Cost of Retained Earning; Computation of overall cost of capital based on Historical and Market weights

Module III: Capital Structures (20 Hours)
Capital Structures: Approaches to Capital Structure Theories - Net Income approach, Net Operating Income approach, Modigliani-Miller (MM) approach, Dividend Policy Decision - Dividend and Capital; The irrelevance of dividends: General, MM hypothesis; Relevance of dividends: Walter's model, Gordon's model; Leverage Analysis: Operating and Financial Leverage; EBIT-EPS analysis; Combined leverage.

Module IV: Working Capital Management (15 Hours)
Working Capital Management: Management of Cash - Preparation of Cash Budgets (Receipts and Payment Method only); Cash management technique (Lock box, concentration banking), Receivables Management – Objectives; Credit Policy, Cash Discount, Debtors Outstanding and Ageing Analysis; Costs - Collection Cost, Capital Cost, Default Cost, Delinquency Cost, Inventory Management (Very Briefly) - ABC Analysis; Minimum Level; Maximum Level; Reorder Level; Safety Stock; EOQ (Basic Model), Determination of Working Capital.

Suggested Readings
3. Rustogi, Financial Management
4. I.M. Pandey, Financial Management
5. L.J. Gitman & C.J. Zutter, Managerial Finance

Mapping of COs to Modules

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MTSC401T: SUPPLY CHAIN MANAGEMENT

(5 credits – 75 Hours) (L-T-P: 5-0-0)

Objective(s)
The objective of this paper is to acquaint the students with the concepts and tools of supply chain management and logistics as relevant for an international firm.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the process of supply chain management. (Remembering)
CO 2: Demonstrate operational purchasing methods and techniques on supplier management (Understanding)
CO 3: Explain the strategic importance of logistics elements (Understanding)
CO 4: Apply sales and operations planning, MRP and lean manufacturing concepts. (Applying)
CO 5: Analyse creation of new value in supply chain for customers & society. (Analysing)

Module I: Basic Framework (15 Hours)
Concept of supply chain management (SCM); SCM and trade Logistics; Business view of SCM; Push and pull of SCM; Decision phases; Impellers and drivers in SCM Process views of SCM, planning and operations; Supply chain modeling; Role of Relationship marketing in SCM; managing relationships with suppliers and customers; Designing strategic distribution network; Factors influencing distribution network.

Module II: Supply Chain and Information Management Systems (15 Hours)
Purchasing Process- Strategic role of purchasing in the supply chain and total customer satisfaction; Types of purchases; Purchasing cycle; Supplier selection and evaluation; Vendor development; Importance of information management; Distribution and sharing of information; Information Technology as a platform for effective and efficient supply chain management

Module III: Logistic System (10 Hours)
Concept, objectives and scope of logistics; System elements; Inbound and Outbound logistics. Reverse inventory, Value added role of logistics, Logistics interface with manufacturer and marketing, Packing, Marking, Just in time concept; Third party logistic outsourcing—challenges and future directions

Module IV: Transportation (20 Hours)
Importance of effective transportation system; Service choices and their characteristics; inter-modal services; Transport cost characteristics and rate fixation; Carrier selection determinants and decision; Structure of Shipping: World seaborne trade; international shipping - characteristics and structure ;Liner and tramp operations; Liner freighting; Chartering-Types, principles and practices; Charter, party agreement; Development in sea transportation-Unitization, containerization, inter and multimodal transport; CFC and ICD; Indian shipping – growth, policy and problems; Ports and port trust; International Air transport: International set up for air transport: Freight rates; India’s exports and imports by air – Problems and prospects; Carriage of Goods by sea, sea and combined transport.

Module V: Warehousing and Inventory Management (15 Hours)
Warehousing And Marketing Strategy; Objectives and functions of warehousing; Warehouse Strategies; Material handling equipment and material mobility Warehousing evaluation and requirements Inventory management-inventory categories, EOQ, LT, ICC; Inventory levels; Material planning and sourcing of procurement; Methods of cost reduction.
Suggested Readings
5. ICAO Journal, New York., various issues
7. Murphy, Paul R. and Donald F. Wood, Contemporary Logistics, Prentice Hall.
8. Marks, Daniel, Shipping Cartels.

Mapping of COs to Modules

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MTSM402T: SERVICES MARKETING
(Credits: 5-75 Hours) (L-T-P: 5-0-0)

Objective(s)
The objective of this course is to make the students know the service concept, its evolution and growth. To make the students understand Marketing Mix in service marketing and its effective management and to know the service marketing techniques applied in various sectors.

Course/Learning Outcomes
At the end of this course students will be able to:
CO1: relate the importance of service economy and Services characteristic. (Remembering)
CO2: explain the concept of Service Marketing Mix (Understanding)
CO3: identify the various service deliver gap and developing appropriate solutions (Applying)
CO4: analyse the reasons for service failure (Analysing)

Module I: Introduction to Service Economy (15 Hours)
Emergence of the service economy, Concept and nature of Service, Difference between goods and services, Service marketing Mix, Service Management Trinity

Module II: Service Consumer Behaviour (20 Hours)
Understanding the Service Customer as a Decision Maker, service purchase and risk association, Service Evaluation process, The Service Consumer Decision Process, and The Decision-making Process in the Service Sector, Components of Customer Expectations, Service Satisfaction, Service Quality Dimensions

Module III: Service Delivery Process (20 Hours)

Module IV: Delivering Quality Service (20 Hours)

Suggested Readings
1. Service Marketing, C. Bhattacharjee, Excel Books
2. Service Marketing, R. Nargundkar, Tata McGraw Hill
4. The Essence of Service Marketing, M.P. Newton, A Payne, PHI
5. Service Marketing - The Indian Context R. Srinivasan, PHI

Mapping of COs to Modules
**Course Outcomes**

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**MTCR403T: CORPORATE RESTRUCTURING**

(Credits: 5-75 Hours) (L-T-P: 5-0-0)

**Objective(s)**

To familiarize the students with various concept and technique that can help in effective corporate structuring in business. Focus will be on the practical application of the concepts learnt.

**Course/Learning Outcomes**

At the end of this course students will be able to:

- CO 1: Define the concept and function of joint venture (Remembering)
- CO 2: Explain the theories of merger and acquisition (Understanding)
- CO 3: Identify takeover and its types (Applying)
- CO 4: Discover the various techniques of valuation of firms during merger (Analyzing)
- CO 5: Assess the impact of merger on shareholders and different stakeholders (Evaluating)

**Module I: Joint Ventures: (15 Hours)**

Joint Ventures: Concept & Meaning of Joint Ventures, Need & Types of Joint Ventures, Structures & Problems faced in Joint Ventures, some relevant case study of successful and failed joined ventures.

**Module II: Mergers and Acquisitions (20 Hours)**

Mergers and Acquisitions: Introduction to mergers, types of mergers, theories of mergers & acquisitions, merger strategy - growth, synergy, operating synergy, financial synergy, diversification; Cross-border mergers and acquisitions, issues and challenges in cross border M&A. Handling cross-culture and taxations issues in cross-border M&A. Analysis of Post-Merger Performance. Demerger, types of demergers, reverse merger, buyback of shares, leverage buy-out strategy, Takeover and its types, takeover strategy, takeover bids, legal framework for mergers and acquisitions, leverages and buyouts; Hostile tender offers and various anti-takeover strategies.

**Module III: Mergers and Acquisitions (20 Hours)**

Deal Valuation and Evaluation: Factors affecting valuation basics, methods of valuation, cash flow approaches, economic value added (EVA), sensitivity analysis, and valuation under takeover regulation, valuation for slump sale, cost-benefit analysis, and swap ratio determination.

**Module IV: Post-Merger Evaluation (20 Hours)**


**Suggested Readings**

1. Sundarsanam (2006); Creating Value from Mergers and Acquisitions, (1st ed.) Pearson Education

**Mapping of COs to Modules**

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<th>Course Outcomes</th>
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MINOR COURSES

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<td>MTFT206T/MTCM207T/MTIM208T/MTAO209T</td>
<td>Fundamentals of Investment / Compensation Management / International Marketing / Airport Operations</td>
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<td>MTSH307T/MTPF308T/MTMR309T/MTGH310T</td>
<td>Strategic HRM / Personal Financial Planning / Marketing Research / Ground Handling Services at Airport</td>
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<td>MTIR311T/MTIP312T/MTDM313T/MTAC314T</td>
<td>Management of Industrial Relations / Investment Analysis and Portfolio Management / Digital Marketing / Air Cargo Operations</td>
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MTBO102T: BUSINESS ORGANIZATION
(4 credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
To familiarize students with the basics of business, the different forms of organisations, the process and the basic concepts and functions of management

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the nature, objectives and social responsibilities of business (Remembering)
CO 2: Describe the different forms of organisations (Understanding)
CO 3: Understand the process and the basic concepts of management (Understanding)
CO 4: Describe the different functions of management (Applying)
CO 5: Explain the different types of business (Evaluating)

Module I: Introduction to Business (10 Hours)
Meaning, Nature, Scope and Social responsibility of Business, Objectives, Essentials of successful business; Functional areas of business; Concept of Business Organisation

Module II: Forms of Business Organization (15 Hours)

Module III: Public Enterprises (15 Hours)
Departmental Undertaking: Definitions, Features, Merits and Demerits. Public Corporations: Definitions, Features, Merits and Demerits. Government Companies: Definitions, Features, Merits and Demerits

Module IV: Business Combinations (10 Hours)
Meaning Definitions, Causes, Types, Forms, merits and demerits of Business Combinations, Recent Trends in Business Combinations

Module V: Management of Organizations (10 Hours)
Suggested Readings
2. Dr. S. C. Saxena - Business Administration & Management, Sahitya Bhawan

Mapping of COs to Syllabus

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MTMF103T: MANAGEMENT FUNDAMENTALS
(4 Credits: - 60 hours) (L-T-P: 4-0-0)

Objectives
The objective for this course to provide an understanding of the task and functions of management and to acquaint the participants with the developments in concept. Theories and practices in the overall field of management.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the nature and significance of Management (Remembering)
CO 2: Explain the nature and significance of planning (Understanding)
CO 3: Describe the staffing functions and explain the significance of communication (Applying)

Module I: Nature and significance of Management (15 Hours)
Nature of management; significance of management; Approaches of management, Contributions of Taylor, Fayol and Barnard, Functions of a Manager, Social responsibility of Managers, Values in management.

Module II: The Nature of significance of Planning (15 Hours)
Nature of Planning, significance of planning, objectives, steps of planning, decision making as key step in planning; process and techniques of decision making; organisation: nature and significance; approaches, departmentation, line and staff relationships; delegation and decentralisation

Module III: Staffing functions (15 Hours)
Nature and significance of staffing functions; selection, interview, training, appraisal and development of managers; directing: Issues in managing human factors, motivation, nature and significance

Module IV: Communication (15 Hours)
Definition and Significance of Communication, Its process, barriers of communication, building effective communication system. Controlling: definition and elements; Control techniques, Coordination, determinants of an effective control system, Managerial Effectiveness.

Suggested Readings
4. Amitai Etzioni: Modern Organizations. PHI, New Delhi; 2021

Mapping of COs with Modules

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MTBI205T: BANKING AND INSURANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course is designed to provide students with the necessary skills and knowledge in the context of the functioning of banking and insurance.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the basic principles of banking and insurance. (Remembering)
CO 2: Relate the various services provided by banks. (Understanding)
CO 3: Apply the concept of Internet Banking in day-to-day transactions. (Applying)
CO 4: Examine the situations to relate the risk and insurance. (Analysing)

Module I: Introduction (10 Hours)
Origin of banking: definition, banker and customer relationship, General and special types of customers, Types of deposits, Origin and growth of commercial banks in India. Financial Services offered by banks, changing role of commercial banks, types of banks.

Module II: Cheque and Paying Banker (10 Hours)
Crossing and endorsement - meaning, definitions, types and rules of crossing. Duties, Statutory protection in due course, collecting bankers: duties, statutory protection for holderin due course, Concept of negligence.

Module III: Banking Lending (6 Hours)
Principles of sound lending, secured vs. unsecured advances, types of advances, Advances against various securities.

Module IV: Internet Banking (10 Hours)
Meaning, Benefits, Home banking, Mobile banking, Virtual banking, E-payments, ATM Card/ iometric card, Debit/Credit card, Smart card, NEFT, RTGS, ECS (credit/debit), E-money, electronic purse, Digital cash.

Module V: Insurance (9 Hours)
Basic concept of risk, Types of business risk, Assessment and transfer, Basic principles of utmost good faith, Indemnity, Economic function, Proximate cause, Subrogation and contribution, Types of insurance: Life and Non-life, Re-insurance, Risk and return relationship, Need for coordination. Power, functions, and Role of IRDA, Online Insurance

Suggested Readings
1. Agarwal, O.P., Banking and Insurance, Himalaya Publishing House
2. Satyadevi, C., Financial Services Banking and Insurance, S. Chand
4. Chabra, T.N., Elements of Banking Law, Dhanpat Rai and Sons
6. Saxena, G.S. Legal Aspects of Banking Operations, Sultan Chand, and Sons
7. Varshney, P.N., Banking Law and Practice, Sultan Chand, and Sons
8. Jyotsna Sethi and Nishwan Bhatia, Elements of Banking and Insurance, PHI Learning

Mapping of COs to Modules
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MTFT206T: FUNDAMENTALS OF INVESTMENT
(4 credits- 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course aims to provide students with an understanding of fundamental concepts of business finance and investment.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the objectives & scope of financial management in context of business (Remembering)
CO 2: Apply the concept of time value of money (Applying)
CO 3: Evaluate investment opportunities using the capital budgeting process (Evaluating)
CO 4: Explain Indian securities market including the derivatives market (Understanding)
CO 5: Evaluate mutual funds as an investing avenue. (Evaluating)

Module I: Introduction (10 Hours)
Meaning of investment; Basic areas of investment; Investment functions; Forms of business organizations; Goals of investment management; concept of returns and Interest rates: level of Interest rate, determinants of market interest rates

Module II: Time Value of Money (10 Hours)
Future Value: Single period, multiple period; Present Value: single period and multiple period; Future Value and Present value for multiple cash flows; Present value of an annuity; Future value of an annuity

Module III: Capital Investment Decisions (10 Hours)
Concept of investment decisions; Generating investment project proposal; Process of Capital budgeting decision;; Net present value, payback method, internal rate of return.

Module IV: Basics of Investing (20 Hours)

Module V: Investing in Mutual Funds (10 Hours)
Concept and background on Mutual Funds: Advantages, Disadvantages of investing in Mutual Funds, Types of Mutual funds: Open ended, close ended, equity, debt, hybrid, money market and entry load vs. exit load funds. Factors affecting choice of mutual funds. CRISIL mutual fund ranking and its usage, calculation and use of Net Asset Value

Suggested Readings
3. Basic Financial Management, Khan and Jain, McGraw Hill Education

Mapping of COs to Modules

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MTCM207T: COMPENSATION MANAGEMENT
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The course aims to clarify the principles and basic concepts of compensation management in organizations, including the role of human resources management in dealing with employees, and methods used to provide compensation.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Define Compensation Management (Remembering)
CO 2: Explain the principles and importance of compensation management. (understanding)
CO 3: Develop and design compensation system. (Applying)
CO 4: Analyze the present trends in calculation of incentives and other pay systems. (Analyzing)

Module I: Introduction to Compensation Management (15 Hours)
Module II: Compensation Planning & Bases of Compensation (15 Hours)
Compensation Planning: Level, Structure and Systems Decision – Factors influencing compensation level planning: internal factors and external factors.
Traditional Bases for Pay-Seniority and Longevity Pay Merit Pay- Performance Appraisal- Methods- Biases -Strengthening the Pay for Performance Link- Possible Limitations of Merit Pay

Module III: Incentive Pay & Other Pay Systems (15 Hours)
Exploring Incentive Pay- Contrasting Incentive Pay with Traditional Pay.
Individual Incentives- Types of Individual Incentives- Advantages and Disadvantages
Group Incentives- Types of Group Incentives- Advantages and Disadvantages
Companywide Incentives- Types- Designing Incentive Pay Programmes
Person Focused Pay- Competency Based Pay, Pay for Knowledge and Skill Based Pay, Team based pay- Concepts.

Module IV: Designing Compensation System (15 Hours)
Building internally consistent Compensation System - Creating Internal Equity through Job Analysis and Job Valuation
Pay structure variations – Broad banding- two tier pay structure.

Suggested Readings

Mapping of COs to Modules

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MTIM208T: INTERNATIONAL MARKETING
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
To familiarize the students with the concept and issues of international marketing and enable them to be able to analyse the foreign market environment and develop international marketing strategies for a business firm.

Course/ Learning Outcomes
At the end of this course, students will be able to:
CO 1: Define international marketing (Remembering)
CO 2: Explain International Product Planning and Pricing decisions (Understanding)
CO 3: Identify the traditional to modern channel structures, Intermediaries (Applying)
CO 4: Analyse the international distribution decisions in terms of issues and planning (Analysing)
CO 5: Evaluate the different aspects of international promotional strategies (Evaluating)

Module I: Introduction: Introduction to International Business (14 Hours)
An overview; International marketing management process, International marketing information system. International Marketing Environment: Influence of physical, economic, socio - cultural, political and legal environments on international marketing decisions; International marketing information system. International Market Segmentation, Selection and Positioning; International market entry strategies – Exporting, licensing, contract manufacturing, joint venture, setting -up of wholly owned subsidiaries abroad.

Module II: International Product Planning and Pricing decisions (14 Hours)
Major Product decisions-product design, labeling, packaging, branding and product support services; Product standardization vs. adaptation; Managing product line; International trade product life cycle; New product development. Pricing decisions for International Markets: Factors affecting international price determination; International pricing process and policies; Delivery
terms and currency for export price quotations; Transfer pricing; Counter trade as a pricing tool- types and problems of counter trading.

**Module III: International Distribution Decisions (12 Hours)**
Distribution channel- from traditional to modern channel structures, Intermediaries for international marketstheir roles and functions; Alternative middlemen choices, Factors affecting choice of channels; Locating, selecting and motivating channel members; International distribution logistics- issues and Planning.

**Module IV: International Promotion Strategies (12 Hours)**
Communications across countries-complexities and issues; Country -of-origin effect; Sales promotions in international markets, trade fairs and exhibitions, International public relations, International Advertising decisions, Personal selling and sales management; Developing international promotion campaign.

**Module V: Emerging trends in International Marketing (8 Hours)**
International Marketing through Internet; Ecological concerns and international marketing ethics.

**Suggested Readings**

**Mapping of COs to Modules**

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**MTAO209T: AIRPORT OPERATIONS**
(4 credits - 60 Hours) (L-T-P: 4-0-0)

**Objective(s)**
The course objective of Airport Operation in Bachelor of Business Administration (BBA) is to provide Students’ with an understanding of the various aspects of airport operations, including airport management, airport security, and airport marketing

**Course/Learning Outcomes**
At the end of this course students will be able to:
CO 1: Explain the basic concepts of airport operations (Remembering)
CO 2: Explain airline navigation systems (Understanding)
CO 3: Analyze the process of airport safety and security (Analyzing)
CO 4: Critically judge the various aspects of Airport Planning and Services (Evaluating)

**Module I: Introduction (15 Hours)**
Airport Definition – Aerodrome and Airport, ICAO set-up and functions, Aerodrome Data and Physical characteristics, Declared Distances, Obstacle Limitation Surfaces.

**Module 2: Airline Navigation (15 Hours)**
Navigational Aids; Runway, Taxiway and Apron; Airfield Lighting; Visual Aids, Category of ILS (Instrument Landing System), Air Traffic Services and aeronautical communication (RT phraseology); Aeronautical Information Publication, NOTAM, Meteorological Report and Forecast, Facilitation (ICAO Annex – 9).

**Module 3: Airport Safety and Security (15 Hours)**
Security – Safeguarding civil aviation; Safe transportation of dangerous goods; Basic Safety Concept at Airport; Hazards; Safety Risk Assessment; SMS framework; Phased approach of SMS implementation.

**Module 4: Airport Planning and Services (15 Hours)**
Airport Planning (Master planning); Set-up of an international airport; Terminal Management; Airfield Management; Airport Operations Control Centre; Landside Management; Immigration and Customs Procedure; APHO Services; Ramp Handling Services; Cargo Operations; Commercial Management; Airport’s economic performance; National Civil Aviation Policy (2016).
**Suggested Readings**


**Mapping of COs to Modules**

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**MTSH307T: STRATEGIC HUMAN RESOURCE MANAGEMENT**

(4 Credits - 60 hours) {L-T-P: 4-0-0}

**Objective(s)**

The objective of this course is to develop within the students the understanding of the student with relevant concepts, roles and challenges related to strategic human resource management practices in the workplace and design the requisite skills to be competent contributors to the organization’s strategic decision-making process and make them competent to for various managerial and administrative positions in different organizations.

**Course/ Learning Outcomes**

At the end of this course students will be able to:

- CO 1: Define the hierarchy of strategy, classify between traditional HR and strategic HR. (Remembering)
- CO 2: Demonstrate the aims of strategic HRM (Understanding)
- CO 3: Analyse the concept of HR strategies, explain the approaches of developing HR strategies (Analysing)
- CO 4: Examine the strategic role of the HR director, determine the strategic role of the HR specialists (Analysing)
- CO 5: Evaluate the various approaches to motivation (Creating)

**Module I: Introduction to Strategic Human Resource Management (12 Hours)**

Introduction, Strategy, Hierarchy of Strategy, Corporate Level Strategy, Business Level Strategy, Functional Level Strategy, Strategic HRM, Emergence of Strategic Human Resource Management (SHRM), The Evolutionary Stages of Strategic HRM, Difference Between Traditional HR and Strategic HR, Case study

**Module II: Concepts of Strategic Human Resource Management (12 Hours)**


**Module III: Human Resource Strategies and its Implementation (12 Hours)**

Introduction, HR Strategies, Types of HR Strategies, Overarching Strategies, Specific HR Strategies, Criteria for an Effective HR Strategy, Developing HR Strategies, Methodology for Formulating HR Strategies, Setting Out the Strategy, conducting a Strategic Review, Implementing HR Strategies Barriers to the Implementation of HR Strategies, Overcoming the Barriers, Case study

**Module IV: Roles in Strategic Human Resource Management (12 Hours)**

The Strategic Role of Top Management, The Strategic Role of Front-line Management, The Strategic Role of the HR Director, The Strategic Role of the HR Specialists, The New Mandate for HR, The Specific Strategic Roles of HR, Business Partner, The Innovation Role, The Change Manager Role, The Implementer Role, Case study

**Module V: Challenges in Strategic Human Resource Management (12 Hours)**

Strategy and its components, Approaches to Human Resource Planning, Managing Executive Information Systems, Challenges for HR Managers, HRM Strategic Challenges, Case study

Suggested Readings

MTPF308T: PERSONAL FINANCIAL PLANNING
(4 Credits - 60 hours) (L-T-P: 4-0-0)

Objective(s)
The course aims to familiarize learners with different aspects of personal financial planning like savings, investment, taxation, insurance, and retirement planning and to develop the necessary knowledge and skills for effective financial planning.

Course/ Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the meaning and the relevance of financial planning. (Remembering)
CO 2: Understand the concept of investment planning and its methods. (Understanding)
CO 3: Examine the scope and ways of personal tax planning. (Applying)
CO 4: Analyse insurance planning and its relevance. (Analysing)
CO 5: Develop insight into retirement planning and its relevance. (Evaluating)

Module I: Introduction to Financial Planning (12 Hours)
Financial goals, steps in financial planning, budgeting incomes and payments, time value of money. Introduction to savings, benefits of savings, management of spending & financial discipline, Setting alerts and maintaining sufficient funds for fixed commitments

Module II: Investment Planning (12 Hours)
Process and objectives of investment, concept and measurement of return & risk for various asset classes, measurement of portfolio risk and return, diversification & portfolio formation. Gold bond; Real estate; Investment in greenfield and brownfield Projects; Investment in fixed income instruments, financial derivatives & commodity market in India. Mutual fund schemes; International investment avenues. Currency derivatives and digital currency

Module III: Personal Tax Planning (12 Hours)
Tax structure in India for personal taxation, Scope of personal tax planning, exemptions and deductions available to individuals under different heads of income and gross total income. Comparison of benefits - Special provision u/s 115 BAC vis-à-vis General provisions of the Income-tax Act, 1961, tax avoidance versus tax evasion

Module IV: Insurance Planning (12 Hours)
Need for insurance. Life insurance, health insurance, property insurance, credit life insurance and professional liability insurance

Module V: Retirement Benefits Planning (12 Hours)
Retirement planning goals, process of retirement planning, Pension plans available in India, Reverse mortgage, Estate planning.

Suggested Readings

Mapping of COs to Modules

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MTMR309T: MARKETING RESEARCH
(4 Credits- 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course is designed to provide students with the necessary skills and knowledge to determine the information necessary to address an identified research problem (basic or applied) and, using this understanding, develop and use an actionable research proposal. In this process, the students will gain an understanding of relevant approaches and elements of undertaking a research enquiry specifically to provide insights to solving a relevant problem.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define marketing research (Remembering)
CO 2: Explain sample and sampling design (Understanding)
CO 3: Identify various data collecting methods and tools (Applying)
CO 4: Analyse data hypothesis and testing procedures (Analyzing)

Module I: Introduction of Marketing Research (15 Hours)

Module II: Sample and Sampling Design (15 Hours)
Some basic terms, Advantages and Limitation of Sampling, Sampling process, Types of Sampling, Types of Sample Designs, Determining the Sample Size, Sampling Distribution of the Mean. Scaling Techniques: The concept of Attitude, Difficulty of Attitude Measurement, Types of Scales, Applications of Scaling in Marketing Research.

Module III: Data Collection (15 Hours)
Secondary Data, Sources of Secondary Data, Primary Data, Collection of Primary Data, Methods of Data Collection-Observation, Questionnaire, Designing of Questionnaire. Data Processing and Tabulation: Editing, Coding and Tabulation.

Module IV: Data Analysis (15 Hours)
Testing of Hypothesis, Measurement of Central Tendency, Dispersion, Univariate Analysis, Multiple Regression, Factor Analysis, Cluster Analysis, Multidimensional Scaling, Conjoint Analysis; Interpretation and Report Writing, Types of Research Reports

Suggested Readings

Mapping of COs to Modules

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MTGH310T: GROUND HANDLING SERVICES AT AIRPORT
(4 credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The paper is to demonstrate conceptual understanding of the scope of Ground Handling Operations in aviation industry and also to analyze the challenges faced by Ground Handling companies while providing services to the clients. The paper also focuses on understanding the work culture of Ground Handling organizations and analyze regulatory framework prevalent in the industry.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the fundamentals of ground handling (Remembering)
CO 2: Understand the fundamentals of passenger handling. (Understanding)
Module I: Ground Handling overview (15 Hours)
Meaning and importance - IATA SAFETY AUDIT for GROUND OPERATIONS (ISAGO) – Airport Operations Control Centre – Role of Turn-Around Coordinator – Ground Handling Equipment.

Module II: Passenger Handling (15 Hours)
Check In and security – Transfer and Transit Passenger handling – Special Category of Passengers – Passenger Embarkation/Disembarkation – Role of Human Factors

Module III: Baggage handling procedures (10 Hours)

Module IV: Cargo and Mail handling procedures (10 Hours)

Module V: Ramp handling procedures (10 Hours)
Aircraft Loading/Unloading – Interior and exterior cleaning – Regulatory authorities – MOCA, BCAS, DGCA

Suggested Readings

Mapping of COs to Modules

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MTIR311T: MANAGEMENT OF INDUSTRIAL RELATIONS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The course focuses on acquainting students with concepts of Industrial Relations and various legislations related to Labour Welfare and Industrial laws.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Define the conceptual knowledge on industrial relations (Remembering)
CO 2: Explain the extent to which the workers can participate in management (Understanding)
CO 3: Apply the mechanism for resolving industrial disputes (Applying)
CO 4: Analyse the provision for payment of wages (Analysing)
CO 5: Discuss the legal framework of factories act (Evaluating)

Module I: Concept of Industrial Relations (15 Hours)
Aspects of industrial relations, conflict and cooperation, parties in industrial relations, workers employers and government, trade unions, objectives process, prerequisites of collective bargaining.

Module II: Workers Participation in Management (10 Hours)
Levels & Mode of participation, Works Committee, Joint Management councils, Worker Director, Grievance Procedure, QC.
Module III: Trade Union Act 1926 (15 Hours)

Module IV: Payment of Wages Act (10 Hours)

Module V: The Factories Act 1948 (10 Hours)
Definition, approval, licensing and registration, health and welfare measures, employment of women and young persons, leave with wages and weekly holidays.

Suggested Readings

Mapping of COs to Modules

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MTIP312T: INVESTMENT ANALYSIS & PORTFOLIO MANAGEMENT
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
To learn the basics of investing and decide where to invest with less risk.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the investment environment, different types of investment vehicles (Remembering)
CO 2: Explain the logic of investment process (Understanding)
CO 3: Apply the quantitative methods for investment decision making (Applying)
CO 4: Analyse the portfolio theory and the process of investment portfolio formation (Analysing)
CO 5: Analyze relevance of stocks and bonds for the investments (Analysing)

Module I: Basics of risk and return (15 Hours)

Module II: Share valuation (15 Hours)
Dividend discount models- no growth, constant growth, two stage growth model, multiple stages; Relative valuation models using P/E ratio, book value to market value. Technical analysis: meaning, assumptions, difference between technical and fundamental analysis; Price indicators- Dow theory, advances and declines, new highs and lows. Volume indicators- Dow Theory, small investor volumes. Other indicators- futures, institutional activity, Trends analysis: line chart, bar chart, candle chart, point & figure chart. Patterns: head & shoulders, triangle, rectangle, flag, cup & saucer, double topped, double bottomed, Indicators: moving averages. Efficient market hypothesis; Concept of efficiency: Random walk.

Module III: Portfolio analysis (15 Hours)
Portfolio risk and return, Markowitz portfolio model: risk and return for 2 and 3 asset portfolios, concept of efficient frontier & optimum portfolio. Market Model: concept of beta systematic and unsystematic risk. Investor risk and return preferences:
Indifference curves and the efficient frontier, Portfolio management services: Passive – Index funds, systematic investment plans. Active – market timing, style investing.

**Module IV: Capital Asset Pricing Model (CAPM) (15 Hours)**

**Suggested Readings**
2. Investment Analysis and Portfolio Management, Prasanna Chandra, Tata Mcgraw Hill Education Private Limited

**Mapping of COs to Modules**

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**MTDM313T: DIGITAL MARKETING**
(4 credits - 60 hours) (L-T-P: 4-0-0)

**Objective(s)**
*After studying this course, the students will be able to learn about the different knowledge and skills needed for effective digital marketing in the corporate sectors and entrepreneurial ventures.*

**Course/Learning Outcomes**
At the end of this course students will be able to:
- CO 1: Define the fundamentals of website marketing. (Remembering)
- CO 2: Explain the fundamentals of search engine technology (Understanding)
- CO 3: Interpret the various types of social media marketing. (Applying)
- CO 4: Analyze the models of digital marketing (Analyzing)
- CO 5: Evaluate the web analytics and social media analytics (Evaluating)

**Module I: Introduction to Digital Marketing (10 Hours)**

**Module II: Search Engine Optimization (15 Hours)**

**Module III: Social Media Marketing (10 Hours)**
Introduction Social Media Marketing, Understanding Platforms; types and categories, Relevance in Marketing, Platform Selection, Performance Marketing, Social Media Mentions and Spread, Social Media Sentiment, Lead Generation, Creating a sales funnel.

**Module IV: Models of Digital Marketing (10 Hours)**

**Module V: Web and Social Media Analytics (15 Hours)**
Fundamentals of Web Analytics and Social Media Analytics, Understanding Analytical Dimensions, Preparation of Analytical Plan, Identification of Core Metrics and KPIs, Formulation of Metrics, Interpretation of Platform Inbuilt Dashboards (Facebook, Instagram etc and Google Analytics) Channels and Content Development. Designing a website (non-programming), Designing a Social Media Page, Merger of Accounts, Understanding Content, Classification of Content, Content Marketing Channels, Post Strategies, Target Identification.
Suggested Readings
1. Ahuja V. Digital Marketing, Oxford University Press.

Mapping of COs to Modules

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MTAC314T: AIR CARGO OPERATIONS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course provides air cargo operations overview and freight forwarders perspective about the air cargo industry. This course cargo operations would focus on the business, operations and regulatory fundamentals. It will explore how the air cargo industry is changing and how to identify opportunities to become more successful as a manager in your company. The purpose of this course is to enlighten the students about various cargo handling process and system which are prevalent in business industry.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define air freight and cargo (Remembering)
CO 2: Demonstrate the cargo terms and glossary. (Understanding)
CO 3: Identify the various the airport documentation (Applying)
CO 4: Categorize the cargo weight, packing etc. (Analysis)
CO 5: Evaluate the cargo laws (Evaluating)

Module I: Air Freight Forwarder (15 Hours)
The Air Freight Forwarder, The Airlines, Geography, The Governing Bodies, Cargo Requiring Special Handling, Aircrafts & ULDs, International Time calculators

Module II: Glossary of cargo terms (10 Hours)
Glossary of cargo terms, Aircraft type: Holds and Compartments.

Module III: Introduction, classification of dangerous goods (15 Hours)
Introduction, classification, limitation, identification, packing, documentation, unitization, handling, acceptance, and the carriage of dangerous goods

Module IV: General cargo, special cargo (10 Hours)
General cargo, special cargo, weight & dimension, packing, marking, labeling, handling label, coding and decoding, all types of cargo requiring special handling

Module V: Introduction, principles and rules governing liability (10 Hours)
Introduction, principles and rules governing liability, the liability of freight forwarder, carriage of Goods by Sea, the Hague rules, Hamburg rules, Warsaw convention, Montreal convention.

Suggested Readings

Mapping of COs to Modules

176|ADBU|Regulations and Syllabus|2023-24
MTBE404T: BUSINESS ENVIRONMENT
(3 Credits - 45 hours) (L-T-P: 3-0-0)

Objective(s)
To apply relevant knowledge, skills and exercise professional judgement in understanding the macro environment in which a business organisation operates. The course would also make the students capable of analysing and understanding policies of the government implemented from time to time and assess their impact on business

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define economic systems in depth (Remembering)
CO 2: Explain how an entity operates in a business environment (Understanding)
CO 3: Identify the role of Public and Private sector in the business environment (Applying)
CO 4: Examine the trade environment in details (Analysing)

Module I: Business Environment (6 Hours)
Concept, Components and importance; Indian Business Environment; Cultural, social, political, technological, economic and legal environment; scanning techniques of environmental forecasting; SWOT- Internal environment -their impact on policy formulation.

Module II: Economic trends (6 Hours)
Economic reforms in India –Liberalization, privatization and globalization; Competitive Strength of Indian industry; Impact of liberalization policy on different sectors; Foreign Investments policy in India.

Module III: Multinational Corporations (6 Hours)
Multinational corporations and their participation in India; strategies of multinational corporations; competitive strengths policies and performance

Module IV: Business Ethics and Social Responsibilities (6 Hours)
Business ethics and social responsibilities; relationship between business and society; Corporate power social accountability; Ethical issues and values in business; Corporate Social policies - issues and challenges; Ecological and environmental issues

Module IV: Economic Development of North Eastern Region (6 Hours)
Special package for economic development of the north eastern region; DONER and its role in economic development, infrastructure and industry; Brief study of the tea industry, paper industry, food processing industry, silk industry and bell metal industry; tourism industry of Assam

Suggested Readings
5. Dutta Rnddar and Sundaram KPM , S. Chand & Co. Ltd., New Delhi.
7. Kazhmi Azhar, Business Policy

Mapping of COs to Modules

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MTAR405T: AIRPORT RESOURCE PLANNING & SERVICES MANAGEMENT
(3 Credits - 45 hours) (L-T-P: 3-0-0)

Objective(s)
The main objective of Airport Planning & Management course is to help the students to acquire and develop skill to take rational decisions in the process of planning costly airport infrastructure. The paper also familiarizes the students in understanding on various customer handling standard operating procedures. This will be helpful to increase and develop skill of independent thinking and decision making.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define airport and airport operations (Remembering)
CO 2: Explain the airspace and air traffic control. (Understanding)
CO 3: Develop the airport system planning (Applying)
CO 4: Analyse the airport customer services. (Analysis)
CO 5: Evaluate the branding strategies (Evaluating)

Module I: Airport and Airport Systems (10 Hours)

Module II: Airspace and air traffic Control (8 Hours)
Brief history of ATC - Present day ATC management & operating infrastructure - Basics of ATC - Current & future enhancement to ATC - Airport terminal and ground access - Historical development of airport terminals - Components of airport terminal - Airport ground access.

Module III: Airport system planning Airport master plan (10 Hours)
Forecasting - Facilities Requirement - Design alternatives - Financial plans - Land use planning - Environmental planning - Airport capacities and delays - Defining capacity - Factors affecting capacity & delay - Estimating capacity - Illustrating capacity with a time space diagram - FAA approximation chart - Simulation models.

Module IV: Customer service (8 Hours)
Introduction, concept of customer service, objectives of customer service, role of customer service representative, objectives of customer services. Dealing with various complaints, reasons and causes of complaints

Module V: Branding Strategies (9 Hours)
Branding strategies with customer services at airports: marketing ambience of airport, role of service and social media in customer service, performance and quality of service offered.

Suggested Readings

Mapping of COs to Modules

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MTRM406T: RESEARCH METHODOLOGY
(2 Credits - 30 Hours) (L-T-P: 2-0-0)

Objective(s)
This course is designed to provide students with the necessary skills and knowledge to determine the information necessary to address an identified research problem (basic or applied) and, using this understanding, develop and use an actionable research proposal. In this process, the students will gain an understanding of relevant approaches and elements of undertaking a research enquiry specifically to provide insights to solving a relevant problem.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the various kinds of research, objectives of doing research (Remembering)
CO 2: Apply the basic knowledge on qualitative research techniques (Understanding)
CO 3: Analyze of data analysis-and hypothesis testing procedures (Analysing)

Module I: Introduction (6 Hours)
Meaning of Research, Objectives of Research, Types of Research, Research Process, Research Problem formulation; Research Design: Features of a good research design; Different Research Designs; Measurement in Research; Data types; Sources of Error

Module II: Measurement and Scaling (8 Hours)

Module III: Data Collection (10 Hours)
Primary & Secondary Data; Survey Method of Data Collection, Classification of Observation Method; Fieldwork and Data Preparation. Hypothesis: Null Hypothesis & Alternative Hypothesis; Type-I & Type-II Errors; Hypothesis Testing: Z-Test, T-Test, ANOVA, Concepts of Multivariate Techniques.

Module IV: Research Report (6 Hours)
Meaning, Types and Layout of Research Report; Steps in Report Writing, Tabular & Graphical Presentation of Data, Citations, Bibliography and Annexure in Report, Avoid Plagiarism; Use of Statistical Software to Analysis the Data.

Suggested Readings

Mapping of COs to Modules

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MTIB407T: INTERNATIONAL BUSINESS
(Credits-3 - 45 hours) (L-T-P: 3-0-0)

Objective(s)
This course provides an overview of the environment, concepts, and basic differences involved in international business.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Describe the foundation of international business.
CO 2: Describe international organizations and multinational corporations.
CO 3: Define forms of foreign involvement.
CO 4: Evaluate various international trade theories.

Module I: Introduction to Global Business (10 Hours)
Global Business: Scope, Global Linkages today; Culture and Global Business: Elements of culture, Training Challenge; Global Trade and Investment Theory: Mercantilism, Classical Trade Theory, Factor Proportion Theory, International Trade and Product cycle theory, Theory of International Investments; Structure of Indian Foreign Trade: Composition & direction; EXIM Bank; Exit
Policy of India; Regulation and Promotion of Foreign Trade.

**Module II: Global Financial Markets (10 Hours)**
Foreign exchange markets; Fixed and Floating Foreign exchange rates; Significant monetary events; Exchange rates, interest rates and economic policy; Economic Integration; Government Trade Policies.

**Module III: Global Business Environment (15 Hours)**
Private International Law; Public International Law; Risk to Global Business; Doctrine of Sovereign Immunity; Doctrine of Eminent Domain; Labour Law Differences; Theoretical foundations of International Business; Balance of Payments; International Liquidity; International Economic; Accounting and Tax differences; Multinational Corporations; Foreign Direct Investment.

**Module IV: International Finance (10 Hours)**
Financing exports and imports; International Capital and Cash Management; Capital Structure: International Dimensions; International Capital Markets; International Banking and Security Markets; IMF; World Bank; IFC; ITA; ADB; WTO.

**Suggested Readings**

**Mapping of COs to Modules**

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SKILL ENHANCEMENT COURSES

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<td>MTRM210L</td>
<td>Retail Management</td>
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**MTED104L: ENTREPRENEURSHIP DEVELOPMENT**

(3 Credits - 45 Hours) (L-T-P: 4-0-0)

**Objective(s):**
*The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior.*

**Course/ Learning Outcomes**
At the end of the course students will be able to:

CO 1: Define the concept of entrepreneur. (Remembering)

CO 2: Classify different types of entrepreneurs and entrepreneurial ventures. (Understanding)

CO 3: Describe the dimensions of entrepreneurial orientation. (Applying)

CO 4: Identify strengths, weaknesses of oneself. (Analysing)

**Module I: Introduction (8 hours)**
Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and creative response to the society’ problems and at work; Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, netpreneurship, ecopreneurship, and social entrepreneurship

**Module II: Entrepreneurship and Micro, Small and Medium Enterprises (8 hours)**
Concept of business groups and role of business houses and family business in India; The contemporary role models in Indian business: their values, business philosophy & behavioural orientations; Conflict in family business and its resolution

**Module III: Sustainability of Entrepreneurship (8 hours)**
Public and private system of stimulation, support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of Industries/entrepreneur’s association and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund

**Module IV: Sources of business ideas and tests of feasibility (12 hours).**
Significance of writing the business plan/ project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential may be covered); Project submission/ presentation and appraisal thereof by external agencies, such as financial/non-financial institutions

**Module V: Mobilising Resources (9 hours).**
Mobilising resources for start-up. Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems

**Suggested Readings**

**Mapping of COs with Syllabus**

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MTOM105L: OFFICE ORGANIZATION AND MANAGEMENT
(3 Credits - 45 hours) (L-T-P: 3-0-0)

Objective(s)
The course aims to establish the importance of office organisation and management and its role in the workplaces. It also prepares the students to acquire basic knowledge and skills necessary for different tasks and aspects in different industries.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the basic knowledge of office organisation and management (Remembering)
CO 2: Demonstrate skills in effective office organisation (Understanding)
CO 3: Organise and to maintain the office records (Applying)
CO 4: Ability the different types of digital records. (Analysing)
CO 5: Appraise the different types of organisation structures (Evaluating)

Module I: Fundamentals of Office Management (10 Hours)
Introduction: Meaning, importance and functions of modern office Modern Office Organisation: Meaning; Steps in office organisation; Principles of Office organisation, Organisation structure types, Nature of office services: Types of services in a modern office, decentralisation and centralisation of office services, Office management: Meaning, Elements and major processes of Office management Office Manager: Functions and qualifications of Office manager

Module II: Administrative Arrangement and Facilities (8 Hours)

Module III: Office Environment (10 Hours)

Module IV: Introduction to Records & Filing System (8 Hours)

Module V: Office Mechanisation and Data Processing (9 Hours)
Meaning, Importance and Objectives of Office Mechanisation, Advantages and disadvantages of Office Mechanisation, Factors Determining Office Mechanisation Kinds of Office Machines: Duplicating Machines and Photocopying Machines, Distinction between Data and Information, Importance of Data and Information, Classification of Data, Classification of Information, Data Collection Methods- Primary and secondary data collection methods Data processing using computers: Computer Applications in Office Management, Advantages and Limitations of Computerisation

Suggested Readings
1. S.P Arora, Office Organisation and Management, Vikas Publishing House Pvt Ltd
2. M.E Thakuram Rao, Office organisation and Management, Atlantic

Mapping of COs with Syllabus

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MTRM210L: RETAIL MANAGEMENT
(Credits: 3-45 hours) (L-T-P: 3-0-0)

Objective(s)
The course aims to establish the importance of retail management. It also prepares the students to acquire basic knowledge and skills necessary for different tasks and aspects of retail management.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: List the types and forms of Retail business. (Understanding)
CO 2: Examine Consumer Behavior in various environment. (Applying)
CO 3: Analyze various Retail operations and evaluate them. (Analysing)
CO 4: Determine the retail marketing mix. (Knowledge)
CO 5: Application of IT in retail sector (Applying)

Module I: Introduction to Retail Business (8 Hours)

Module II: Consumer Behaviour in Retail Business (10 Hours)
Buying decision process and its implication on retailing – Influence of group and individual factors, Customer shopping behaviour, Customer service and customer satisfaction.

Module III: Retail Operations (12 Hours)

Module IV: Retail Marketing Mix (8 Hours)

Module V: Information Technology in Retailing (7 Hours)
Non store retailing (e-retailing) - The impact of Information Technology in retailing - Integrated systems and networking – EDI – Bar coding – Electronic article surveillance – Electronic shelf labels – customer database management system.

Suggested Readings
1. Suja Nair; Retail Management, HPH
2. Karthic – Retail Management, HPH
3. S.K. Poddar& others – Retail Management, VBH.
4. R.S Tiwari ; Retail Management, HPH

Mapping of COs with Syllabus

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INTERNSHIPS

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MTIN106I/MTIN211I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 Credits - 120 Hours) (L-T-P: 0-0-8)

Objective(s)
The students are required to undergo an internship in work related to Commerce and Management during the semester break at the end of fourth Semester or fifth Semester. The purpose of this internship is to expose the students to real-life industry work situations. This is an opportunity for the students to learn the application of knowledge that they have acquired from the classes, in an on-the-job situation.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Identify career alternatives prior to graduation. (Understanding)
CO 2: Translate theory into practice. (Applying)
CO 3: Improve work habits and attitudes towards job success in workplace (Creating)

INTRODUCTION
The field of Management is very practical oriented and requires an in-depth knowledge about both the theoretical and practical aspect of business operations. In the BBA programme the students are made acquainted with the various facets of General Management, Marketing, HR and Finance functions. However, the lessons mostly remain with the limits of classroom discussion. The real practices of business are much more complex and subject to judgement of the manager. This internship is an attempt to enable the students to acquire some learning experiences in the practical field and equip themselves with necessary traits to succeed in the corporate environment.

INSTRUCTION AND GUIDELINES FOR STUDENTS
The students should follow the following instruction and guidelines during the course of internship:
1. The internship should be for a minimum duration of three weeks for 120 hours which can be extended up to any limit depending upon the convenience and requirement of the student and the organisation respectively.
2. The students have to undergo the internship at the end of 1st Year or 2nd Year if they choose to leave the programme. Any students willing to undergo internship during the semester classes will not be encouraged and would be completely on his/her own cost of attendance and classes. Further, in such a case, the Department holds full right to reject the internship of such student
3. The students can undergo internship at any organisation which is recognised or registered, as applicable, of their choice but the work must be related to commerce and management.
4. After the completion of the internship, the students must submit the Internship Report which should include the Internship Diary as an Annexure to the Report. The format of the Internship Report and Internship Diary should be in accordance with the one prescribed by the Department. There would be a Seminar Presentation (PPT) and Viva-Voce Examination towards the end of the 6th Semester based on which the students would be evaluated for the internship. The Internship report would also be a part of evaluation.

STRUCTURE OF INTERNSHIP
The Internship Report must comprise of the following:
a. Recommendation Letter from the Department.
b. Completion Certificate from the Organisation where the student has worked as intern.
c. Internship Diary as per the prescribed format.
d. Organisation details (Address, E-mail, Contact Number) including name, contact number and e-mail of the supervisor is mandatory. This should be included as a part of the Internship Diary according to the prescribed format.
e. The Contents of the Report must include:
   I. Introduction.
   II. Objectives of the Internship.
   III. About the Organisation (Sector, Activities, Operations).
   IV. Description of the work.

The Assessment for the internship must have the following components:
a. Internship Report: 20 marks
b. Internship Diary: 20 marks
c. Seminar Presentation: 30 marks
d. Viva-Voce Examination: 30 marks

MTIN315I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits- 60 Hours) (L-T-P: 0-0-4)

Objective(s)
The students are required to undergo an internship in work related to Commerce and Management during the semester break at the end of Fourth Semester or Fifth Semester. The purpose of this internship is to expose the students to real-life industry work situations. This is an opportunity for the students to learn the application of knowledge that they have acquired from the classes, in an on-the-job situation.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Identify career alternatives prior to graduation. (Understanding)
CO 2: Translate theory into practice. (Applying)
CO 3: Improve work habits and attitudes towards job success in workplace (Creating)

INTRODUCTION
The field of Management is very practical oriented and requires an in-depth knowledge about both the theoretical and practical aspect of business operations. In the BBA programme the students are made acquainted with the various facets of General Management, Marketing, HR and Finance functions. However, the lessons mostly remain with the limits of classroom discussion. The real practices of business are much more complex and subject to judgement of the manager. This internship is an attempt to enable the students to acquire some learning experiences in the practical field and equip themselves with necessary traits to succeed in the corporate environment.

INSTRUCTION AND GUIDELINES FOR STUDENTS
The students should follow the following instruction and guidelines during the course of internship:
1. The internship should be for a minimum duration of two weeks for 80 hours which can be extended up to any limit depending upon the convenience and requirement of the student and the organisation respectively.
2. The students have to undergo the internship during the semester break at the end of 3rd semester examination or at the end of 5th semester examination. Any students willing to undergo internship during the semester classes will not be encouraged and would be completely on his/her own cost of attendance and classes. Further, in such a case, the Department holds full right to reject the internship of such student
3. The students can undergo internship at any organisation which is recognised or registered, as applicable, of their choice but the work must be related to commerce and management.
4. After the completion of the internship, the students must submit the Internship Report which should include the Internship Diary as an Annexure to the Report. The format of the Internship Report and Internship Diary should be in accordance with the one prescribed by the Department. e. There would be a Seminar Presentation (PPT) and Viva-Voce Examination towards the end of the 6th Semester based on which the students would be evaluated for the internship. The Internship report would also be a part of evaluation.

STRUCTURE OF INTERNSHIP
The Internship Report must comprise of the following:
a. Recommendation Letter from the Department.
b. Completion Certificate from the Organisation where the student has worked as intern.
c. Internship Diary as per the prescribed format.
d. Organisation details (Address, E-mail, Contact Number) including name, contact number and e-mail of the supervisor is mandatory. This should be included as a part of the Internship Diary according to the prescribed format.
e. The Contents of the Report must include:
   I. Introduction.
   II. Objectives of the Internship.
   III. About the Organisation (Sector, Activities, Operations).
   IV. Description of the work.

The Assessment for the internship must have the following components:
a. Internship Report: 20 marks
b. Internship Diary: 20 marks
c. Seminar Presentation: 30 marks
d. Viva-Voce Examination: 30 marks
BBA (Honours)

MTDI408P: RESEARCH PROJECT/DISSERTATION - I
(6 Credits - 180 Hours) (L-T-P: 0-0-12)

Objective(s)
The basic objective of the project work is to give students an idea of research during 7th semester. In which they need to undertake a field survey for collecting data. Further they need to analyse the data and present a report on the topic in which they have conducted research. The evaluation is done on the basis of the project report, presentation and viva-voce examination.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the different types of research project. (Remembering)
CO 2: Explain the various steps of designing research project (Understanding)
CO 3: Build questionnaires and schedules (Applying)
CO 4: Assess the data for analysis (Analyzing)
CO 5: Appraise the findings in the report (Evaluating)
CO 6: Design a research project report (Creating)

Guidelines Related To Project:
The entire project will be carried out in one phase during 7th semester. It includes Introduction and Review of Literature part, Research Methodology, Data Analysis and Interpretation and Findings, suggestions and conclusion part.

The Dissertation will comprise of the following:
1. Synopsis: Submission of a write up on a specific area/topic of study
2. Review of Literature: Submission of a specified number of reviews to respective guide
3. Research Methodology: Lecture based on the topic of study
4. Referencing Style: Lecture on referencing style to be followed while submitting report
5. Training on application of Statistical software used in research
6. Submission of Progress Report

Report should comprise of Introduction, Review of Literature, Research Methodology and References. EVALUATION:
A diary is to be maintained by every student to keep a record of meeting with his/her guide. A format of the diary will be circulated at the beginning with the semester.

Evaluation will be done by the respective guide based on timely submission of part-work and quality of work as follows:
Synopsis (30 marks)
Review of Literature (30 marks)
Research Methodology (30 marks)
Publication in Referred Journal: (10 marks)

MTDI409P: RESEARCH PROJECT/DISSERTATION - II
(6 Credits - 180 Hours) (L-T-P: 0-0-12)

BBA (Honours) with Research
MTDI410P: Dissertation-I
(18 Credits - 540 Hours) (L-T-P: 0-0-36)

Objective(s)
The objective of the course would be to educate the students about the various dimensions of a research based project work. The students will also be taught about the application of statistical tools through SPSS. In 7th sem (BBA – Research)

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the different types of research project. (Remembering)
CO 2: Explain the various steps of designing research project (Understanding)
CO 3: Build questionnaires and schedules (Applying)
CO 4: Assess the data for analysis (Analyzing)
CO 5: Appraise the findings in the report (Evaluating)
CO 6: Design a research project report (Creating)

The Dissertation will comprise of the following:
1. Synopsis: Submission of a write up on a specific area/topic of study
2. Review of Literature: Submission of a specified number of reviews to respective guide
3. Research Methodology: Lecture based on the topic of study
4. Referencing Style: Lecture on referencing style to be followed while submitting report
5. Training on application of Statistical software used in research
6. Submission of Progress Report

Report should comprise of Introduction, Review of Literature, Research Methodology and References. EVALUATION:
A diary is to be maintained by every student to keep a record of meeting with his/her guide. A format of the diary will be circulated at the beginning of the semester.

Evaluation at Phase I will be done by the respective guide based on timely submission of part-work and quality of work as follows:
Synopsis (30 marks)
Review of Literature (30 marks)
Research Methodology (30 marks)
Publication in Referred Journal: (10 marks)

Mapping of COs to Modules

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MTDI411P: DISSERTATION-II
(20 credits - 600 hours) (L-T-P: 0-0-40)

Objective(s)
The objective of the course would be to develop analytical skills among the students for solving any research queries. The students will also be taught about the preparation of a project report. In 8th semester of BBA Research

Course/ Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the different types of research project. (Remembering)
CO 2: Explain the various steps of designing research project (Understanding)
CO 3: Build questionnaires and schedules (Applying)
CO 4: Analyse the data for analysis (Analyzing)
CO 5: Appraise the findings in the report (Evaluating)
CO 6: Design a research project report (Creating)
DISSERTATION GUIDELINES

Chapter I INTRODUCTION
   a. Broad introduction to thesis topic and method.
   c. On sense, usually the problem is to expand the body of knowledge examined in the literature review.
   d. Need for the research. Who will benefit? Discuss applied and scientific contributions.
   e. Nominal definitions. Define central terms.
   f. Context. Add further info to clarify the research problem.

Chapter II THEORY Literature review
Organize by idea; avoid stringing together abstracts of articles.
   a. Overview. Theoretical foundations
   b. Literature. Group articles by ideas. For a given idea, first discuss common strands in the literature, then departures.
   c. Model of a process, usually. Based on the lit reviewed.
   d. Hypotheses (in broad sense of the term; also called Propositions). For each, give brief restatement of justification tied to
      earlier sections; explain derivation and implications. Include assumptions. Explicitly state plausible rival hypotheses
      (explanations of process) of a substantive nature.
   e. Scope of the study. Theoretical assumptions; discuss limitations they impose.

Chapter III METHODS
Outline in a few pages.
   a. Introduction. General description of method and design
   b. Design. Experiment, quasi-experiment, survey, and so forth. Detailed description
   c. Sample. Universe, population, element, sample design, tolerance, probability.
   d. Measurement. Operational definitions. Include, as applicable, detailed discussion of indexes/scales. Specify methods used
      to assess validity and reliability.
   e. Analysis. Techniques to be used; justification. Nature of relationships expected (e.g., asymmetrical, symmetrical,
      reciprocal; linear, monotonic, other curvilinear; necessary, sufficient, necessary and sufficient). Include dummy tables and
      worked examples of statistics.
   f. Validity. Design: Internal and external, with relevant subtypes.
   g. Methodological assumptions. Discuss limitations they impose.

APPENDICES
   a. Schedule. In Gantt Chart form.
   b. Facilities. Faculty and staff expertise, library and computer resources, other special facilities contributing to a successful
      study.
   c. Budget.
   d. Bibliographic essay. Sources searched (indexes, abstracts, bibliographies, etc.). Strengths and weaknesses of literature.

Chapter IV FINDINGS
   a. Brief overview.
   b. Results of application of method; any unusual situations encountered. Nature of sample
   c. Descriptive analysis. One-way frequency distributions on central variables
   d. Validity/reliability analysis.
   e. Tests of hypotheses. ANOVAs, cross tabulations, correlations, and such, depending on techniques used; give in same order
      as hypotheses.

Chapter V DISCUSSION
When discussing implications, deal with both the theoretical and the practical. Present only interpretations of the findings, not
opinion.
   a. Brief overview.
   b. Discussion of results of application of method. Implications.
   c. Discussion of descriptive analysis. Implications.
   d. Discussion of tests of hypothesis. Implications.
   e. Post-hoc analysis. Implications.

Chapter VI CONCLUSION
May include writer’s opinion.
   a. Summary of entire thesis in a few pages.
b. Conclusions. Refer to lit review.
c. Implications. Speculate about broadest possible consequences, both theoretical and practical. Label speculation clearly.
d. Limitations. Theory, method.
e. Suggestions for future research.

Appendices. Bibliographic essay. Questionnaire and coding manual, if any. Raw data.

BIBLIOGRAPHY. Include all relevant sources examined, whether cited or not.
DEPARTMENT OF COMMERCE

PROGRAMME: BACHELOR OF COMMERCE
DEGREE: BCOM (HONOURS)/ BCOM (HONOURS) WITH RESEARCH

VISION
Creating an institute of academic excellence with commitment to quality teaching and research environment in the field of Commerce and Management

MISSION
1. To empowering students with all the knowledge and guidance which help them to become excellence in management professionals.
2. To impart value based education for students which ultimately enhances their credibility and employability
3. To develop a niche for ourselves in the specialized field of commerce and management.
4. To nurture and motivate the students to become globally competent.

Program Outcomes

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<td>Ability to engage in reflective and independent thinking by understanding the concepts of Commerce and Business.</td>
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<td>Ability to examine the problems in different branches of Commerce and Business.</td>
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<td>Capability to reduce a business problem and apply the classroom learning into practice to offer a solution for the same.</td>
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<td>Effective decision making in business and commerce through meaningful and impactful community engagement practices.</td>
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<td>Ability to search for, locate, extract, organise, evaluate, analyse and report information that is relevant to particular problem.</td>
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<td>Ability to ascertain unethical behaviour, falsification and manipulation of information</td>
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Program Specific outcomes (PSO)

PSO 1: To enhance knowledge related to major theories and models in key areas of Accountancy, Finance, Taxation, Marketing, Human resource management and other allied & interdisciplinary areas.
PSO 2: To nurture skills on entrepreneurship and business analysis required for an entrepreneur.
PSO 3: To empower the students to take-up professional courses viz., CA, CS, CMA, CFA and competitive examination like AFS/IFS.
PSO 4: To enable students to work on real life projects viz., Service learning, Internship, Industry Visit and real-life projects and assignments.
PSO 5: To enable students to manage self and various social systems for the betterment of the society at large.

BCOM WITH 4 YEAR UG DEGREE (HONOURS)/ BCOM WITH 4 YEAR UG DEGREE (HONOURS WITH RESEARCH)

COURSE OUTCOMES MAPPING WITH POS/PSOs

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**DEPARTMENT OF COMMERCE**

**DETAILED SYLLABUS**

**MAJOR COURSES**

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**CMFA100T: FINANCIAL ACCOUNTING**

(4 Credits-60 hours) (L-T-P: 4-0-0)

**Objective**

The objective of this course is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions and assess the financial condition of the business.

**Course/Learning Outcomes**

After learning this course, the students will be able to:

CO 1: Define the theoretical framework and accounting process (Remembering)

CO 2: Explain the accounting process (Understanding)

CO 3: Identify the important constituents of business income (Applying)

CO 4: Analyse the final accounts (Analysing)

CO 5: Evaluate the accounting for inland branches (Evaluating)

CO 6: Elaborate the accounting system for dissolution of the partnership firm (Creating)

**Module I: Theoretical Framework, Accounting Process, Financial Accounting Standards (10 Hours)**

- **Theoretical Framework**: Accounting as an information system, the users of accounting information and their needs. Qualitative characteristics of accounting, Functions, advantages and limitations of accounting; accounting principles: Basic concepts and conventions, branches of accounting. Bases of accounting: cash basis and accrual basis

**Accounting Process**: Double entry

- book keeping system - Basic accounting equation, accounting cycle; Recording of a business transaction: Journal, Ledger and preparation of trial balance including adjustments, Capital and Revenue expenditure and receipts, Profit and Loss Account and Balance Sheet (Sole Proprietorship only). Rectification of Errors, Depreciation Accounting.


**Module II: Accounting for Hire Purchase and Installment System (12 Hours)**

Meaning of Hire Purchase and Installment Purchase System - Journal entries and ledger accounts in the books of Hire Vendors and Hire purchasers for large value items including default and repossession, stock and debtors system; Difference between
Module III: Branch and Departmental Accounting (16 Hours)
- Meaning, objectives, need of Branch Accounting; classification of Branches; Accounting treatment of Branch Accounting – synthetic or Debtors System, Analytical or stock and debtor for system. Final Account system including accounting treatment for independent Branch.
- Departmental accounting; introduction, methods and techniques, allocation of expenses, inter departmental transfer, preparation of departmental Trading, Profit and Loss account and balance sheet.

Module IV: Royalty Accounts (12 Hours)
Meaning and definition, Technical Terms, Royalty, Landlord, Tenant, Minimum Rent, Short Workings, Recoupment of Short Workings under (Fixed Period) restrictive and non-restrictive (Floating Period), Recoupment within the Life of the Lease, Treatment of Strike and Stoppage of work, Accounting Treatment in the books of lessee and lessor, journal entries and Ledger Accounts including minimum rent account.

Module V: Accounting for Partnership Firm (10 Hours)
Partnership Accounts: Essential characteristics of partnership, Partnership deed, Final accounts, adjustments after closing the accounts, Fixed and fluctuating capital, Goodwill, Joint Life Policy, Change in Profit Sharing Ratio. Reconstitution of a partnership firm: Admission of a partner, Retirement of a partner, Death of a partner, Amalgamation of partnership firm; Dissolution of a partnership firm: Modes of dissolution of a firm, Accounting entries, Insolvency of partners, Sale of firm to a company, Gradual realization of assets and piecemeal distribution.

Suggested Readings
- Gupta RL and Radhaswamy, M: *Financial Accounting*; Sultan Chand and Sons, New Delhi
- Gautam HC, and Sikidar S, *Financial Statement Analysis*; New Central Book Agency (P) Ltd, Kolkata

Mapping of Cos to syllabus

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CMMP101T: MANAGEMENT PRINCIPLES AND APPLICATIONS
(4 credits- 60 hours) (L-T-P: 4-0-0)

Objective
The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Define the basic concepts and facts of management. (Remembering)
CO 2: Identify the best practices from around the globe in management. (Understanding)
CO 3: Appraise the learning to transform the management practices of organisations. (Applying)
CO 4: Interpret management principles and practices. (Analysing)

Module I: Introduction to Management (15 Hours)
Concept and Definitions of Management; Need and Significance of Management; Managerial Functions - Planning, Organising, Staffing, Directing and Controlling; Evolution of the Management Thought, Classical Approach – Taylor and Fayol, Neo-Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency
Approach; MBO and MBE- Peter F. Drucker, Michael Porter – Five-force analysis, Three generic strategies and value-chain, analysis; ‘Fortune at the Bottom of the Pyramid’ – C. K. Prahalad.

Module II: Planning  (10 Hours)
Concept and significance of planning; types of plans; Strategic planning – Concept, process, Importance and limitations
Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT, BCG Matrix, Competitor Analysis), Business environment; Concept and Components; Decision-making – concept, importance; Committee and Group Decision-making, Process, Perfect rationality and bounded rationality, Techniques (qualitative and quantitative, MIS and DSS)

Module III: Organising  (10 Hours)
Concept and process of organising; Span of management, Different types of authority (line, staff and functional), Decentralisation, Delegation of authority; Formal and Informal Structure; Principles of Organising; Network Organisation Structure

Module IV: Staffing and Directing  (15 Hours)
Staffing: Concept of staffing, staffing process; Motivation: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow’s Need-Hierarchy Theory; Herzberg’s Two-factor Theory, Vroom’s Expectancy Theory.
Leadership: Concept, Importance, Major theories of Leadership (Likert’s scale theory, Blake and Mouten’s Managerial Grid theory,), Transactional leadership, Transformational leadership, Transforming Leadership; Communication: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication.

Module V: Control and changing dynamics in management  (10 Hours)
Control: Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Ratio Analysis, ROI, Budgetary Control, EVA, PERT/CPM; Emerging issues in Management.

Suggested Readings
4. Newman, Summer, and Gilbert, Management, PHI

Mapping of COs to Syllabus:

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CMBL200T: BUSINESS LAW
(4 Credits- 60 hours) (L-T-P: 5-0-0)

Objectives
The objectives of this course is to enable students to have a detailed understanding of the Indian Contract Act, 1872, Sales of Goods Act, Consumer Protection Act, Essential Commodities Act and the partnership act. The course also aims at giving the students in depth knowledge about Companies Act 2013.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Define the legal terms related to Contract Act, sales of goods Act, consumer protection, partnership Act and Companies Act 2013. (Remembering)
CO 4: Analyze the relevant legal provision that applicable for the business. (Analysing)

**Module I: The Indian Contract Act, 1872 (15 Hours)**

a. Proposal- its communication, acceptance and revocation; Agreement vis-à-vis contract, void agreement & voidable contract
b. Consideration – essential elements, exception to rule- No consideration no contract; privity of contract and consideration
c. Capacity to contract; free consent – coercion, undue influence, misrepresentation, fraud; Mistake – of fact and of law
d. Legality of object – agreements opposed to public policy and in restraint of marriage, trade & legal proceedings; Contingent contracts
e. Performance of contract–liability of joint promisors; Consequences of breach of contract–liquidated damages and penalty
f. Quasi contract; Indemnity guarantee

g. Bailment–Duties and liabilities of bailor and bailee, bailment of pledges;
h. Agency—types of agency, agents duty to principal and vice-versa, ratification and revocation of agent’s authority

**Module II: The Sale of Goods Act, 1930 (15 Hours)**


**Module III: Consumer Protection: (15 Hours)**

a) Consumer Protection Act, 1986: Consumer Protection in India; Rights of Consumers; Consumer Dispute Redressal Forums; Nature and Scope of Remedies.
b) Essential Commodities Act, 1955: Essential Commodities; Powers of Central Government; Authorities responsible to administer the Act; Delegation of powers; Nature of Order passed under the Act; Seizure and Confiscation of Essential Commodities; Offences by Companies.

**Module IV: The Indian Partnership Act, 1932 (10 Hours)**

a) Nature of Partnership; Relation of partners-inter se; Relation of partners to third parties; Incoming and outgoing partners
b) Dissolution of Firm; Registration of Firms-effect of non-registration

**Module V: The Companies Act, 2013 (15 Hours)**

a) Meaning, characteristics and kinds; Lifting the corporate veil; Registration and incorporation; Memorandum of Association–alteration therein
b) Doctrine of Ultra Vires–consequences of ultra vires transaction
c) Articles of Association–alteration therein, its relation with memorandum of Association; Rule of constructive notice; Doctrine of Indoor Management; Prospectus- liability for misstatement, statement in lieu of prospectus
d) Shares–statutory restrictions, kinds of share capital; Debentures
e) Directors- Position, Appointment, Removal, Power & Duties, their responsibility,
f) Meetings; Majority Powers and Minority Rights; Prevention of Oppression and Mismanagement
g) Winding up-liability under company Act 2013: Winding up by order of court and subject to its supervision; Voluntary winding up; Conduct of winding up

**Suggested Readings**

2. Consumer Protection Law and Practice- Dr. V.K. Aggarwal
5. Indian Partnership Act, 1932 (Lawmann’s) (2017)- Lawmann

**Mapping of COs to Syllabus**

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CMBE201T: BUSINESS ECONOMICS  
(4 Credits - 60 HOURS)  
L-T-P: 4-0-0

Objective
This course is designed to provide students with the necessary knowledge and skills regarding Business Economics. The syllabus is designed in such a way that the students can relate to the various economic aspects of a business enterprise. By the end of the term the students will be able to understand the various economic theories, tools and laws applicable to business and will be able to implement them in their future for building a profitable business model.

Course/Learning Outcomes
At the end of the course students will be able to:

CO 1: Define and tell what business economics is. (Remembering)
CO 2: Understanding economic concepts related to business. (Understanding)
CO 3: Identify the various tools of economics and applying them in daily business activities. (Applying)
CO 4: Classification of the market according to the various structures (Analyzing)
CO 5: Evaluate the revenue and cost models of business (Evaluating)
CO 6: Create value to the organization by economic estimations. (Creating)

Module I: Basic Concepts (12 Hours)
Nature and scope of Business Economics; Scarcity and Choice; Positive and normative economics; Production possibility frontier, concepts of opportunity cost, rate of growth; Demand, Supply, rate of growth, and of total, average and marginal functions, Market demand, elasticity, shifts and movements.

Module II: Consumer Equilibrium (12 Hours)
Concept of Utility: Cardinal theory & Ordinal theory: Indifference curves: Consumer equilibrium; utility maximization; Engels curve, Income and substitution effects: Hicks and Slutsky equation; inferior, normal and Giffen goods Applications of indifference curves to other economic problems; Revealed preference theory.

Module III: Production and Cost Analysis (12 Hours)
Concept of economic cost; Short run and long run cost curves; isoquants; production functions with one and more variable inputs; returns to scale; Law of variable proportion, total, average and marginal product, marginal rate of technical substitution, iso-cost line and firm’s equilibrium, economies of scale; increasing and decreasing cost industries; Prices as parameters: Firm equilibrium and profit; short and long-run supply function; taxes and subsidies

Module IV: Market Structure (12 Hours)
Perfect competition: Equilibrium of the market. Long run industry supply: producer and consumer surplus. Applications: effects of taxes and subsidies. Monopoly: Equilibrium; supply; multipiant firm; monopoly power; deadweight loss; price discrimination; bundling; two-part tariffs. Monopolistic Competition: Product differentiation; equilibrium of the firm in the industry-with entry of new firms and with price competition. Comparison with pure competition

Module V: Macro Economics (12 Hours)
Trade Cycle - Phases of Trade Cycle, Cause and Remedies of Trade Cycle, Budget - Meaning and purpose of Government budgets, Types of budget- Revenue and functional, classifications of budgets; Employment - Types of Unemployment, Concept of Full Employment

Suggested Readings
1. Ahuja H.L, Advanced Economic Theory, S Chand
3. Jhingan M L, Micro Economics, S Chand

Mapping of COs to syllabus

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CMHR202T: HUMAN RESOURCE MANAGEMENT
(5 Credit-75 Hours) (L-T-P: 5-0-0)

Objectives:
- To familiarize students with the concept, techniques, programme, policy associated with Manpower Management.
- The subject will guide the students towards acquiring knowledge connecting with job evaluation, its form, method and evaluation process.
- To visualise the different emerging and dynamic prospects of HRM in the Global Market.

Course/Learning Outcomes
After learning this course, the students will be able to:
- CO 1: Remembering of different terms associated with HRM. (Remembering)
- CO 2: Understanding about different plan and policy of HRM. (Understanding)
- CO 3: Application of different appraisal method in HRM. (Application)
- CO 4: Analysing the various emerging horizon in Manpower Management. (Analysing)

Module I: Introduction to HRM (15 Hours)
Concept and scope of HRM, Evolution and growth of HRM in India, Significance, Functions and challenges of HRM; status and qualities of HR Managers; objectives of Human Resource policies; HR Planning, Kaizen, TQM and Six Sigma. Personnel Management vs. HRM, HR Policies, HRM vs HRD. Emerging Challenges of Human Resource Management;

Module II: Recruitment and Acquisition of Human Resource (15 Hours)
Concept of recruitment, process of recruitment, sources of recruitment, Advantages and disadvantages of internal and external sources; selection procedure, difference between selection and recruitment, Types of tests and interviews, Job Evaluation, job description and job specification.

Module III: Training and Development (15 Hours)
Concept and Importance; Identifying Training and Development Needs; Training vs. Development; Designing Training Programmes; Role- Specific and Competency- Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.

Module IV: Performance Appraisal (15 Hours)
Nature, objectives and importance; Modern techniques of performance appraisal; potential appraisal and employee counselling; job changes - transfers and promotions; Compensation: concept and policies.

Module V: Emerging Horizons in HRM (15 hours)
Impact of Globalization on HRM, Future trends of HRM (Hybrid Work Model, Human Leadership, People Analytics, transition from Employee Well-being to Healthy Organization), concept of virtual organization, types of virtual organizations, learning organization; Distinction between Domestic and International HRM, Repatriation, Workforce diversity, Downsizing, Exit Interview; VRS; Human Resource Information System.

Suggested Reading:
2. Graham, Ryan, Strategic Human Resource Management, Pearson Education
4. S.S. Khanka, Human Resource Management,

Mapping of Course Outcomes

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CMCM203T: COST AND MANAGEMENT ACCOUNTING
(5 Credit- 75 hours) (L-T-P: 5-0-0)

Objective
To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment and cost accounting bookkeeping systems.
**Course/Learning Outcomes**

After learning this course, the students will be able to:

**CO 1:** Define the concept and the role of cost accounting and Management Accounting in the modern economic environment. (Remembering)

**CO 2:** Describe the methods of calculating stock consumption and labour cost. (Understanding)

**CO 3:** Apply the tools and techniques of Management Accounting in managerial decision (Applying).

**CO 4:** Examine the methods of Allocation, apportionment and absorption of overheads. (Analysis)

**CO 5:** Interpret the impact of the selected costs method. (Evaluating)

**Module I: Introduction to Cost and Management Accounting (10 Hours)**
- Meaning, objectives and advantages of cost accounting and Management Accounting
- Difference between cost accounting, financial accounting and Management Accounting
- Cost concepts and classifications
- Elements of cost
- Installation of a costing system
- Role of a cost accountant in an organization
- Preparation of Cost Sheet

**Module II: Management Accounting (10 Hours)**
- Tools and Techniques of Management Accounting
- Budgeting and Budgetary Control
- Standard Costing and Variance Analysis
- Absorption versus Variable Costing
- Role of Management Accountant in Decision Making

**Module III: Material Costing and Labour Costing (20 Hours)**

**a. Materials:**
- Material/inventory control techniques
- Accounting and control of purchases, storage and issue of materials
- Methods of pricing of materials issues — FIFO, LIFO, Simple Average, Weighted Average

**b. Labour:**
- Accounting and Control of labour cost
- Time keeping and time booking
- Concept and treatment of idle time, overtime, labour turnover and fringe benefits
- Methods of wage payment and the Incentive schemes-Halsey, Rowan, Taylor’s Differential piece wage

**Module IV: Overhead Costing and Cost Records (20 Hours)**
- Definition: Importance; Classification; allocation, apportionment and absorption of overheads
- Methods of absorption of manufacturing overheads, computation of Machine hour rate
- Integrated and non-integrated accounting system
- Reconciliation Cost and financial accounts

**Module V: (15 Hours)**
- Module costing; Job costing; Contract costing; Process Costing (process losses, valuation of work in progress, joint and by-products); Service costing (only transport)
- Distinguishing between job costing and process costing

**Suggested Readings**

5. Rajiv Goel, *Cost Accounting*, International Book House
10. Iyengar, S.P. *Cost Accounting*, Sultan Chand & Sons

**Mapping of COs to Syllabus**

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CMQT204T: QUANTITATIVE TECHNIQUES FOR BUSINESS
(4 Credits – 60 hours) (L-T-P: 4:0:0)

Objectives
1. Students will be able to apply quantitative techniques such as statistical analysis, linear programming, simulation, and decision analysis to solve business problems and make data-driven decisions.
2. Students will be able to design and conduct experiments to test hypotheses and evaluate business strategies.
3. Students will be able to interpret the results of quantitative analyses and effectively communicate findings to stakeholders using visual aids such as graphs, charts, and tables.

Course/Learning Outcomes
CO 1: Remembering: Remembering the key theories behind quantitative methods.
CO 2: Understanding: Understanding the relevance & application of various quantitative techniques in business decisions.
CO 3: Applying: Application of different quantitative techniques under different circumstances to take business decisions.
CO 4: Analysing: Analysing and solving business problems using quantitative methods.

Module I: Linear Algebra (10 Hours)
Matrices, vectors, systems of linear equations; Calculus: derivatives, integrals, optimization, applications business; Differential equations: first-order equations, second-order equations, applications in business.

Module II: Optimization (15 Hours)
Linear programming, quadratic programming, convex programming, applications in business; Game theory: Basic concepts, two-person zero-sum games, mixed strategies.

Module III: Descriptive statistics (15 Hours)
Descriptive statistics: measures of central tendency, measures of variability, graphical representation of data.

Module IV: Inferential statistics (10 Hours)
Probability theory - random variables, distributions, conditional probability, Bayes’ theorem, hypothesis testing, confidence intervals, goodness-of-fit tests; correlation and regression - simple regression, multiple regression.

Module V: Time series (10 Hours)
Trend analysis, seasonal analysis, ARIMA models, forecasting

Suggested Readings

COs mapping to Syllabus

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CMMM300T: MARKETING MANAGEMENT
(5 credits – 75 hours) (L-T-P: 5-0-0)

Objective
To apply relevant knowledge, skills and exercise professional judgement in selecting and applying marketing principles and concepts in different business contexts and to contribute to the evaluation of the performance of an organisation and its strategic and operational development.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Define and explain marketing mix models in workplace and contribute to organisational growth (Remembering and Understanding)
CO 2: Assess the impact of product and brand management decisions on organizational performance (Applying)
Module I: Introduction to Marketing (15 Hours)
Marketing in the Twenty-First Century; The Impact of the New Economy; Change in Customers; Changes in Business Scenario; Marketing Objectives; Marketing Environment; Marketing Mix; Elements of Marketing Mix, Product Mix, Price Mix, Promotion/Communication Mix, Place Mix/ Distribution Mix; Significance of Marketing Mix; Factors Affecting Marketing Mix; Growth & Future of marketing in a new economy.

Module II: Product, and Product Brand Management (15 Hours)

Module III: Pricing and Promotion Decision (15 Hours)
a) Pricing Decisions; Concept of Price; Significance of Pricing; Factors Affecting Pricing Decisions; Major Pricing Methods; Pricing Policies and Strategies; Geographical Pricing, Product Line Pricing, Discounts and Rebates.
b) Meaning and Nature of Promotion, Importance of Promotion, Communication Process, Concept of Integrated Marketing Communication, Meaning of Promotion Mix, Elements of Promotion Mix (Methods of Promotion), Factors Influencing Promotion Mix Decisions, Promotion Mix Strategies, Communication Planning and Control.

Module IV: Distribution and Retailing (15 Hours)
c) Meaning of Retailing, Functions and Services of Retailers, Types of Retailing; Malls and major markets; FDI in retail market; Management of Retailing Operations: An Overview, Retailing in India – Changing Scenario.

Module V: Rural Marketing, Consumer Protection and Developments in Marketing (15 Hours)
c) Recent Developments in Marketing, Social Marketing, Direct Marketing, Online Marketing, Relationship Marketing, Green Marketing, Marketing Ethics, Sustainable Marketing, Marketing of Services.

Suggested Readings

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CMCA301T: CORPORATE ACCOUNTING
(5 credits– 75 hours) {L-T-P: 5-0-0}

Objectives
The course aims to help the students to acquire the conceptual knowledge of the corporate accounting system and to learn the techniques of preparing the financial statement of companies.
Course/Learning Outcomes

CO 1: Explain the matters related to issues of share capital, debentures, bonus shares, redemption of preference shares and debentures of a company. (Understanding)

CO 2: Construct the profit and loss account and balance sheet of corporate entities. (Applying)

CO 3: Analyse the valuation of intangible assets and shares of a company. (Analysing)

CO 4: Determine the alteration and reduction of company’s share capital. (Evaluating)

CO 5: Adapt the accounting problems related to amalgamation of companies and Holding companies. (Creating)

Module I: Accounting for Share Capital & Debentures (15 hours)
Types of shares; Accounting for Share Capital, Issue of Rights and Bonus Shares; ESOPs and Buy-Back of shares; Issue and Redemption of preference Shares and Debentures. Underwriting of Shares and Debentures. [In reference to Relevant Accounting Standards (AS and Ind AS) and Guidance Notes as applicable.]

Module II: Final Accounts (15 hours)
Preparation of profit and loss account and balance sheet of corporate entities, excluding calculation of managerial remuneration, Disposal of company profits

Module III: Valuation of Intangible Assets and Shares (15 hours)
Valuation of Intangible Assets and Shares, Value Added Statement, Economic Value Added, Market Value Added, Shareholder Value Added and Valuation of Shares

Module IV: Amalgamation of Companies and Internal reconstruction (15 hours)
Concepts and accounting treatment for Amalgamation of companies as per AS 14/ Ind AS 103 (excluding inter-company holdings). Internal reconstruction: concepts and accounting treatment excluding scheme of reconstruction.

Module V: Accounts of Holding Companies (15 hours)
Preparation of consolidated balance sheet with one subsidiary company, Relevant provisions of Accounting Standard: 21 (ICAI).

Note:
1. The relevant Accounting Standards (both AS & Ind AS) for all of the above topics should be covered.
2. Any revision of the relevant Indian Accounting Standards/Accounting Standards would become applicable.
3. The relevant provisions of The Companies Act, 2013, as applicable for all of the above topics should be covered.

Suggested Readings
5. Goyal V.K. and Goyal R., Corporate Accounting. PHI Learning.
8. Dam B.B anf Gautam H.C., “Corporate Accounting” Gayatri Publications, Guwahati

Mapping of COs to Syllabus

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CMBE302T: BUSINESS ENVIRONMENT
(4 credits—60 hours) (L-T-P: 4-0-0)

Objective
The course attempts to understand the macro environment in which a business organisation operates. It also aims to analyse and understand the policies of the government implemented from time to time and to assess their impact on business.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Explain the various categories that constitute the business environment (Understanding)
Module I: Business Environment (15 hours)
Concept, Components and importance of Indian Business Environment; Types of Business environment-Cultural, Demo graphic and social-cultural, political, technological, economic and legal environment; Significance and approaches of environmental forecasting; Interaction between internal and external environment.

Module II: Economic trends (12 hours)
History of Economic system in India; Economic reforms in India –Liberalization, privatization and globalization and its impact on business; Industrial Policy, Fiscal Policy; Monetary Policy; Foreign Investments policy in India.

Module III: Multinational Corporations (8 hours)
Multinational corporations and their participation in India; strategies of multinational corporations; competitive strengths policies and performance.

Module IV: Business Ethics and Social Responsibilities (10 hours)
Business ethics and social responsibilities; relationship between business and society; Corporate power social accountability; Ethical issues and values in business; Corporate Social policies - issues and challenges; Ecological and environmental issues.

Module V: Economic Development of North Eastern Region of India (15 hours)
Special package for economic development of the north eastern region; DONER and its role in economic development, infrastructure and industry; North East Industrial Policy- promotional measures for cross-border trade, Role of NEC and NEDFI.

Problems and prospects of the industry in Assam, Brief study of the tea industry, paper industry, food processing industry, silk industry and bell metal industry; tourism industry.

Suggested Readings
5. Dutta Rnddar and Sundaram KPM, S. Chand & Co. Ltd., New Delhi.
7. Gupta, Liberalisation - its impact on Indian Economy, Macmillan.

Mapping of COs to Syllabus

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CMAG303T: AUDITING AND CORPORATE GOVERNANCE
(4 Credits-60 hours) (L-T-P: 4-0-0)

Objectives:
The course aims to provide knowledge of the various concepts related to auditing, principles, procedures and techniques in accordance with current legal requirements. The course also focuses on the procedures related corporate governance theories, models and various corporate scandals in India and Abroad. It also tries to familiarize the learners with the ethics and moral values that a business organization should adhere to and also describes the various corporate responsibilities towards the society.

COURSE/LEARNING OUTCOMES
After completing the course successfully the student will be able to-
CO 1: Understand the basic concepts of auditing and execute the knowledge of special areas of audit and computer aided audit techniques and tools(Understanding and Applying)
CO 2: Explain the concepts of audit of Limited companies, liabilities of statutory Auditors under the companies Act 2013(Understanding)
CO 3: Analyse the procedures related Corporate Governance theories and models and various corporate scandals in India and Abroad
CO 4: Evaluate the requirements of different business ethics, corporate ethics in a business
CO 5: Explain the concept of CSR with responsibility with corporate Sustainability

Module I: Introduction (10 hours)
Introduction, Meaning, Objectives, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities.

Module II: Audit of Companies (12 hours)
Audit of Limited Companies: Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor’s Report- Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013;

Module III: Special Areas of Audit (10 hours)
Special Areas of Audit: Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Computer aided audit techniques and tools; Auditing Standards; Relevant Case Studies/Problems.

Module IV: Business Ethics (8 hours)
Morality and ethics, business values and ethics, approaches and practices of business ethics, corporate ethics, ethics program, codes of ethics, ethics committee; Ethical Behaviour: Concepts and advantages; Rating Agencies; Green Governance; Clause 49 and Listing Agreement

Module V: Corporate Governance (10 hours)
Conceptual framework of Corporate Governance: Theories & Models, Broad Committees; Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Module VI: Corporate Social Responsibility (CSR) (10 hours)
Concept of CSR, Corporate Philanthropy, Strategic Planning and Corporate Social Responsibility; Relationship of CSR with Corporate Sustainability; CSR and Business Ethics, CSR and Corporate Governance; CSR provisions under the Companies Act 2013; CSR Committee; CSR Models, Codes, and Standards on CSR

Suggested Readings
3. Anil Kumar, Corporate Governance: Theory and Practice, Indian Book House, New Delhi
4. KV Bhanumurthy and Usha Krishna, Politics, Ethics and Social Responsibility of Business, Pearson Education
5. N Balasubramanian, A Casebook on Corporate Governance and Stewardship, McGraw Hill Education
6. Christine Mallin, Corporate Governance (Indian Edition), Oxford University Press Relevant Publications of ICAI on Auditing (CARO)
7. Sharma, J.P., Corporate Governance, Business Ethics, and CSR, Ane Books Pvt Ltd, New Delhi

Note: Latest edition of text books may be used

Mapping of COs to Syllabus
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CMFM304T: FINANCIAL MANAGEMENT
(4 credits – 60 hours) (L-T-P: 4-0-0)

Objective
This Course will explain the financial tools and techniques, which can be used to help firms maximize value by improving decisions relating to capital budgeting, capital structure and working capital management.
Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Explain the objectives and scope of financial management and time value of money (Remembering)
CO 2: Explain various capital structure theories and factor affecting capital structure decision (Understanding)
CO 3: Analyse the process of working capital management and capital budgeting process (Analysing)
CO 4: Critically judge the various theories of dividend and determine the factors affecting dividend polices (Evaluating)

Module I: Introduction (10 hours)

Module II: Investment Decisions (15 hours)
The Capital Budgeting process, Cash flow Estimation, Payback period Method, Accounting Rate of return, Net Present Value(NPV), Net Terminal Value, Internal Rate of Return (IRR), Modified Internal rate of return, Profitability Index, Capital budgeting under Risk- Certainty Equivalent Approach and Risk Adjusted Discount Rate.

Module III: Financing Decisions (15 hours)

Module IV: Dividend Decisions (10 hours)
Theories of Relevance and irrelevance of dividend decision for corporate valuation; Cash and stock dividends; Dividend polices in practice

Module V: Working Capital Decisions (10 hours)
Concepts of working capital, the risk –return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, inventory management and payables management.

Suggested Readings
4. Basic Financial Management, Khan and Jain, McGraw Hill Education

Mapping of COs to Syllabus

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CMTL305T: TAXATION LAW AND PRACTICES
(4 Credits – 60 hours) (L-T-P: 4 - 0 - 0)

Objective
To provide basic knowledge and equip the students with application of the principles of taxation and to acquaint them with the various provisions of Income-tax Act, 1961, Indirect tax laws (including GST Act 2017) and the relevant rules for filing of returns.

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Define the various concepts related to direct taxes and Indirect taxes. (Remembering)
CO 2: Explain the provisions of the direct tax laws and Indirect tax laws (including GST Act 2017). (Understanding)
CO 3: Execute the knowledge of the provisions of the direct tax laws and indirect tax laws to the various situations in actual practice. (Applying)
CO 4: Analyse the procedures related to filing of returns, TDS and GST return filing. (Analysing)
CO 5: Evaluate the requirements of different assessee for filing tax returns under the income tax laws. (Evaluating)
CO 6: Develop the skill of creativity in the field of indirect tax and direct tax laws with regard to tax savings and Indirect.
Module I: Introduction (15 hours)
Basic concepts: Income, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, maximum marginal rate of tax; Permanent Account Number (PAN)
Residential status: Scope of total income on the basis of residential status, Exempted income under section 10

Module II: Computation of Income under different heads-1 (15 hours)
Income from Salaries; Income from house property; Profits and gains of business or profession (basic numerical only); Capital gains; Income from other sources

Module III: Total Income and Tax Liability of Individuals (10 hours)
Assesses Total Income (Cluubing of Income) ; Set off and Carry Forward of Losses ; Deductions, Rebate and Relief ; Taxation of Individual ; Advance Tax; Tax Deducted at Source & Tax Collected at Source (excluding Non-resident); Filing of Return of Income ; Self-Assessment & Intimation.

Module IV: Concept of Indirect Taxes (10 hours)
Concept and Features of Indirect Taxes, Difference between Direct and Indirect Taxes, Background of erstwhile Indirect Taxes (Central Excise, VAT etc.), Customs Act-Basic Concepts and Definitions, Types of Duties, Valuation Rules, Computation of Assessable Value and Duties.

Module V: Goods and Services Tax (GST) Laws (10 hours)
Introduction to GST Law, Levy and Collection of CGST and IGST, Application of CGST/IGST law, Concept of Supply including Composite and Mixed Supplies, Charge of Tax including Reverse Charge, Exemption from Tax, Composition Levy, Basic concepts of Time and Value of Supply, Input Tax Credit, Computation of GST Liability, Registration, Tax Invoice – Electronic Way Bill, Returns and Payment of Taxes

Suggested Readings
7. Excel Utility’ available at incometaxindiaefiling.gov.in

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CMAT306P: AUDIT TRAINING
(4 Credit: 60 hours) (L-T-P: 3-0-1)

Objectives:
- To familiar with various concepts and principles of audit
- To understand the roles and responsibilities of an auditor
- To plan, conduct and report the audit
- To understand the interpretations of auditing standards
- To understand the principles and practice of auditing
- Learning through case studies & exercises.
Course/Learning Outcomes
After completing the course successfully, the student will be able to-
CO 1: Define the various concepts related to Auditing (Remembering)
CO 2: Explain the concepts of various types of audit and audit techniques (Understanding)
CO 3: Execute the Knowledge of special areas of Audit and computer aided audit techniques and tools (Applying)
CO 4: Examine the procedures related to various techniques of audit and preparation of audit report (Analysing)

Module I: Introduction (15 hours)
Audit: Meaning, objectives, nature and scope; Audit concepts: vouching, verification, internal control, internal check; Roles, liabilities and responsibilities of an auditor.

Module II: Audit types (15 hours)
Types of audit: Statutory audit, concurrent audit, internal audit, external audit, financial audit, operational audit, tax audit, cost audit, management audit.

Module III: Audit techniques (15 hours)
Vouching, confirmation, reconciliation, testing, physical examination, analysis, scanning, inquiry, verification of posting, Flow chart, observation, audit plan, audit check list, audit working paper, audit note.

Module IV: Audit training (Practical) (15 hours)
Undergo an audit training to get a practical exposure of auditing in a particular organisation. Preparation of audit report of the organisation.

Suggested Readings
3. Anil Kumar, Corporate Governance: Theory and Practice, Indian Book House, New Delhi
4. MC Kuchhal, Modern Indian Company Law, Shri Mahaveer Book Depot.(Publishers). (Relevant Chapters)
5. KV Bhanumurthy and Usha Krishna, Politics, Ethics and Social Responsibility of Business, Pearson Education

Note: Latest edition of text books may be used

Mapping of COs to Syllabus

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CMST307P: SALESPERSON TRAINING
(4 Credit: 60 hours) (L-T-P: 3-0-1)

Objectives
The course curriculum for most sales courses offers enhanced knowledge and understanding of business operations and management. With an extensive curriculum covering topics in commerce, banking, management, finance, marketing, so on and so forth, the courses pave paths for future sales professionals or teachers, researchers, and professors.
1. To provide basic training of Sales Management
2. To demonstrate effective selling
3. Apply negotiation skills to selling situations.
4. To understand the various selling styles.
5. To identify successful techniques for working with customers in business situations.

Course/Learning Outcomes
CO 1: Define the various concept related to sales, sales Personal selling etc. (Remembering)
CO 2: Explain the concepts of Sales territories and sales quota. (Understanding)
CO 3: Execute the knowledge of various sales appraising performance. (Applying)
CO 4: Examine the various effective techniques for selling a particular product. (Analysing)
Module I: An Overview of Sales
Meaning, scope and objectives, Modern Concept of Sales person, Sales organization-Importance, types and basic issues, Skills and Qualities required in sales Person, Various steps in selling process, Sales budget, Theories of Personal selling.

Module II: Importance and Techniques of Sales Person Training
Sales Personnel Planning (Quantitative and qualitative aspects of sales personnel planning process), Recruitment (Sources of sales recruits and process of recruiting sales representatives), Selection (Significance of sound selection and procedure), Training (Significance, areas, methods of sales training and its evaluation, Placement of sales force), Compensating sales personnel (Requirements of a sound compensation plan, methods and policies regarding reimbursement of sales expenses). Methods for appraising sales personnel's performance.

Module III: Sales Territories and Quotas
Meaning, objectives, types and factors determining the size of a sales territory and setting sales quotas, Reasons for establishing, revising and assigning sales territories to Sales personnel, Administering the quota system. Motivation & Compensation for Salesperson

Module IV: Practical
1. Case studies
2. Role playing exercise
3. Preparation of sale presentation plan by each student on basis of selected product.
4. Project specific information gathering/participation in community activities

Suggested Readings
- Salesmanship-Himalayan Publishing House
- Personal Selling and Sales management

Mapping of CO s to Syllabus

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CMSA308P: SWOT ANALYSIS OF AN INDUSTRY
(4 Credit: 60 hours) (L-T-P:0-0-4)

Objectives
- Understand the concepts and principles of SWOT analysis and its relevance to industry analysis.
- Conduct comprehensive industry research to identify industry-specific strengths, weaknesses, opportunities, and threats.
- Apply critical thinking skills to analyze and interpret SWOT findings within the context of an industry.
- Evaluate the competitive position of an industry by integrating SWOT analysis with other strategic frameworks.
- Develop effective strategic recommendations based on SWOT analysis to address industry challenges and capitalize on opportunities.

Course outcome:
CO 1: Remembering the key terms used in industry analysis. (Remembering)
CO 2: Understanding the concepts & principles of SWOT analysis and its relevance to industry. (Understanding)
CO 3: Applying SWOT analysis techniques to various industry contexts. (Applying)
CO 4: Analysing industry data to formulate business strategies based of SWOT Analysis findings. (Analysing)

Module I:
Introduction to SWOT Analysis and Industry Analysis: Overview of industry analysis and its importance, Introduction to the SWOT framework and its components, Integrating SWOT analysis with other strategic frameworks, SWOT Analysis in Strategic Decision Making. (No. of sessions 10)

Module II:
Identifying Industry Strengths & Weaknesses: Understanding industry resources, capabilities, and competitive advantages, Techniques for identifying and evaluating industry strengths, Case studies on successful industry strengths assessment. Identification of industry vulnerabilities, and limitations; evaluation of factors that hinder industry competitiveness & growth; analyzing industry weaknesses using real-world examples. (No. of sessions 20)

Module III:
Exploring Industry Opportunities & Evaluation of threats: Recognizing emerging trends and market opportunities, Assessing
customer needs, market demand, and industry growth potential. Case studies highlighting successful industry opportunity identification. Identification of competitive pressures, market risks, technological obsolescence, and regulatory changes. Techniques for assessing and prioritizing industry threats. (No. of sessions 20)

**Module IV:**
Application of SWOT analysis: Applying SWOT analysis to a specific industry or sector of interest. Conduct a comprehensive SWOT analysis on the selected industry. Formulation of strategic recommendations based on the SWOT analysis findings.

**Suggested Readings**
- SWOT Analysis: Develop strengths to decrease the weaknesses of your business - Management & Marketing Christophe Speth (author) eBook (17 Aug 2015)

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CMAA400T: ADVANCED ACCOUNTING
(5 Credits—75 hours) (L-T-P: 5-0-0)

**Objective**
The objective of this course is to provide advanced knowledge in the field of accounting. It stresses on specialized accounting processes followed in specific organisations. This course also gives insight into various modern concepts of Accounting.

**Course/Learning Outcomes**
At the end of the course students will be able to:
CO 1: Define the recent concepts of accounting (Remembering)
CO 2: Explain the conceptual framework in the preparation and presentation of financial statements (Understanding)
CO 3: Explain the various modes of liquidation of companies (Understanding)
CO 4: Compare the accounting techniques followed under general and specialised processes and determine insurance claims from loss of profit and stock (Analysing and Applying)
CO 5: Construct financial statements of insurance and banking companies (Creating)

**Module I: Conceptual Framework (10 hours)**
Conceptual Framework in the preparation and presentation of Financial Statements: Objectives, Purpose, Constituents of Financial Statements, Underlying assumptions in the preparation of Financial Statements, Qualitative Characteristics and Elements of Financial Statements, GAAP and Accounting Standards in India, Compliance Requirements of Accounting Standards in India, Applicability of Accounting Standards

**Module II: Accounts of Banking Companies (15 hours)**
Features of Banking Companies, Banking Regulation Act, 1949, Rebate on Bills Discounted, Income recognition, Statutory books to be maintained, special features of Bank book keeping, Preparation and presentation of Financial Statements of Banks, Advances and its classification, provisions to be made against advances.

**Module III: Accounts of Insurance Companies and Insurance Claims (20 hours)**

**Module IV: Investment Accounts and Liquidation of a company (20 hours)**
Investment Account: Meaning, features, concept of cum-interest, ex-interest, cum-dividend, ex-dividend, Accounting for fixed interest earning securities and variable earning securities, bonus shares and right shares, Intercompany investment. Winding up of a company: Meaning, winding up by National Company law Tribunal, Modes of Winding up, preferential payments, Preparation of Statement of Affairs, Liquidator’s Final statement of Account.

**Module V: Inflation and Government Accounting (10 hours)**
Inflation Accounting: Meaning, Need, Objectives, Current Purchasing Power Method, Current Cost Accounting; Government Accounting: Meaning, features and Objectives of Government Accounting; difference between commercial accounting and
Government Accounting; General Principles of Government Accounting; System of financial administration and financial control in India; Accounts keeping of the government; Classification of Accounts in Government Accounting; Accounting for Human Resources in an organisation.

**Suggested Readings**
1. Jawahar Lal, Financial Accounting, S Chand
3. Dam B. B., Advanced Accounting, Capital Publishing Company

**Mapping of Course Outcomes**

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**CMFS401T: FINANCIAL STATEMENT ANALYSIS**
(5 credits – 75 hours) (L-T-P: 5-0-0)

**Objective**
The course introduces the knowledge of decision makers information about a business enterprise for use in decision-making and to evaluate the economic situation of the firm and predicting its future course based on the financial statements.

**Course/Learning Outcomes**
At the end of the course students will be able to:
CO 1: Define the role of standard setters and regulators in Financial Reporting (Remembering).
CO 2: Illustrate the information provided by Balance Sheet, Income Statement and Cash Flow Statement (Understanding)
CO 3: Identify and compare cash flow classifications of operating, investing and financing activities (Applying)
CO 4: Analysing the link between Income statement, Balance Sheet and Cash Flow Statement (Analysing)
CO 5: Criticise rations used to analyse a company’s liquidity, profitability, solvency and efficiency (Evaluating)
CO 6: Build a strong base on financial statement analysis (Creating)

**Module I: Introduction to Financial Statement Analysis (15 hours)**
Meaning and Scope of Financial Statement Analysis; Financial Statements and other information sources; Financial Statement Analysis Framework; Classification of Business Activities; Financial Reporting Standards; Regulatory Authorities; International Financial Reporting Standards Framework (IFRS); Comparison of IFRS with other Reporting Standards.

**Module II: Analysis of Income Statement (15 hours)**
Components and format of Income Statement; Revenue Recognition; Expense Recognition; Non-recurring and Non-operating items; Earnings Per Share(EPS) : Simple Vs complex capital structure, Basic EPS, Diluted EPS; Analysis of Income Statement: Common size analysis, Comparative income statement Analysis , Income Statement Ratios. Case Study I

**Module III: Analysis of Balance Sheet (15 hours)**
Components and format of Balance Sheet; Measurement Bases of Assets and Liabilities; Equity: Components, Statement of Changes in Shareholders Equity; Uses and Analysis of Balance Sheet: Common size analysis, comparative analysis, Balance Sheet Ratios. Case Study II

**Module IV: Cash Flow Statement (15 hours)**

**Module V: Financial Statement Analysis Techniques (15 hours)**
Financial Analysis Process; Analysis tools and techniques; Common Ratios: Activity Ratios, Liquidity Ratios, Solvency Ratios, Profitability Ratios; Integrated Financial Ratio Analysis. CAMEL analysis for banking companies. Case Study IV

**Suggested Readings**
DEPARTMENT OF COMMERCE


Mapping of COs to Syllabus

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CMCR402T: CONSUMER BEHAVIOUR AND RELATIONSHIP MANAGEMENT
(5 Credits-75 hours) (L-T-P: 5-0-0)

Objectives
• To learn the concept of market, consumer, and sellers and so on.
• To understand the importance of regulatory measures in consumer marketing.
• To find out the remedies available in case of consumers’ problems.
• To develop an understanding of underlying concepts and issues in Consumer relationship

Course/Learning Outcomes
After completing the course successfully, the student will be able to
CO 1: Learn the concept of market, consumer, and sellers and so on (Remembering).
CO 2: Understand the importance of regulatory measures in consumer marketing (Understanding).
CO 3: Develop insights into the remedies available in case of consumers’ problems. (Applying)
CO 4: Analyse the relationship of CRM in various sector of Industry. (Analysing)

Module I: Introduction to Consumer Behaviour (15 hours)

Module II: Factors affecting Consumer Behaviour (15 hours)

Module III: Marketing Communications, Decision Making Models, Consumer Rights (15 hours)

Module IV: Customer Relationship Management (15 hours)

Unit V: Services of CRM in various sector: (15 hours)
Status of Customer Relationship Management in service industry in India; Relevance of CRM for Hospital Services; Customer Relationship Management in Banking and Financial Services; CRM in Insurance Sector; Future of CRM;

Suggested Readings
4. Anita Ghatak, Consumer Behaviour in India, D K Agencies (P) Ltd New Delhi
5. Sarkar A Problems of Consumer Behaviour in India, Discovery Publishing House New Delhi

Note: The Latest edition of text books and Acts should be used.
CMIF403T: INTERNATIONAL FINANCE  
(5 credits-75 Hours) (L-T-P: 5-0-0)

Objective  
The purpose of the course is to familiarize the learners with various concept and technique of international finance that can help in effective financial management in business. The focus is on the practical application of the concepts learnt.

Course/Learning Outcomes  
At the end of the course students will be able to:

CO 1: Describe the nature and scope of international finance, international financial system and Instruments. (Understanding)  
CO 2: Understand Foreign Exchange Markets and analyse the factors affecting the exchange rates. (Understanding and Analysing)  
CO 3: Evaluate various kinds of risks due to fluctuation in the exchange rate and management of these risks. (Evaluating)

Module I International Financial Environment: (13 hours)  

Module II: Foreign Exchange Markets: (13 hours)  

Module III: Exchange Rate Determination: (15 hours)  
Factors affecting Exchange Rate, Relative Inflation Rate, Relative Interest Rate, Relative Income Levels, Government Controls, expectations, etc. Theories of Exchange Rate (Purchasing Power Parity, Interest Rate Parity and Fisher’s Effect).

Module IV: International Financial Markets and Foreign Exchange Risk Management: (18 hours)  

Module V: International Capital Budgeting: (16 hours)  
Cross border investment decision: Types and issues, Greenfield investment vs. cross border M&As. Estimation of cash flows from cross border investment projects. Risks in cross border investment decision-currency risk, political risk, country risk, inflation risk etc. Valuation techniques by incorporating risk and other factors.

Suggested Readings  

Mapping COs to Syllabus  

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MINOR COURSES

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<td>CMFI103T/CMEP104T</td>
<td>Financial Market and Institutions/ Export Import Procedures</td>
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<td>Intellectual Property Rights</td>
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<td>CMSSM206T/CMCT207T</td>
<td>Investment in Stock Market/Corporate Tax Planning</td>
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<td>CMFM311T/CMIL312T/CMCR313T</td>
<td>Fundamentals of Marketing Management/Industrial Relations and Labour Laws/ Corporate Restructuring and Valuation</td>
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<td>CMTF314T/CMFA315T</td>
<td>Tax Filing &amp; E-Return/Financial Analytics</td>
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<td>CMRM407T</td>
<td>Research Methodology</td>
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<td>CMSSM408T/CMFC409T/CMSSL410T</td>
<td>Service Marketing/ Financial &amp; Commodity Derivatives/Supply Chain and Logistics Management</td>
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CMFA102T: FUNDAMENTALS OF ACCOUNTING
(4 Credits: 60 Hours) (L-T-P: 4-0-0)

Objective
To provide basic knowledge on introduction, principles and practices of accounting, techniques used in accounting, Accounting Equation; Preparing journal entries, ledger accounts; Trial Balance, preparation of cash book, preparation of depreciation accounts using different methods and students’ skills in preparing Financial Statements and its interpretations. Also to give knowledge on accounting for non-for profit organisations.

Course Outcome:
CO 1: Understanding accounting concepts, types, rules, principles and the importance of accounting information to the users.
CO 2: Recording of business transactions using the double-entry accounting, different types of transactions and preparation of ledger accounts and trial balance.
CO 3: Applying the concept of revenue and capital items in preparation of receipts & payments account and income & expenditure account
CO 4: Evaluate and Analyse financial statements to evaluate the financial performance of an undertaking
CO 5: Analyse the depreciation methods and its application in business world

Module I: Introduction (15 hours)
Accounting: Meaning, objectives, types, concepts; accounting information and its need to different stakeholders; Accounting Equation: Components, double entry system,

Module II: Recording of Transactions (10 hours)

Module III: Accounting for Non-For Profit Organisation (10 hours)

Module IV: Financial Statement (15 hours)
Financial statement: its concepts, importance; income statement, position statement, statement of cash flow, interpretation of financial statements.

Module V: Accounting for Depreciation (10 hours)
Depreciation: meaning, causes; Methods, computation and accounting treatment
Suggested Readings
1. CA Dr KM Bansal and Dr Ritu Gupta, Basic Accounting, Taxman Publication, edition 2022
2. CA Dr. P C Tulsian, Tushar & CA Bharat Tulsian, Accountancy S Chand CA Intermediate Tulsian’s

Mapping of Course Outcomes

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CMF103T: FINANCIAL MARKET AND INSTITUTIONS
(4 Credits-60 Hours) (L-T-P: 4-0-0)

Objective
This course primarily deals with the Financial System of India. It will enable students to acquire a basic understanding of the structure, organization and functioning of the financial system and will give an exposure to different financial instruments and their implications in the existing regulatory framework.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: State the concept and importance of the financial system for the national economy. (Remembering)
CO 2: Understand the market structure, Different types of financial Instruments, Financial Institutions and financial services. (Understanding)
CO 3: Differentiate the role of Money markets and Capital markets and distinguish between banking and Non-Banking financial Institutions. (Analysing)
CO 4: Analyse the different types of financial services and financial instruments. (Applying)
CO 5: Evaluate the function of financial intermediaries. (Evaluating)

Module I: Financial System (10 Hours)
Introduction to financial system, role and the structure of financial system; an overview of financial institutions, market structure and its components, financial instruments and services; financial system and economic significance; reforms in the financial system.

Module II: Financial Markets (20 Hours)
a) Money Markets: Meaning, objectives, importance, characteristics, money markets instruments, participants and functions of money market, role of Reserve Bank of India and Commercial Banks in the Indian money market.
b) Capital Markets: Meaning, objectives and functions, classification of capital markets, capital market instruments.
c) Primary market or new issue market: meaning, methods of marketing of securities, Book Building, Red herring prospectus.
d) Secondary Market: Meaning, characteristics and functions, growth of stock exchange, functions of stock exchange, types of speculators on stock exchange, SENSEX, NIFTY, OTCEI (Over the Counter Exchange of India); Debt Market; Derivatives Market.

Module III: Financial Instruments (10 Hours)
a) Financial instruments: meaning, role, and classification of financial instruments: general issue, functional categories, maturity and type of interest rate; financial derivatives and employee stock options.
b) Proposed functional category and instrument breakdown
c) Investment, type of investments, assets, liabilities
d) IAS 32 financial instruments

Module IV: Financial Institutions (10 Hours)
Commercial banking- introduction, its role in project finance and working capital finance; Development financial institutions (DFIs)- An overview and role in Indian economy; Life and non-life insurances companies in India; Mutual funds- Introduction and their role in capital market development. Non-banking financial companies (NBFCs), Financial Regulatory Authorities.

Module V: Financial Services (10 Hours)
Financial Services- Introduction, characteristics, types; investment banking; depositories and custodians; credit rating; factoring and forfeiting; housing finance; leasing and hire purchase; merchant banking; venture capital.

Suggested Readings
6. Annual Reports of Major Financial Institutions in India.

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CMEP104T: EXPORT IMPORT PROCEDURE
(4 Credits-60 hours)[L-T-P: 4-0-0]

Objectives

- Understand the documentation and procedures involved in international trade
- Students will be able to identify potential export and import markets based on country prospects and regulatory requirements.
- Students will be able to manage logistics and supply chain operations involved in exporting and importing goods, including transportation, warehousing, and inventory management.

Course/Learning Outcomes

CO 1: Remembering the process of international trade. (Remembering)
CO 2: Understanding the regulatory requirements involved in international trade. (Understanding)
CO 3: Evaluate potential market, prepare necessary documentation, comply with regulatory requirements, manage logistics and develop appropriate strategies. (Applying)
CO 4: Solve problems and make decisions related to international trade. (Analysing)

Module I: The Basic Formalities of Export and Import: (15 Hours)
Registration of Exporters, Importers - Import Export Code Number, Selection of Product & Market, Export-import Documentation, Quality Control and Pre shipment Inspection, Labelling, Marking, Packaging; Export import procedure and Methods of Payment, Trade Financing.

Module II: Export prospects of a country (15 Hours)

Module III: Export documentation (15 Hours)
Document related to Excise clearance, Documents related to customs clearance, Documents related to foreign exchange clearance, Documents related to transportation and procedures, Documents required for Preparation of main documents: Bill of Lading, Auxiliary documents, Mate’s Receipt, Inspections Certificate, Insurance Certificate, Place of Origin, Packing/Shipping note.

Module IV: Review of Export Promotion Policies and schemes (15 Hours)
EPCG scheme, Duty drawback, DE passbook scheme, Gem and Jewellery Promotion Scheme, Other Export Promotion Schemes; Export Promotion: Institutional set up – Export Houses, EPZ, FTZ, EHTP, STP, SEZ, AEZ, 100% E.O.U., Focus Market & Focus Product Scheme.

Suggested Readings
2. Export-Import Procedures and Documentation" by Tulisan P.C. and Tulisan Bharat - Pearson Education India
4. Export-Import Procedures and Documentation" by Bhatia Rakesh- New Age International Publishers

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CMIR205T: INTELLECTUAL PROPERTY RIGHTS
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objectives
- To provide a comprehensive understand on the basics of intellectual property law, including the different types of IP and their legal protections.
- To understand the economic and social importance of intellectual property, including its role in promoting innovation and creativity.
- To understand the legal framework for protecting and enforcing IP rights, including national and international laws and regulations.
- To learn about the processes for obtaining and maintaining patents, trademarks, copyrights, and trade secret.

Course/Learning Outcomes
CO 1: Remembering: Remembering the process of patent application process, legal framework for IP Protection and Environment
CO 2: Understanding: Understanding the regulatory requirements of trademark registration process, copyright law, infringement and litigation

Module I: Introduction to Intellectual Property Rights (20 hours)

Module II: Types of Intellectual Property (20 hours)

Module III: Ethical considerations (20 hours)
Ethical considerations in Intellectual Property Management & Enforcement, Challenges and Opportunities in Global IP protection, Ethical Dilemmas in IP Law and Practice, IP policies and Best Practices

Suggested Readings

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CMSM206T: INVESTING IN STOCK MARKETS
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objectives
- To give knowledge and insights on the functioning of Indian Stock market
- To Develop tools and skills for security analysis-fundamental and technical
- To develop trading and investment skills in securities market

Course/Learning Outcomes
CO 1: Understand the functioning of Indian Stock market and the regulations governing the stock market
CO 2: Understand the fundamental principles of investment including risk and return
CO 3: Develop the necessary skills to make informed trading and investment decisions
CO 4: Analyse different investment strategies including long term and short term investment

Module I: Basics of Investing (15 hours)
Basics of Investment & Investment Environment; Risk and Return, Instruments of Investment- Equity shares, Preference shares, Bonds and Debentures. Indian Security Markets: Primary Markets (IPO, FPO, Private placement, Offer for sale), Secondary Markets (cash market and derivative market: Futures and Options) Market Participants:

Module II: Indian Security Markets (15 hours)

Module III: Fundamental Analysis (15 hours)
Top down and bottom up approaches, Analysis of international & domestic economic scenario, Industry analysis, Company analysis (Quality of management, financial analysis :Both Annual and Quarterly, Income statement analysis, position statement analysis including key financial ratios, Cash flow statement analysis, Industry market ratios: PE, PEG, Price over sales, Price over book value, EVA), Understanding Shareholding pattern of the company.

Module IV: Technical Analysis (15 hours)
Trading rules (credit balance theory, confidence index, filter rules, market breath, advances vs declines and charting (use of historic prices, simple moving average and MACD) basic and advanced interactive charts. Do’s & Don’ts of investing in markets.

Suggested Readings
1. Kumar, Vinod and Nangia, Raj Sethi, Investing in Stock Markets, Ane books

Mapping of Course Outcomes

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CMCT207T: CORPORATE TAX PLANNING
(4 credits – 60 hours) (L-T-P: 4-0-0)

Objective
To provide Basic knowledge of corporate tax planning and its impact on decision-making

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Define the basic concepts of Taxation of Companies and residential status (Remembering)
CO 2: Summarise the various uses of corporate tax planning in business (Understanding)
CO 3: Apply the concept of Tax-planning in specific management decisions (Applying)
CO 4: Explain the provisions of taxation related to non-residents/ International Taxation (Analysing)
CO 5: Assessing Tax planning in respect of business restructuring cases (Evaluating)

Module I: Introduction (10 hours)
Tax planning, tax management, tax evasion, tax avoidance; Corporate tax in India; Types of companies; Residential status of companies and tax incidence; Tax liability and minimum alternate tax; Tax on distributed profits

Module II: Tax planning-1 (10 hours)
Lectures Tax planning with reference to setting up of a new business: Location aspect, nature of business, form of organization; Tax planning with reference to financial management decision - Capital structure, dividend including deemed dividend and bonus shares; Tax planning with reference to sale of scientific research assets

Module III: Tax planning-2 (15 hours)
Tax planning with reference to specific management decisions - Make or buy; own or lease; repair or replace Tax planning with reference to employees’ remuneration Tax planning with reference to receipt of insurance compensation Tax planning with reference to distribution of assets at the time of liquidation.

Module IV: Special provisions relating to non-residents (10 hours)
Double taxation relief; Provisions regulating transfer pricing; Advance rulings; Advance pricing agreement
Module V: Tax planning with reference to business restructuring (15 hours)
Amalgamation, Demerger, Slump sale, Conversion of sole proprietary concern/partnership firm into company, Conversion of company into LLP, Transfer of assets between holding and subsidiary companies.

Suggested Readings

Mapping of Course Outcomes

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CMFM311T: FUNDAMENTAL OF MARKETING MANAGEMENT
(4 credits – 60 hours) (L-T-P: 4-0-0)

Objective
To apply relevant knowledge, skills and exercise professional judgement in selecting and applying marketing principles and concepts in different business contexts and to contribute to the evaluation of the performance of an organisation and its strategic and operational development.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Define and explain marketing mix models in workplace and contribute to organisational growth (Remembering and Understanding)
CO 2: Assess the impact of product and brand management decisions on organizational performance (Applying)
CO 3: Examine the effectiveness of pricing and promotion decisions (Analysing)
CO 4: Determine appropriate distribution and retailing strategies in improving organisational performance (Evaluating)

Module I: Introduction to Marketing (15 classes)
Meaning of Marketing, nature, scope, Marketing Objectives; Importance of Marketing, core concepts of Marketing, Marketing Environment; Marketing Mix; Elements of Marketing Mix, Product Mix, Price Mix, Promotion/Communication Mix, Place Mix/Distribution Mix; Significance of Marketing Mix; Factors Affecting Marketing Mix; Growth & Future of marketing in India.

Module II: Product, and Product Brand Management (15 hours)

Module III: Pricing and Promotion Decision (15 Classes)
a) Pricing Decisions; Concept of Price; Significance of Pricing; Factors Affecting Pricing Decisions; Major Pricing Methods; Pricing Policies and Strategies; Geographical Pricing, Product Line Pricing, Discounts and Rebates.
b) Meaning and Nature of Promotion, Importance of Promotion, Communication Process, Concept of Integrated Marketing Communication, Meaning of Promotion Mix, Elements of Promotion Mix (Methods of Promotion), Factors Influencing Promotion Mix Decisions, Promotion Mix Strategies, Communication Planning and Control.

Module IV: Distribution and Retailing (15 Classes)
b) Meaning of Physical Distribution, Importance of Physical Distribution, Elements of Physical Distribution, Marketing
Logistics Decisions.
c) Meaning of Retailing, Functions and Services of Retailers, Types of Retailing; Malls and major markets; FDI in retail market; Management of Retailing Operations: An Overview, retailing in India – Changing Scenario.

Suggested Readings

Mapping of Course Outcomes

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CMIL312T: INDUSTRIAL RELATION AND LABOUR LAWS
(4 Credit -60 Hours) (L-T-P : 4-0-0)

Objectives
- To understand evolution of industrial relations and its significance in managerial world.
- To conceive how to interact, negotiate and transact with trade unions.
- To understand the basic framework of collective bargaining and workers’ participation
- To understand the legal structure provided for grievance handling under the Industrial Disputes Act 1947

Course/Learning Outcomes
After completing the course successfully, the student will be able to
CO 1: Remembering the terminologies connecting with Industrial Relation. (Remembering)
CO 2: Understanding the various discipline and legislation of IRLL. (Understanding)
CO 3: Application of various dimensional framework associated with IRLL. (Applying)
CO 4: Analysing the provision connected with IRLL. (Analysing)

Module I: Introduction to Industrial Relations (IR) (10 hours)
Concept of Industrial Relations; Nature of Industrial Relations; Objectives of IR; Factors affecting IR in changing Environment, Evolution of IR in India; Trade Union; Employers’ Organisation; Human Resource Management and IR, Role of ILO in Industrial Relations, worker education International Dimensions of IR

Module II: Trade Union (10 hours)
Trade Union: Origin and growth, unions after Independence, unions in the era of liberalisation; Factors Affecting Growth of Trade Unions in India, different forms of trade union, Multiplicity & Recognition of Trade Unions; Major Provisions of Trade Union Act 1926

Module III: Collective Bargaining and Workers’ Participation in Management (15 hours)
b) Workers’ Participation in Management: Consent, practices in India, Works Committees, Joint management councils; Participative Management and co-ownership; Productive Bargaining and Gain Sharing

Module IV: Discipline and Grievance Redressal (10 hours)
Discipline: Causes of indiscipline, Maintenance of discipline and misconduct; Highlights of domestic enquiries; Principle of Natural Justice; Labour turnover; Absenteeism; Grievance: Meaning of Grievance, Settlement Machinery, Grievance redressal machinery in India, Grievance handling procedure; salient features of Industrial Employment (Standing orders) Act

Module V: Labour law and legislation (15 hours)
Suggested Readings
1. PK Padhi, Industrial Relations and Labour Law, PHI Learning.

Note: Latest edition of text books may be used.

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CMCR313T: CORPORATE STRUCTURING AND VALUATION
(4 Credit-60 hours) (L-T-P: 4-0-0)

Objectives
- Understanding why ‘things go wrong’.
- Gain understanding and insights on the laws, rules and procedures for corporate restructuring.
- Insights on financial and strategic implications of restructuring.
- Working on valuation to develop win-win restructuring deals.

Course/Learning Outcomes
CO 1: Remembering key terms related to corporate restructuring. (Remembering)
CO 2: Understanding the different types of corporate restructuring initiatives. (Understanding)
CO 3: Application of value drivers to develop restructuring synergies. (Applying)
CO 4: Analysing empirical evidence on various corporate restructuring. (Analysing)

Module I: Fundamentals of Corporate restructuring (10 hours)
Corporate restructuring: Planning, Formulation and Execution of Various Corporate Restructuring Strategies - Mergers, Acquisitions, Takeovers, Disinvestments and Strategic Alliances, Demerger and Hiving off, Bankruptcy, equity restructuring, and spin-offs. Laws, rules and procedures governing corporate restructuring in India.

Module II: Drivers of valuation (20 hours)
Drivers of valuation: Weighted forecasts of growth in company revenue, Weighted forecasts of growth in company margin, Patterns of cash returned to shareholders, Changes in the company’s debt-to-equity ratio, The economic conditions of the industry, Market volatility in the geographic areas in which the industry’s major companies compete. Adjusted present value, WACC, capital cash flow, and discounted cash flow valuation.

Module III: Financial restructuring (15 hours)
Financial restructuring: Debt restructuring, Equity restructuring, reduction of capital, reorganization of share capital, buy back of shares –concept and necessity, procedure for buy back of shares.

Module IV: Restructuring of Sick companies (15 hours)
Revival, Rehabilitation and Restructuring of Sick Companies: Sick companies and their revival with special reference to the law and procedure relating to sick companies.

Suggested Readings
4. Corporate Finance, Ashvarath Damodaran, Wiley India, Latest Edition
Mapping of Course Outcomes

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CMTF314T: TAX FILING AND E-RETURN
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objectives
The objective of this course is to provide fundamentals of Income tax Concepts, GST Concepts and provisions. It help the student to understand file online ITR, TDS return deal with Income Tax matters and e-filing of GST return.

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Define the various concepts related to direct taxes and Indirect taxes. (Remembering)
CO 2: Explain the provisions of the direct tax laws and Indirect tax laws (including GST Act 2017). (Understanding)
CO 3: Execute the knowledge of the provisions of the direct tax laws and indirect tax laws to the various situations in actual practice. (Applying)
CO 4: Analyse the procedures related to filing of returns, TDS and GST return filing. (Analysing)

Module I: Computation of Income tax (15 Hours)
a) Basic concept, Definition of previous year, Assessment year, person, assessee, determination of residential status,
b) Brief about the various Sources of Income (with Illustration).

Module II: Introduction to Goods and Service Tax Act 2017 (15 Hours)
Introduction to GST Law, Levy and Collection of CGST and IGST, Application of CGST/IGST law, Concept of Supply including Composite and Mixed Supplies, Charge of Tax including Reverse Charge, Exemption from Tax, Composition Levy, Basic concepts of Time and Value of Supply, Input Tax Credit, Computation of GST Liability,

Module III: E-filing of Income tax returns (15 Hours)
Set off and Carry Forward of Losses ; Deductions, Rebate and Relief ; Taxation of Individual ; Advance Tax; Tax Deducted at Source & Tax Collected at Source (excluding Non-resident); Filing of Return of Income ; Self-Assessment & Intimation.

Module IV: E-filing of GST returns (15 Hours)
E Filing of GST, GST-DVAT/ HVAT/CST Applicability., Tax Invoice generation, Bilty Challan, GST return, Online Payment (DVAT), Quarterly Return (DVAT), online submission of road permit

Suggested Readings
7. Excel Utility’ available at incometaxindiaefiling.gov.in

Mapping of Course Outcomes

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CMFA315T: FINANCIAL ANALYTICS
(4 Credits - 60 hours) (L-T-P: 4-0-0)

Objectives
- Understand and articulate a business problem and convert it into a viable analytics question;
- Apply Data Visualization for exploratory analysis and communicate effectively to diverse audience;
- Evaluate various analytical approaches and select the most appropriate for the given problem;
- Build Analytics solutions and assess their effectiveness;
- To develop solutions across a range of functional areas like marketing, Finance, HR and Operations.

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: To demonstrate the awareness and knowledge of Financial Analytics (Remembering)
CO 2: To understand the basic concepts of analytics to the business scenarios (Understanding)
CO 3: To extend the knowledge about future trends in Financial Analytics (Applying)
CO 4: To interpret the analytics methodology (Analysing)
CO 5: To assess the relevance and effectiveness of financial analytics solutions (Evaluating)
CO 6: To apply the knowledge of technical skills in descriptive and predictive modeling to support business decision making

Module I: Data Bases, Data Warehousing and Data Mining (10 Hours)
Types of Data Sources- Structured Vs Semi Structured Vs Unstructured data; Data Warehouse Vs Databases, Relational databases vs Non-Relational Databases; RDBMS Data Structures; Columnar Data structures; Data mining meaning, Association Rules and Clustering; Decision trees; Random forests.

Module II: Analytics Methodology (10 Hours)
Introduction to Analytics Methodology; preparing objectives & identifying data requirements, Data Collection, Understanding data, Data preparation- Data Cleansing, Normalisation, Data Blending, Data Modelling, Evaluation & feedback.

Module III: Visualisation of Data (10 Hours)
Introduction, Data summarization methods; Tables, Graphs, Charts, Histograms, Frequency distributions, Relative Frequency Measures of Central Tendency and Dispersion; Box Plot; Basic probability concepts; Conditional probability; Probability distributions; Continuous and discrete distributions; Sequential decision making.

Module IV: Time Series (10 Hours)
Trend Analysis; Seasonality & Cyclical behaviour, Moving Average, Exponential smoothing methods- Single exponential, double exponential, HOLT-WINTERS, ARIMA; Multiple linear regression-based forecasting; GARCH.

Module V: Predictive Analysis (10 Hours)
Simple linear regression; Coefficient of determination; Significance tests; Residual Analysis; Confidence and prediction intervals; Multiple linear regression: Coefficient of multiple coefficient of determination, interpretation of regression coefficients; Categorical variables; Heteroscedasticity, multi-collinearity, outliers, autoregression and transformation of variables.

Module VI: Financial Analytics Future Trends (10 Hours)
Role of Artificial Intelligence in Finance; Machine Intelligence; Competitive Intelligence; Text Mining, Web Analytics (Web content mining, Web usage mining, Web structure mining); Social Networking Analysis, Big Data tools & Techniques, Ethical and legal considerations in Financial Analytics.

Suggested Readings
3. Data Science for business- What you need to know about data mining and data analytic thinking, Foster Provost, Tom Fawcett, O’ Reilly Media publications, 2013

Mapping of Course Outcomess

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CMFF404T: FUNDAMENTALS OF FINANCIAL MANAGEMENT
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
This Course will explain the financial tools and techniques, which can be used to help firms maximize value by improving decisions relating to capital budgeting, capital structure and working capital management.

Course/Learning Outcomes
After learning this course, the students will be able to:
CO 1: Explain the objectives and scope of financial management and time value of money (Remembering)
CO 2: Explain various capital structure theories and factor affecting capital structure decision (Understanding)
CO 3: Analyse the process of working capital management and capital budgeting process (Analysing)
CO 4: Critically judge the various theories of dividend and determine the factors affecting dividend polices (Evaluating)

Module I: Introduction (10 hours)
Nature, scope and objective of Financial Management, Time value of money, Risk and return (including Capital Asset Pricing Model), Valuation of securities – Bonds and Equities

Module II: Investment Decisions (15 hours)
The Capital Budgeting process, Cash flow Estimation, Payback period Method, Accounting Rate of return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Modified Internal rate of return, Profitability Index, Capital budgeting under Risk- Certainty Equivalent Approach and Risk Adjusted Discount Rate; Concepts of working capital, the risk – return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, inventory management and payables management.

Module III: Financing Decisions (10 hours)

Module IV: Dividend Decisions (10 hours)
Theories of Relevance and irrelevance of dividend decision for corporate valuation; Cash and stock dividends; Dividend polices in practice

Suggested Readings
4. Basic Financial Management, Khan and Jain, McGraw Hill Education

Mapping of Course Outcomes

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CMSP405T: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT
(3 – Credits – 45 hours) (L-T-P: 3-0-0)

Objectives
2. Develop tools and skills for security analysis.
3. Develop tools and approaches to help navigate the complexities and challenges in Financial Market.

Course/Learning Outcomes
CO 1: Remembering relevant sections of corporate tax planning. (Remembering)
CO 2: Understand both the mechanics and operations of financial markets. (Understanding)
Module I Security analysis - I (10 hours)
Evaluation of fixed income securities, Stock market and indices, Index calculation, Evaluation of equity - Fundamental analysis-
economy, industry and company. Technical analysis- chart pattern, price actions, determining support and resistance, break outs and break downs, working on tools.

Module II Security analysis II (10 hours)
Valuation of shares – Earnings, dividend and net assets, CAPM, Valuation of bonds and bond yields. – Working with analytics - Beta, covariance, variance and standard deviation, correlation and regression.

Module III Portfolio Management (15 hours)
Portfolio Management – Risks and Returns: Concept of portfolio and portfolio management, concept of risk, optimal portfolio-
portfolio diversification, mechanics of diversification. Working with efficient frontier, capital market line and indifference curve
on a hypothetical portfolio.

Module IV Behavioral Finance and event study (10 hours)
Behavioral Finance and event study: Meaning of Behavioral finance - when, how and why psychology influences investment
decisions. The Event Study- assessing the market reaction to firm-specific and market events with statistical tools.

Suggested Readings
   India, 2008.

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CMCR406T: CORPORATE FINANCIAL REPORTING & ANALYSIS  
(3 Credits- 45 Hours) (L-T-P:3-0-0)

Objectives
- To equip with Conceptual Framework on Financial Reporting, Quality, Accuracy and Relevance of Information to
  stakeholders,
- Understand the impact of global economic trends and events on financial reporting and analysis for corporations.
- To understand the importance of students with comprehensive understanding of financial reporting standards and recent
  advancements in financial reporting.sustainable and integrated reporting in the present day world.
- To develop requisite skills to analyse and interpret Financial Statements from the perspective of various stakeholders.

Course/Learning Outcomes
CO 1: Remembering important sections of Indian Companies Act 2013 and accounting standards related to Corporate
Financial Reporting. (Remembering)
CO 2: Understand the fundamentals and recent advancements in financial reporting and accounting standards for
corporations. (Understanding)
CO 3: Develop the ability to use financial ratios and other analytical tools to assess a company's financial performance and
sustainability reporting of corporations. (Applying)
CO 4: Analyze and interpret financial statements, including balance sheets, income statements, and cash flow statements.
(Analysing)

Module I: Introduction to Financial Reporting (10 hours)
Conceptual Framework on Financial Reporting, Quality, Accuracy and Relevance of Information to stakeholders, Generally
Accepted Accounting Principles (GAAP)- International Financial Reporting Standards (IFRS), Adoption and Convergence of IFRS,
Overview of IND-AS.

**Module II: Recent Advances in Financial Reporting & Disclosures (10 hours)**
Triple Bottom Line, Sustainability and Integrated Reporting: Natural Resource Accounting, Human Resource Accounting, Environment, Social & Governance (ESG), Fair Value Accounting (IND AS113).

**Module III: Financial Statements (15 hours)**
Preparation & Presentation of Financial Statements- IND AS 1 & Schedule III of Companies Act 2013; Relevant sections related Financial Statement in Indian Companies Act 2013 – Section 2(40), Section 129, 130, 131, 132, 133, 134, 135 & 136; Standalone & Consolidated Financial Statements (IND AS 109); Segment Reporting (IND AS 108); Financial Reporting of Banking & Insurance Companies.

**Module IV: Financial Statement Analysis (10 hours)**

**Suggested Readings**
4. The Interpretation of Financial Statements by Benjamin Graham and Spencer B. Meredit.

**Mapping of Course Outcomes**

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**CMRM407T: RESEARCH METHODOLOGY**
(2 Credit: 30 hours) (L-T-P: 3-0-0)

**Objectives:**
- The students will gain a strong and enduring understanding of how to systematically design research, gather and analyze data, to help drive business decisions.
- The students will learn a practical framework for conducting research, knowledge to properly design research, techniques and tools to analyze data and practical information sources.
- The students will be able to maximize their ability to apply what they learn.

**Course/Learning Outcomes**
CO 1: Remembering of different concepts of research methodology. (Remembering)
CO 2: Understanding how to proceed with a research work. (Understanding)
CO 3: Working on research proposal and research design and choice of research analytics. (Applying)
CO 4: Measurement of data and data analysis. (Analysing)

**Module I Research Design (10 hours)**
Research Design: Introduction to Research- Defining and developing a Research Problem, how to approach. Types of research and research design.

**Module II Survey design & Measurement (20 hours)**
Measurement & Scaling Types, Sampling – sample size and techniques.

**Module III Research Analytics & Report writing (15 hours)**
Research Analytics & Report writing: Hypotheses testing, Correlation and Regression overview and intro to SPSS, Factor
analysis, Cluster Analysis.
Research Report writing - Best practices, References and Bibliography, Ethics in Research.

Suggested Readings

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**CMSM408T: SERVICE MARKETING**
(3 Credits – 45 Hours) (L-T-P: 3-0-0)

**Objectives**
- To define and study the characteristics, Components, Classification of Service Marketing
- Managing service encounters, common encounter situations, Managing Service Encounters for Satisfactory Outcomes, Service Failure, Service Recovery, Process of Service Recovery

**Course/Learning Outcomes**
CO 1: Remembering the different new term and terminology relating with Service Marketing. (Remembering)
CO 2: Understand the various dimension of Service Marketing. (Understanding)
CO 3: Analyse the various Trend in Service Marketing. (Applying)
CO 4: Creation of different Strategies of Relationship in Service Marketing. (Analysing)

**Module I Introduction to Service Marketing (8 hours)**
Meaning, Definition, Characteristics, Components, Classification of Service Marketing, Factors Leading to a Service Economy

**Module II Service Consumer Behaviour (10 hours)**

**Module III the Service Delivery Process and Strategic Issue in Service Marketing (10 hours)**

**Module IV Relationship and Challenges of Service Marketing (10 hours)**
Marketing Planning for Services, Developing and Managing the Customer Service Function, Developing and Maintaining Quality of Services, the levels of Customer Relationships, Dimensions of a Relationship marketing, Goal of relationship marketing, Challenges faced in Service Marketing in modern times

**Module V Recent Trends and Ethics In Service Marketing (7 Hours)**
Tourism Industry, Hospitality, Health Care, Banking, Insurance, IT & Entrainment Industry, Service Ethics

**Suggested Readings**

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CMFC409T: FINANCIAL AND COMMODITY DERIVATIVES
(3 Credits - 45 hours) (L-T-P: 3-0-0)

Objectives
- To provide students with an understanding of the basics of financial and commodity derivatives and how they are used for risk management and speculation.
- To have a comprehensive understanding of various types of derivatives, such as futures, options, swaps, and forwards, and how they function.
- To provide an illustration of the use of derivatives in risk management, including portfolio diversification and hedging of financial and commodity risks.

Course/Learning Outcomes
CO 1: Remembering the concepts and mechanics of derivatives, including futures, options, swaps, and forwards. (Remembering)
CO 2: Understanding the dynamics of derivative market and its instruments. (Understanding)
CO 3: Use derivatives to hedge financial and commodity risks in real-world scenarios. (Applying)
CO 4: Analyze the impact of various market factors, such as interest rates, volatility, and supply and demand, on derivatives pricing. (Analyze)

Module I: Introduction to derivative instruments: (15 hours)
Evolution of derivative instruments, types and its uses, exchange traded vs. OTC derivatives, concept of Hedging, speculation and arbitrage; Underlying assets, financial derivative market in India- its regulation and structure; Energy & Commodity derivatives- commodity specific issues, demand-supply dynamics, price trends and factors that influence prices, commodity exchanges in India.

Module II: Forward contracts: (10 hours)
Basic properties of Forward contracts, risk involved, pricing of forward contracts, payoffs from forward contracts, risk hedging using Forward contracts.

Module III: Futures (10 hours)
Basic properties of futures, Forward vs. Futures, Pricing and valuation of Futures, Convergence of futures price to spot price, payoffs from futures, Futures on Financial and commodity underlying, Market quotes, Margins & Settlement, role of clearing house, Hedging strategies- perfect hedge, long, short and cross hedge.

Module IV: Options & SWAPS (10 hours)
Types of options- Plain Vanilla & Exotic, call & Put option, parties involved- buyer and writer, pricing of options- binomial model, the Black-Scholes-Merton Model, Put-call Parity, Relevance of option Greeks- Delta, Gamma, Theta, Vega and Rho; Options on Financial and commodity underlying, basic principles of option trading and trading strategies; SWAPs: concept and features, Types- interest rate, currency and Debt-Equity SWAPs.

Suggested Readings
2. *Commodity Derivatives* by Helyette Geman - Published by Wiley Finance
3. *Derivatives Markets* by Robert L. McDonald - Published by Pearson Education
4. *Commodity Options: Trading and Hedging Volatility in the World's Most Lucrative Market* by Carley Garner - Published by FT Press
5. *Fundamentals of Futures and Options Markets* by John C. Hull - Published by Pearson Education
8. *Energy Derivatives: Trading Emerging Markets* by Helyette Geman - Published by Wiley Finance

Mapping of Course Outcomes

<table>
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<tr>
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CMSL410T: SUPPLY CHAIN and LOGISTICS MANAGEMENT
(3 Credits – 45 Hours) (L-T-P: 3-0-0)

Objective
The objective of this paper is to acquaint the students with the concepts and tools of supply chain management and logistics as relevant for an international firm.

Course/Learning Outcomes
After learning the course, the students will be able to:
CO 1: Define the process of supply chain management. (Remembering)
CO 2: Demonstrate operational purchasing methods and techniques on supplier management and supply in specific business contexts. (Understanding)
CO 3: Explain the strategic importance of logistics elements and describe how they affect supply chain management. (Understanding)
CO 4: Apply sales and operations planning, MRP and lean manufacturing concepts. (Applying)
CO 5: Analyse the creation of new value in the supply chain for customers, society and the environment. (Analysing)

Module I: Basic Framework (10 hours)
Concept of supply chain management (SCM); SCM and trade Logistics; Business view of SCM; Push and pull of SCM; Decision phases; Impellers and drivers in SCM Process views of SCM, planning and operations; Supply chain modelling; Role of Relationship marketing in SCM; managing relationships with suppliers and customers; Designing strategic distribution network; Factors influencing distribution network.

Module II: Supply Chain and Information Management Systems (10 hours)
Purchasing Process- Strategic role of purchasing in the supply chain and total customer satisfaction; Types of purchases; Purchasing cycle; Supplier selection and evaluation; Vendor development; Importance of information management; Distribution and sharing of information; Information Technology as a platform for effective and efficient supply chain management

Module III: Logistic System (10 hours)
Concept, objectives and scope of logistics; System elements; Inbound and Outbound logistics; Reverse inventory, Value added role of logistics, Logistics interface with manufacturer and marketing, Packing, Marking, Just in time concept; Third party logistic outsourcing—challenges and future directions.

Module IV: Transportation (10 hours)
Importance of effective transportation system; Service choices and their characteristics; inter- modal services; Transport cost characteristics and rate fixation; Carrier selection determinants and decision; Structure of Shipping: World seaborne trade; international shipping - characteristics and structure;Liner and tramp operations; Liner freighting; Chartering-Types, principles and practices; Charter, party agreement; Development in sea transportation-Unitization, containerisation, inter and multimodal transport; CFC and ICD; Indian shipping – growth, policy and problems; Ports and port trust; International Air transport: International set up for air transport: Freight rates; India’s exports and imports by air – Problems and prospects; Carriage of Goods by sea, sea and combined transport.

Module V: Warehousing and Inventory Management (5 hours)
Warehousing And Marketing Strategy; Objectives and functions of warehousing; Warehouse Strategies; Material handling equipment and material mobility Warehousing evaluation and requirements; Inventory management-inventory categories, EOQ, LT, ICC; Inventory levels; Material planning and sourcing of procurement; Methods of cost reduction.

Suggested Readings

Mapping of Course Outcomes
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### SKILL ENHANCEMENT COURSES

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<td>Business &amp; Professional Communications</td>
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<td>Trading and Investment in Share Market</td>
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<td>S E Course 3</td>
<td>CMED208T</td>
<td>Entrepreneurship Development</td>
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### CMBP105T: BUSINESS AND PROFESSIONAL COMMUNICATIONS

(3 Credits - 45 hours) (L-T-P: 3-0-0)

#### Objectives

This course enables the students towards developing communication skill in the professional platform. It will improvise one's managerial, leadership and motivational skill in the different professions and business.

#### Course/Learning Outcomes

CO 1: Know about different terms and concept of business communication (Remembering).

CO 2: Understanding about the modes and method of communication in business and profession. (Understanding)

CO 3: Application of Various guidelines related with business communication. (Applying)

CO 4: Analyse the implication of communication process in sustainable development towards the society. (Analysing)

#### Module I: Introduction to Business Communication (10 Hours)

Importance of communication in business, Different types of business communication, the media and tools of communication in different business houses and professions, Communication Process. Barriers and different Gateway to Communication

#### Module II: Verbal and Non-Verbal Communication (10 hours)

Meaning, features, importance and types of verbal and Non-verbal Communication, Group discussion, meetings, Seminar, Conference; Body language, Gestures, Facial expression, tone, appearance; Art of facing interview, selection Process, Appraisal System, Disciplinary Committees, Exit Interview.

#### Module III: Professional Written Communication Skill (15 Hours)

Formats of writing business letter and Memos, Notice and Disciplinary Action, preparing professional Resume and Job Application, joining letter, promotional letter, Resignation letter, Meeting and Minutes writing, Tender preparation, Effective Business Report writing, Digital Communication, Power point Presentation, Content writing, knowledge sharing via web/internet

#### Module IV: Sustainable communication (10 Hours)

Meaning, importance of sustainable communication; foundation of sustainable communication: clear ambition, sustainable claims, compelling message, transparent communication, accessible information; sustainable communication strategy in business.

#### Suggested Readings

1. Pal, Rajendra, Korlahalli, J.B Essentials of Business Communication, Sultan Chand & Sons
2. Dr Jain, V.K, Dr Biyani Omprakash Business Communication, S. Chand
3. David L. Lewis Communication in the Workplace

#### Mapping of Course Outcomes

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CMTI106T: TRADING AND INVESTMENT IN SHARE MARKET
(3 Credits: 45 hours) (L-T-P: 2-0-1)

Objectives
- To provide essential skills on equity trading & investments;
- To give hands on experience of investing & trading in equity market using virtual stock market platform.
- To increase financial literacy among the students for wealth creation.

Course/Learning Outcomes
CO 1: Demonstrate a basic understanding of investments and the nature of investing;
CO 2: Exhibit the acquaintance of the securities market and its constituents;
CO 3: Apply knowledge gained to perform analysis of various securities;
CO 4: Analyse and apply models to securities performance and forecasting;
CO 5: Construct optimal portfolios and evaluate those using models.

Module I: Capital Market (10 hours)
Overview of the capital market in India - Primary Market: IPO, FPO, Private placement, Offer for sale; Role and importance of Primary market, Book building process. Secondary Market: Cash market and derivative market: Futures and Options.

Module II: Market participants: (10 hours)
Stock broker, Investor, Depositories, Clearing House- Concept, Roles of the participants and distinguishing features; Stock Exchanges in India, Stock Market Index.

Module III: Trading in Securities: (15 hours)
How shares are traded? Technical analysis for trading in stocks- when to entry and exit with stop loss, determining support & resistance, break out and break down; Trading stocks in virtual platform, Trading strategies- price, volume & momentum study; Common mistakes to be avoided while trading; Discipline required in trading; Types of orders- cash and carry & Mark to market orders and trading settlement; Trading in F&O segment & strategies.

Module IV: Investment in stock market: (10 hours)
Fundamental analysis for investment; Economy- GDP, Monetary Policy, Government Budget & Fiscal Policy, Understanding external shocks to market; Industry- Banking, FMCG, IT, Pharmaceuticals, Metal & Real Estate; Company analysis- Financial Statements from investors’ perspectives, key parameters & ratios to make informed investment decisions.

Suggested Readings
3. John C. Hull, Options, Futures, and Other Derivatives, Pearson Education.

Mapping of Course Outcomes to syllabus:

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<th>Course Outcomes</th>
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CMED208T: ENTREPRENEURSHIP DEVELOPMENT
(3 Credits-45 Hours) (L-T-P: 3-0-0)

Objectives
- Students will be able to understand the mindset and thinking of successful entrepreneurs, and apply that thinking to their own business ideas.
- Students will be able to identify and evaluate business opportunities based on market research, competition analysis, and industry trends.
- Students will be able to create a comprehensive business plan that includes market research, financial projections, and operational strategies.
- Students will be able to identify and overcome the challenges of starting and growing a business, including managing risk, dealing with competition, and adapting to changing market conditions.
Course/Learning Outcomes
CO 1: Remembering key concepts related to entrepreneurship. (Remembering)
CO 2: Understand the mindset and thinking of successful entrepreneurs. (Understanding)
CO 3: Innovate and create value through their business ideas, products, or services, and develop a competitive advantage in the marketplace. (Applying)
CO 4: Evaluate business opportunities and create business plan based on market research, competition analysis, and industry trends. (Analysing)

Module I: Introduction to entrepreneurship (15 hours)
Entrepreneurship capabilities and skills, Ways to be enterprising in everyday life- thinking creatively, taking initiative, organizing activities, making reasoned evaluations, developing new skills and using them in different situations, problem solving, working as a part of team and using technology in learning, Legal compliance to set up an enterprise- industry and enterprise specific.

Module II: Setting up an enterprise (10 hours)
Enterprise Opportunities- local, national and global, Changes in taste and fashion, advances in technology, changes in Government policy, changes in the size and structure of population, changes in real income, Risk involved in entrepreneurship- identify risks, analyse the implications of each risk, plan how to manage the risk.

Module III: Business Idea (10 hours)
Sources of business ideas and tests of feasibility, Significance of writing the business plan/project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report, financial forecasting – Cash flow forecast, break even and income statement, sources of finance for setting up an enterprise.

Module IV: Markets and customers (10 hours)
Market research- Identifying the target market, positioning; creating brand and brand loyalty to increase sales, market share and profit, marketing communication to reach intended consumers.

Mapping of Course Outcomes

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Suggested Readings
**INTERNSHIPS**

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**CMIN107I/ CMIN108I**: Internship (Exit of 1st Year or 2nd Year)  
(4 Credit: 120 hours)

**CMIN316I**: Internship (At the end of 4th Semester and evaluated in 5th Semester)  
(2 Credits: 60 hours)

**CMIN309P**: INTERNSHIP (During 6th Semester)  
(4 Credit: 120 hours) (L-T-P: 0-0-4)

**INTRODUCTION**

The field of Commerce and Management is very practical oriented and requires an in-depth knowledge about both the theoretical and practical aspect of business operations. In the 4 YEAR (B.Com.) programme, the students are made acquainted with the various facets of Accounting, Management and Finance, marketing and entrepreneurship. However, the lessons mostly remain with the limits of classroom discussion. The real practices of business are much more complex and subject to judgement of the manager. This internship is an attempt to enable the students to acquire some learning experiences in the practical field and equip themselves with necessary traits to succeed in the corporate environment.

**OBJECTIVES**

The students are required to undergo an internship in work related to Commerce and Management during the semester break after the end of 3rd/4th Semester till they reach 6th semester. The purpose of this internship is to expose the students to real-life industry work situations. This is an opportunity for the students to learn the application of knowledge that they have acquired from the classes, in an on-the-job situation. After the internship the students have to present their experiences in the form of reports and seminar presentations at a specified date towards the end of the sixth semester. Students will be evaluated on the basis of the report, seminar presentation and viva-voce examination.

**Course/ Learning Outcomes**

At the end of the internship students will be able to:

CO 1: Familiarise themselves with the working in the corporate sector. (Observation)  
CO 2: Identify the situations and real life problems in business management and operations. (Knowledge)  
CO 3: Work on projects under a supervisor and deal with situations. (Application)  
CO 4: Develop and understand group cohesion. (Co-ordination)  
CO 5: Know about the pattern of working and environment in business organisations. (Awareness)  
CO 6: Improve communication skills, presentation and other soft skills. (Personality Development)

**INSTRUCTION AND GUIDELINES FOR STUDENTS**

The students should follow the following instruction and guidelines during the course of internship:

The internship should be for a minimum duration of 100-120 hours which can be extended up to any limit depending upon the convenience and requirement of the student and the organisation respectively. The students have to undergo the internship during the Summer Break at the end of 2nd/ 4th/ 5th Semester Examination or Winter. Any students willing to undergo internship during the semester classes will not be encouraged and would be completely on his/her own cost of attendance and classes. Further, in such a case, the Department holds full right to reject the internship of such student.

The students can undergo internship at any organisation which is recognised or registered, as applicable, of their choice but the work must be related to commerce and management. After the completion of the internship, the students must submit the Internship Report which should include of the Internship Diary as an Annexure to the Report. The format of the Internship Report and Internship Diary should be in accordance with the one prescribed by the Department. There would be a Seminar Presentation (PPT) and Viva-Voce Examination towards the end of the 2nd Semester (If anyone leave after first year) or at the end of 4th semester (If anyone leave after second year of the programme or even those who will complete the programme till 4th year based on which the students would be evaluated for the internship. The Internship report would also be a part of evaluation.

**STRUCTURE OF INTERNSHIP**
The Internship Report must comprise of the following:
Recommendation Letter from the Department.
Completion Certificate from the Organisation where the student has worked as intern.
Internship Diary as per the prescribed format.
Organisation details (Address, E-mail, Contact Number) including name, contact number and e-mail of the supervisor is mandatory. This should be included as a part of the Internship Diary according to the prescribed format.

The Contents of the Report must include:
Introduction
Objectives of the Internship
About the Organisation (Sector, Activities, Operations)
Description of the work

The Assessment for the internship must have the following components:
Internship Report: 20 marks
Internship Diary: 20 marks
Seminar Presentation: 30 marks
Viva-Voce Examination: 30 marks

RESEARCH PROJECT/ DISSERTATION

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BCOM (Honours) with Research

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BCOM (Honours)

CMPP411P: PROJECT PHASE I
(6 Credits: 180 hours) (L-T-P: 0-0-12)

Objective
The objective of the course would be to educate the students about the various dimensions of a research-based project work. The students will also be taught about the application of statistical tools through SPSS etc.

The Dissertation will comprise of the following:
1. Synopsis: Submission of a write up on a specific area/topic of study
2. Review of Literature: Submission of a specified number of reviews to respective guide
3. Research Methodology: Lecture based on the topic of study
4. Referencing Style: Lecture on referencing style to be followed while submitting report
5. Training on application of Statistical software used in research
6. Submission of Progress Report
Report should comprise of Introduction, Review of Literature, Research Methodology and References.

EVALUATION:
A diary is to be maintained by every student to keep a record of meeting with his/her guide. A format of the diary will be circulated at the beginning with the semester.
Evaluation will be done by the respective guide based on timely submission of part-work and quality of work as follows:
Synopsis (30 marks)
Review of Literature (30 marks)
Research Methodology (30 marks)
Publication in Referred Journal: (10 marks)

Course/ Learning Outcomes
CMPP412P: PROJECT PHASE II
(6 Credits: 180 hours) (L-T-P: 0-0-12)

Objective
The objective of the course would be to develop analytical skills among the students for solving any research queries. The students will also be taught about the preparation of a project report.

Course/ Learning Outcomes
CO 1: Define the different types of research project. (Remembering)
CO 2: Explain the various steps of designing research project (Understanding)
CO 3: Building questionnaire and schedules (Applying)
CO 4: Analyzing the data for analysis (Analyzing)
CO 5: Appraising the findings in the report (Evaluating)
CO 6: Designing a research project report (Creating)

BCOM (Honours) with Research

CMDI410P: Dissertation I
(18 Credits -540 Hours) (L-T-P: 0-0-36)

CMDI411P: Dissertation II
(20 Credits -600 Hours) (L-T-P: 0-0-40)

DISSERTATION GUIDELINES

Chapter I: INTRODUCTION
a. Broad introduction to thesis topic and method. Page or two. Write after remainder of proposal is completed.
b. Research problem. State broadly, in question form. Give sub-questions. Explain carefully. In one sense, usually the problem is to expand the body of knowledge examined in the literature review.
c. Need for the research. Who will benefit? Discuss applied and scientific contributions.
e. Context. Add further info to clarify the research problem.

Chapter II: THEORY: LITERATURE REVIEW
Organize by idea; avoid stringing together abstracts of articles
b. Literature. Group articles by ideas. For a given idea, first discuss common strands in the literature, then departures.
c. Model. Of a process, usually. Based on the lit reviewed.
d. Hypotheses (in broad sense of the term; also called Propositions). For each, give brief restatement of justification tied to earlier sections; explain derivation and implications. Include assumptions. Explicitly state plausible rival hypotheses (explanations of process) of a substantive nature.
e. Scope of the study. Theoretical assumptions; discuss limitations they impose.
Chapter III: METHODS
Outline in a few pages.

a. Introduction. General description of method and design
b. Design. Experiment, quasi-experiment, survey, and so forth. Detailed description
c. Sample. Universe, population, element, sample design, tolerance, probability.
d. Measurement. Operational definitions. Include, as applicable, detailed discussion of indexes/scales. Specify methods used to assess validity and reliability.
e. Analysis. Techniques to be used; justification. Nature of relationships expected (e.g., a symmetrical, symmetrical, reciprocal; linear, monotonic, other curvilinear; necessary, sufficient, necessary and sufficient). Include dummy tables and worked examples of statistics.
f. Validity. Design: Internal and external, with relevant subtypes.
g. Methodological assumptions. Discuss limitations they impose.

APPENDICES:

a. Schedule. In Gantt Chart form.
b. Facilities. Faculty and staff expertise, library and computer resources, other special facilities contributing to a successful study.
c. Budget.
d. Bibliographic essay. Sources searched (indexes, abstracts, bibliographies, etc.). Strengths and weaknesses of literature.

Chapter IV: FINDINGS

a. Brief overview.
b. Results of application of method; any unusual situations encountered. Nature of sample.
c. Descriptive analysis. One-way frequency distributions on central variables.
d. Validity/reliability analysis.
e. Tests of hypotheses. ANOVAs, cross tabulations, correlations, and such, depending on techniques used; give in same order as hypotheses.

Chapter V: DISCUSSION

When discussing implications, deal with both the theoretical and the practical. Present only interpretations of the findings, not opinion.
a. Brief overview.
b. Discussion of results of application of method. Implications.
c. Discussion of descriptive analysis. Implications.
d. Discussion of tests of hypothesis. Implications.
e. Post-hoc analysis. Implications.

Chapter VI: CONCLUSION

May include writer’s opinion

a. Summary of entire thesis in a few pages.
b. Conclusions. Refer to lit review.
c. Implications. Speculate about broadest possible consequences, both theoretical and practical. Label speculation clearly.
d. Limitations. Theory, method.

Mapping of COs to course

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APPENDICES, Bibliographic essay, Questionnaire and coding manual, if any. Raw data.

BIBLIOGRAPHY, Include all relevant sources examined, whether cited or not.
DEPARTMENT OF CHEMISTRY

PROGRAMME: BACHELOR OF SCIENCE in CHEMISTRY (BSC)

DEGREE: BSC CHEMISTRY (HONOURS)/ BSC CHEMISTRY (HONOURS) WITH RESEARCH

PROGRAM OUTCOMES – UG PROGRAMME

PO 1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more other disciplines that form a part of an undergraduate programme of study.

PO 2: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO 3: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully; and present complex information in a clear and concise manner to different groups.

PO 4: Social Interaction: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO 5: Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 6: Moral and Ethical Awareness: Ability to embrace moral/ethical values in conducting one’s life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 7: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO 8: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes. Critical sensibility to lived experiences, with self awareness and reflexivity of both and society.

PO 9: Information and Digital Literacy: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 10: Research related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Ability to apply one’s learning to real life situations.

PROGRAM SPECIFIC OUTCOMES (BSC CHEMISTRY)

PSO 1: Scientific Problem-solving skill: Sound knowledge of fundamentals which can develop the problem-solving skills using chemical principles.

PSO 2: Analytical skills: Develop analytical skills such as synthesizing, separating, characterizing chemical compounds and chemical reaction with the help of sophisticated instruments.

PSO 3: Skills related to employability: Develop deep knowledge in some applied areas of chemistry such as pesticides chemistry, pharmaceutical chemistry etc. which helps in employability.

PSO 4: Learning on life processes: Develop basic understanding the role of chemistry in natural products as well as biological system.

SYLLABUS (BSC CHEMISTRY)

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DEPARTMENT OF CHEMISTRY

DETAILED SYLLABUS

MAJOR COURSES

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CHFC100T: FUNDAMENTALS OF CHEMISTRY I
(3 Credits-45 hours) (L-T-P: 3-0-0)

Objective
This course will discuss about the basic concepts of inorganic, organic and physical chemistry

Course/ Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the basic concepts of organic chemistry like electronic displacements, nomenclature, hybridization etc. and chemical kinetics (Remembering)
CO 2: Predict the structure and properties of molecules and also the kinetics of the reactions. (Applying)
CO 3: Evaluate the optical activity, absolute and relative configuration using the concept of stereochemistry (Evaluating)
Module I: Inorganic Chemistry (15 lectures)

a) Atomic Structure (8 lectures)
What is Quantum mechanics? Time independent Schrödinger equation and meaning of various terms in it. Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms).

b) Chemical Bonding and Molecular Structure (7 lectures)
Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy (no derivation), Born-Haber cycle and its applications, Fajan’s rules, dipole moment and percentage ionic character.
Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR (H2O, NH3, PCl5, SF6, ClF3, SF4) and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral complexes.
Concept of resonance and resonating structures in various inorganic and organic compounds. MO treatment of homonuclear diatomic molecules of 1st and 2nd periods and heteronuclear diatomic molecules such as CO, NO and NO+.

Module II: Organic Chemistry (15 lectures)

a) Basics of Organic Chemistry (6 lectures)
Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.
Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes.
Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

b) Stereochemistry (9 lectures)
Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis-trans and, syn-anti isomerism E/Z notations with C.I.P rules.
Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centers, Distereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

Module III: Physical Chemistry (15 lectures)

Suggested Readings
1. A new Concise Inorganic Chemistry, J. D. Lee, E L. B. S.
7. Organic Chemistry (Vol I and II), I. L. Finar, E. L. B. S.

Mapping of COs to Modules

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<tr>
<th>Course Outcomes</th>
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CHFC101: FUNDAMENTALS OF CHEMISTRY LAB
(1 Credits- 30 hours) (L-T-P: 0-0-1)

Objective
This course will help the students to learn about the basic laboratory experiments of Inorganic, Organic and Physical chemistry together.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the concept of molarity, normality, molality etc. (Remembering)
CO 2: Illustrate the concept of solubility for purification of organic compounds via recrystallization (Understanding)
CO 3: Identify unknown organic molecule by determining the melting point of the compounds. (Creating)
CO 4: Evaluate the activation energy of a given reaction. (Evaluating)

Module I: Organic Experiments
a. Checking the calibration of the thermometer.
b. Purification of organic compounds by crystallization using the following solvents:
   1. Water
   2. Alcohol
   3. Alcohol-Water
c. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus).
d. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
e. Determination of boiling point of liquid compounds (boiling point lower than and more than 100 °C by distillation and capillary method).
f. Estimation of oxalic acid by titrating it with KMnO4.
g. Estimation of Cu (II) ions iodometrically using Na2S2O3.
h. Detection of elements in organic compounds.

Module II: Inorganic Experiments
a. Estimation of oxalic acid by titrating it with KMnO4.

Module III: Physical Experiments
Chemical Kinetics: Study the kinetics of the following reactions.
a. Initial rate method: iodide-persulphate reaction.
b. Integrated rate method:
   • Acid hydrolysis of methyl acetate with hydrochloric acid.
   • Saponification of ethyl acetate.
   • Compare the strengths of HCl and H2SO4 by studying kinetics of hydrolysis of methyl acetate.

Suggested Readings
3. Vogel, A. I. Vogel’s Qualitative Inorganic Analysis, Prentice Hall
4. Vogel, A. I. Vogel’s Qualitative Inorganic Analysis, Prentice Hall
5. Senior Practical Physical Chemistry, B. D. Khosla, R. Chand & Co.

Mapping of COs to Syllabus

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CHFC102T: FUNDAMENTALS OF CHEMISTRY II
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course will discuss about the fundamental concepts of inorganic, organic and physical chemistry.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the periodicity of elements and thermodynamics of chemical reactions. (Understanding)
CO 2: Calculate the change in free energy accompanying a chemical reaction. (Applying)
CO 3: Explain the mechanism of different organic reactions. (Analysing)

Module I: Physical Chemistry (15 lectures)
a) Thermodynamics and Chemical Equilibrium (6 lectures)
Review of thermodynamics and the Laws of Thermodynamics.
b) Ionic Equilibria (9 lectures)

Module II: Organic Chemistry (15 lectures)
a) Chemistry of Aliphatic Hydrocarbons (10 lectures)
- **Carbon-Carbon pi bonds**: Formation of alkenes and alkynes by elimination reactions, Mechanism of E₁, E₂, E₁cb reactions. Saytzeff and Hofmann eliminations. *Reactions of alkenes*: Electrophilic additions their mechanisms (Markownikoff/AntiMarkownikoff addition), mechanism of oxymercuration-demercuration, hydroboration oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation(oxidation). 1,2- and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethylbenzene.
- **Reactions of alkynes**: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.
- **Cycloalkanes and Conformational Analysis**: Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

b) Aromatic Hydrocarbons (5 lectures)
Aromaticity: Hückel’s rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft’s alkylation/acylation with their mechanism. Directing effects of the groups.

Module III: Inorganic Chemistry (15 lectures)
a) Atomic Structure (6 lectures)
Bohr’s theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de-Broglie equation, Heisenberg’s Uncertainty Principle and its significance, Schrödinger’s wave equation, significance of ψ and ψ². Quantum numbers and their significance.
Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Pauli’s Exclusion Principle, Hund’s rule of maximum multiplicity, Aufbau’s principle and its limitations, Variation of orbital energy with atomic number.
b) Periodicity of Elements (6 lectures)
s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s &p-block.
   i. Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.
   ii. Atomic radii (van der Waals).
iii. Ionic and crystal radii.
iv. Covalent radii (octahedral and tetrahedral).
v. Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.

c) Oxidation-Reduction (3 lectures)
Redox equations, Standard Electrode Potential and its application to inorganic reactions. Principles involved in volumetric analysis to be carried out in class.

Suggested Readings
5. Physical Chemistry, G. M. Barrow, Tata McGraw Hill.

Mapping of COs to Syllabus

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CHFC103L: FUNDAMENTALS OF CHEMISTRY II LAB
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective
This course will help the students to learn about the laboratory experiments of Inorganic, Organic and Physical chemistry together.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the chromatographic technique for separation and purification of mixture of organic compounds. (Understanding)
CO 2: Apply the concept of acid-base titration for estimation. (Applying)
CO 3: Apply principles of experiments related to pH meter and thermochemistry (Applying)

Module I: Organic Experiments
1. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography.
2. Separation of a mixture of two sugars by ascending paper chromatography.
3. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC).
4. Estimation of Sodium carbonate and Sodium hydroxide present together in mixture.
5. Estimation of Fe(II) and oxalic acid using standardized KMnO₄ solution.

Module II: Inorganic Experiments
1. Estimation of Sodium carbonate and Sodium hydroxide present together in mixture.
2. Estimation of Fe(II) and oxalic acid using standardized KMnO₄ solution.

Module III: Physical Experiments
1. Preparation of buffer solutions of different pH
   • Sodium acetate-acetic acid.
   • Ammonium chloride-ammonium hydroxide.
2. pH metric titration of
   • strong acid vs. strong base.
   • weak acid vs. strong base.
   • Determination of dissociation constant of a weak acid.
3. Thermochemistry
   • Determination of heat capacity of calorimeter for different volumes.
   • Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
Suggested Readings
3. Vogel, A. I. Vogel’s Qualitative Inorganic Analysis, Prentice Hall
4. Vogel, A. I. Vogel’s Qualitative Inorganic Analysis, Prentice Hall

Mapping of COs to Syllabus

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CHO200T: ORGANIC CHEMISTRY-I: OXYGEN CONTAINING FUNCTIONAL GROUPS
(3 Credits – 45 hours) {L-T-P:3-0-0)

Objective
This course is aimed at familiarizing students with the concepts of different functional groups.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Recall concepts of chemical reactivity of different organic compounds. (Remembering)
CO 2: Explain the chemistry of halogenated hydrocarbons. (Understanding)
CO 3: Solve problems of transformation of functional groups using different reactions conditions. (Applying)
CO 4: Differentiate alcohols, phenol, ethers, epoxides. (Analysing)

Module I: Chemistry of Halogenated Hydrocarbons (10 lectures)
Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereo chemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.
Aryl halides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SNAr, Benzyne mechanism.
Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. Organometallic compounds of Mg (Grignard reagent) – Use in synthesis of organic compounds.

Module II: Alcohols, Phenols, Ethers and Epoxides (10 lectures)
Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Oxidation of diols by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement.
Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe’s–Schmidt Reactions, Fries and Claisen rearrangements with mechanism.

Module III: Carbonyl Compounds and Carboxylic acids (25 lectures)
Structure, reactivity, preparation and properties; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, α - substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, LiAlH4, NaBH4, Meerwein-Pondorf-Verley (MPV), PDC.
Addition reactions of α, β- unsaturated carbonyl compounds: Michael addition.
Active methylene compounds: Keto-enol tautomerism, preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.
General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituents on acidic strength, typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids.
Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of at acyl group, mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann- bromamide degradation and Curtius rearrangement.

Suggested Readings
Mapping of COs to Syllabus

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**CHOF201L: ORGANIC CHEMISTRY-I: OXYGEN CONTAINING FUNCTIONAL GROUPS LAB**

(1 Credits – 30 hours) (L-T-P: 0-0-1)

**Objective**

This course helps the students to understand clearly about the synthesis of some organic compounds and detection of functional group.

**Course /Learning Outcomes**

At the end of this course students will be able to:

- CO 1: Recall principles and procedures involved in functional group detection of organic compounds and preparations. (Remembering)
- CO 2: Explain the chemistry behind the detection of functional groups. (Understanding)
- CO 3: Carry out reactions to transform functional groups. (Applying)
- CO 4: Assess optimal conditions for organic reactions. (Evaluating)

**Module I:**

a. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid group.

b. Organic preparations:

   Acetylation of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-, m-, p-anisidine) and phenols (β -naphthol, vanillin, salicylic acid) by any one method:
   
   i. Using conventional method.
   ii. Using green approach.
   iii. Benzoylation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, p-anisidine) and one of the following phenols (β -naphthol, resorcinol, p- cresol) by Schotten-Baumann reaction.
   iv. Oxidation of ethanol/ isopropanol (Iodoform reaction).
   v. Selective reduction of meta dinitrobenzene to m-nitroaniline.
   vi. Hydrolysis of amides and esters.
   vii. Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
   viii. S-Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid, oxalic acid, phenyl acetic acid and phthalic acid).
   ix. Aldol condensation using either conventional or green method.
   x. The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization and melting point.

**Suggested Readings**


Mapping of Cos to Syllabus

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CHTH202T: PHYSICAL CHEMISTRY-I: CHEMICAL THERMODYNAMICS
(3 Credits – 45 hours) (L-T-P:3-0-0)

Objective
In this course, students learn how the laws of thermodynamics influence chemical and phase equilibria in ideal and non-ideal fluids (liquids and gases).

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the laws of thermodynamics and the properties of thermodynamic functions (Understanding)
CO 2: Derive equations relating different thermodynamic functions (Applying)
CO 3: Apply thermodynamic laws and equations to explain phase and chemical equilibria in closed systems in the gas and liquid phases. (Application)
CO 4: Compare conditions in which the different thermodynamic relations can be applied (Evaluating)

Module 1: Chemical Thermodynamics (15 hours)
Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.
First law: Concept of heat, q, work, w, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.
Thermochemistry: Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff’s equations) and pressure on enthalpy of reactions. Adiabatic flame temperature, explosion temperature.
Second Law: Concept of entropy; thermodynamic scale of temperature, statement of these law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.
Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.
Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.

Module II: Systems of Variable Composition (10 hours)
Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

Module III: Chemical Equilibrium (10 hours)
Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exoergic and endoergic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants $K_p$, $K_c$ and $K_x$. Le Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.

Module 4: Solutions and Colligative Properties (10 hours)
a) Dilute solutions; lowering of vapour pressure, Raoult’s and Henry’s Laws and their applications. Excess thermodynamic functions.
b) Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

Suggested Readings
Mapping of COs to Modules

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CHTH203L: PHYSICAL CHEMISTRY-I: CHEMICAL THERMODYNAMICS LAB
(1 Credits- 30 hours) (L-T-P: 0-0-1)

Objective
In this course, students learn some practical aspects of thermodynamics viz. calorimetry, which deals with measurements of heats of reaction in the liquid phase using an adiabatic isobaric caloriometer.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall principles and methods of thermochemistry. (Remembering)
CO 2: Explain methods and principles to carry out calorimetric measurements. (Understanding)
CO 3: Measure heats of reactions following appropriate procedures. (Applying)
CO 4: Calculate the heats of reactions in each experiment. (Analysing)
CO 5: Design experiments to measure enthalpy changes in solution. (Creating)

Module I: Thermochemistry
a. Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).

Suggested Readings

Mapping of COs to Modules

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CHHC204T: ORGANIC CHEMISTRY II: HETEROCYCLIC CHEMISTRY
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective
This course is designed to make the students familiar with reaction mechanisms, natural product chemistry and heterocyclic chemistry.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the preparation and reactions of amines, nitrile, isonitrile and nitro compounds etc. (Remembering)
CO 2: Preparation and properties of polynuclear aromatic compounds. (Understanding)
CO 3: Synthetic route for the preparation of heterocycles and applications in the present research. (Applying)
CO 4: Structural elucidation of polynuclear aromatic compounds, alkaloids and terpenes etc. (Analysing)
Module I: Nitrogen Containing Functional Groups (20 lectures)
Preparation and important reactions of nitro compounds, nitriles and isonitriles.
Amines: Preparation and properties: Effect of substituent and solvent on basicity; Gabriel phthalimide synthesis, Carbamoyl reaction, Mannich reaction, Hoffmann’s exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid.
Diazonium Salts: Preparation and their synthetic applications.

Module II: Polynuclear Hydrocarbons (6 lectures)
Aromaticity of polynuclear hydrocarbons, structure elucidation of naphthalene; Preparation and properties of naphthalene, phenanthrene and anthracene.

Module III: Heterocyclic Compounds (24 lectures)
Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Indole(Fischer indole synthesis and Madelung synthesis), Quinoline and isoquinoline, (Skraup synthesis, Friedlander’s synthesis, Knorr quinoline synthesis, Doebner- Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction)

Module IV: Alkaloids and Terpenes (10 lectures)
Natural occurrence, General structural features, Isolation and their physiological action, Hoffmann’s exhaustive methylation, Emde’s modification; Structure elucidation and synthesis of Nicotine, medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine. Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral.

Suggested Readings

Mapping of COs to Syllabus

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CHHC205L: ORGANIC CHEMISTRY II: HETEROCYCLIC CHEMISTRY LAB
(1 Credits- 30 hours) (L-T-P: 0-0-1)

Objective
This course is designed to make the students familiar with the concepts of qualitative organic analysis.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Gain knowledge about Qualitative analysis of organic compounds. (Remembering)
CO 2: Explain the chemistry of various tests used in the detection of functional groups and elements present in an organic sample. (Understanding)
CO 3: Qualitative analysis for the identification of organic compounds from mixtures. (Applying)
CO 4: Analyze the melting point of the compound and its derivative for the determination of its exact structure. (Analysing)

Module I:
a. Functional group test for nitro, amine and amide groups.
b. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, carbonyl compounds and esters).

Suggested Readings

Mapping of COs to Module

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CHPC206T: PHYSICAL CHEMISTRY II: PHASE EQUILIBRIA AND CHEMICAL KINETICS
(3 Credits-45 hours) (L-T-P: 3-0-0)

Objective
This course is designed to make the students familiar with theories of Chemical kinetics and phase equilibria.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall basic concepts of chemical kinetics and adsorption (Remembering)
CO 2: Explain concepts such as the Gibbs phase rule for non-reactive and reactive systems. (Understanding)
CO 3: Apply the concepts of phase equilibria to systems with varying components. (Applying)
CO 4: Analyze the kinetics of different types of chemical reactions. (Analysing)

Module I: Phase Equilibria (30 lectures)

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications.
Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions, Three component systems, water-chloroform-acetic acid system, triangular plots.

Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary miscible liquids (ideal and nonideal), azeotropes, lever rule, partial miscibility of liquids, CST, miscible pairs, steam distillation. Nernst distribution law: its derivation and applications.

Module II: Chemical Kinetics (20 lectures)

Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental methods of the determination of rate laws, kinetics of complex reactions (integrated rate expressions up to first order only): (i) Opposing reactions (ii) parallel reactions and (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions.
Temperature dependence of reaction rates; Arrhenius equation; activation energy, collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates.

Module III: Catalysis (6 lectures)

Types of catalyst, Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

Module IV: Surface chemistry (4 lectures)

Physisorption, chemisorption, adsorption isotherms.

Suggested Readings
1. Physical Chemistry, A. Peter and J. de Paula, Oxford University Press.
# CHPC207L: PHYSICAL CHEMISTRY-II: PHASE EQUILIBRIA AND CHEMICAL KINETICS LAB

(1 Credits - 30 hours) (L-T-P: 0-0-1)

**Objective**

*This course is designed to make the students to understand the practical application of chemical kinetics and phase equilibria.*

**Course / Learning Outcomes**

At the end of this course students will be able to:

- **CO 1**: Measure the distribution coefficient of liquids, CST and equivalence points through potentiometric titrations. (Applying)
- **CO 2**: Find out how CST of the phenol-water system is affected by impurities. (Analysing)
- **CO 3**: Find the Kinetics of different types of chemical reaction (Analysing)
- **CO 4**: Explain the different isotherms using adsorption techniques. (Understanding)

**Module I:**

- **a.** Determination of critical solution temperature and composition of the phenol-water system and to study the effect of impurities on it.
- **b.** Phase equilibria: Construction of the phase diagram using cooling curves or ignition tube method:
  1. simple eutectic and
  2. congruently melting systems.
- **c.** Distribution of acetic/benzoic acid between water and cyclohexane.
- **d.** Study the equilibrium of at least one of the following reactions by the distribution method:
  1. \( \text{I}_2(\text{aq}) + \text{I}^- (\text{aq}) \rightarrow \text{I}_3^- (\text{aq}) \)
  2. \( \text{Cu}^{2+}(\text{aq}) + n\text{NH}_3 \rightarrow \text{Cu} (\text{NH}_3)_n \).
- **e.** Study the kinetics of the following reactions.
  1. Initial rate method: iodide-persulphate reaction.
  2. Acid hydrolysis of methyl acetate with hydrochloric acid
  3. Compare the strengths of HCl and H2SO4 by studying kinetics of hydrolysis of methylacetate.
- **f.** Adsorption
  1. Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

**Suggested Readings**


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# CHSP208T: INORGANIC CHEMISTRY I: METALLURGY, S - AND P-BLOCK ELEMENTS

(3 Credits – 45 hours) (L-T-P: 3-0-0)

**Objective**

*This course helps the students to understand clearly about the principle of metallurgy and the properties of s and p block elements.*

**Course / Learning Outcomes**

At the end of this course students will be able to:

- **CO 1**: Recall the concepts of general principles of metallurgy, the chemistry of s and p block elements (Remembering)
- **CO 2**: Explain the structure, bonding, properties and uses of some important inorganic compounds. (Understanding)
- **CO 3**: Apply the concepts to solve simple problems on periodic properties of s-block elements. (Applying)
CO 4: Analyze the periodic properties p block elements. (Analysing)

Module I: General Principles of Metallurgy (10 lectures)
Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent, Electrolytic reduction, hydrometallurgy with reference to cyanide process for silver and gold, Methods of purification of metals: electrolytic process, van Arkel-de Boer process and Mond’s process, Zone refining.

Module II: Chemistry of s Block Elements (15 lectures)
a. General characteristics: melting point, flame colour, reducing nature, diagonal relationships and analogous behaviour of first member of each group.
b. Reactions of alkali and alkaline earth metals with oxygen, hydrogen, nitrogen and water.
c. Common features such as ease of formation, thermal stability and solubility of the following alkali and alkaline earth metal compounds: hydrides, oxides, peroxides, super oxides, carbonates, nitrates, sulphates.

Module III: Chemistry of p-block elements (5 lectures)
Electronic configuration, atomic and ionic size, metallic/non-metallic character, melting point, ionization enthalpy, electron gain enthalpy, electronegativity, allotropy of C, P, S; inert pair effect; diagonal relationship between B and Si and anomalous behaviour of first member of each group.

Module IV: Structure, bonding and properties: acidic/basic nature, stability, ionic/covalent nature, oxidation/reduction, hydrolysis, action of heat on the following compounds (10 lectures)
a. Hydrides: hydrides of Group 13 (only diborane), Group 14, Group 15 (EH₃ where E=N, P, As, Sb, Bi), Group 16 and Group 17.
b. Oxides: oxides of phosphorus, sulphur and chlorine.
c. Oxoacids: oxoacids of phosphorus and chlorine; peroxoacids of sulphur.
d. Halides: halides of silicon and phosphorus.

Module V: Preparation, properties, structure and uses of the following compounds (5 lectures)
a. Borazine.
b. Silicates, silicones.
c. Interhalogen and pseudohalogen compounds.

Suggested Readings
1. Concise Inorganic Chemistry, J. D. Lee, Pearson Education.

Mapping of COs to Modules

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CHSP209L: INORGANIC CHEMISTRY-II: S- AND P-BLOCK ELEMENTS LAB
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective
This course helps the students to understand clearly about the synthesis of some inorganic compounds and Iodo/Iodimetric and Complexometric titrations.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the idea of different types of estimations of inorganic compounds. (Remembering)
CO 2: Explain the principles of different types of iodimetric titrations. (Understanding)
CO 3: Utilize the methods of preparation of some inorganic complexes. (Applying)
CO 4: Analyse the principle of complexometric titrations for the estimation of inorganic compounds. (Analysing)
Module I:

a. **Iodo / Iodimetric Titrations**
   1. Estimation of Cu(II) and K₂Cr₂O₇ using sodium thiosulphate solution (iodometrically).
   2. Estimation of antimony in tartar-emetic iodimetrically.

b. **Complexometric titrations using disodium salt of EDTA**
   1. Estimation of Mg²⁺, Zn²⁺.
   2. Estimation of Ca²⁺ by substitution method.

c. **Inorganic Preparations**
   1. Cuprous chloride, Cu₂Cl₂.
   2. Manganese (III) phosphate, MnPO₄·H₂O.
   3. Aluminium potassium sulphate KAl(SO₄)₂·12H₂O (potash alum) or chrome alum.

**Suggested Readings**
1. A textbook of quantitative inorganic analysis, A. I. Vogel, ELBS.

**Mapping of COs to Syllabus**

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**CHBI300T: ORGANIC CHEMISTRY III: BIOMOLECULES**
(4 Credits – 60 hours) (L-T-P: 4-0-0)

**Objective**
This course aims at helping the students to become acquainted with the basic concepts of biomolecules, energy in biosystem and pharmaceutical compounds

**Course / Learning Outcomes**
At the end of this course students will be able to:
CO 1: Explain the concept of energy in the biosystem. (Understanding)
CO 2: Suggest the scheme for the synthesis of a peptide. (Applying)
CO 3: Explain the roles of lipids, proteins, enzymes and nucleic acids in a living system. (Analysing)
CO 4: Suggest mechanisms for creating a particular sequence of the protein or nucleic acid. (Creating)

**Module I: Nucleic Acids (8 lectures)**
Components of nucleic acids, Nucleosides and nucleotides; Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine; Structure of polynucleotides (DNA and RNA).

**Module II: Amino Acids, Peptides and Proteins (20 lectures)**

**Module III: Enzymes (5 lectures)**
Introduction, classification and characteristics of enzymes. Salient features of active site of enzymes. Mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action, coenzymes and cofactors, specificity of enzyme action (including stereo specificity), enzyme inhibitors and their importance.

**Module IV: Lipids (6 lectures)**
Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

**Module V: Concept of Energy in Bio systems (15 lectures)**
Cells obtain energy by the oxidation of foodstuff (organic molecules). Introduction to metabolism (catabolism, anabolism). ATP: The universal currency of cellular energy, ATP hydrolysis and free energy change. Agents for transfer of electrons in biological redox systems: NAD+, FAD.
Conversion of food to energy: Outline of catabolic pathways of carbohydrate- glycolysis, fermentation, Krebs cycle.
Caloric value of food, standard caloric content of food types.

**Module VI: Pharmaceutical Compounds: Structure and Importance (6 lectures)**
Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarial: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine).

**Suggested Readings**

**Mapping of COs to Syllabus**

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**CHBI301L: ORGANIC CHEMISTRY III: BIOMOLECULES LAB**
(1 Credit -30 hours) (L-T-P: 0-0-1)

**Objective**
*This course aims at helping the students to become acquainted with the estimation of some amino acid, protein etc.*

**Course / Learning Outcomes**
At the end of this course students will be able to:
CO 1: Recall principles of estimation of some amino acids and proteins. (Remembering)
CO 2: Understand the principles involved in estimations of amino acids, proteins. (Understanding)
CO 3: Apply the principles they learn to carry out the aforementioned estimations. (Applying)
CO 4: Analyse the experimental data of these experiments. (Analysing)

**Module I:**
a. Estimation of glycine by Sorenson’s formalin method.
b. Study of the titration curve of glycine.
c. Estimation of proteins by Lowry’s method.
d. Study of the action of salivary amylase on starch at optimum conditions.
e. Effect of temperature on the action of salivary amylase.

**Suggested Readings**

**Mapping of COs to Module**

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**CHCO303T: INORGANIC CHEMISTRY II: COORDINATION CHEMISTRY**
(4 Credits-60 hours) (L-T-P: 4-0-0)

**Objective**
*This course helps the students to understand clearly about the transition elements, coordination complexes and inorganic reaction mechanism.*

**Course / Learning Outcomes**
At the end of this course students will be able to:
CO 1: Recollect the properties of transition elements and coordination compounds. (Remembering)
CO 2: Infer the properties of transition elements. (Understanding)
CO 3: Correlating various Theories of coordination compounds with properties. (Applying)
CO 4: Explain the reaction mechanisms involved in different complexes of transition elements (Analysing)

Module I: Coordination Chemistry (24 lectures)
Theory of coordination complexes, valence bond theory (inner and outer orbital complexes), Crystal field theory, measurement of 10 Dq (Δo), CFSE in weak and strong fields, Octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry, Jahn-Teller theorem, square planar geometry, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds, Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect.

Module II: Transition Elements (15 lectures)
Study of electronic configuration, colour, variable valency, magnetic and catalytic properties, Stability of various oxidation states and e.m.f (Latimer diagrams), difference between the first, second and third transition series. Chemistry of Cr, Mn, and Fe in various oxidation states with special reference to the following compounds: peroxo compounds of chromium, potassium dichromate, potassium permanganate, potassium ferrocyanide, potassium ferricyanide.

Module III: Lanthanoids and Actinoids (6 lectures)
Electronic configuration (anomalies), common oxidation states, colour, spectral and magnetic properties, lanthanide contraction, separation of lanthanides (ion-exchange method).

Module IV: Inorganic Reaction Mechanism (15 lectures)
Concept of inorganic reaction mechanisms, Labile and inert complexes, substitution reactions in square planar complexes, trans-effect and theories, thermodynamic and kinetic stability.

Suggested Readings
3. Inorganic Chemistry (adapted), G. L. Miessler and D. A. Tarr, Pearson.

Mapping of the COs to the Modules

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CHCO304L: Inorganic Chemistry II: Coordination Chemistry Lab
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course helps the students to understand clearly about the synthesis of some inorganic compounds, gravimetric preparation and some spectroscopic methods to understands the properties of some inorganic complexes.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall principles and methods for gravimetric analysis of inorganic compounds. (Remembering)
CO 2: Explain the principle of gravimetric estimation of some transition metal complexes. (Understanding)
CO 3: Apply the principles and methods to know the properties of complexes. (Applying)
CO 4: Adopt suitable methods to prepare inorganic compounds. (Creating)

Module 1:
a. Gravimetric Analysis:
   2. Estimation of copper as CuSCN.
   3. Estimation of iron as Fe$_2$O$_3$ by precipitating iron as Fe(OH)$_3$.
   4. Estimation of Al(III) by precipitating with oxine and weighing as Al(oxine)$_3$ (aluminium oxinate).
b. Inorganic Preparations:
   1. Tetraamminecopper (II) sulphate, $[\text{Cu(NH}_3\text{)}_4]_2 \text{SO}_4 \cdot \text{H}_2\text{O}$.
   2. Acetylacetonate complexes of Cu$^{2+}$/Fe$^{3+}$.
   3. Tetraamminecarbonatocobalt (III) nitrate.
   4. Potassium tri(oxalato)ferrate(III).
c. Properties of Complexes
   1. Measurement of 10 Dq by spectrophotometric method.
   2. Verification of spectrochemical series.
   3. Synthesis of ammine complexes of Ni(II) and its ligand exchange reactions (e.g. bidentate ligands like acetylacetone, DMG, glycine) by substitution method.

Suggested Readings
1. A text book of Quantitative Analysis, A.I. Vogel, ELBS.

Mapping of COs to Syllabus

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CHSQ305T: PHYSICAL CHEMISTRY III: QUANTUM CHEMISTRY AND SPECTROSCOPY
(3 Credits - 45 hours) (L-T-P: 3-0-0)

Objective
This course aims to introduce students to the introductory principles of quantum chemistry and molecular spectroscopy

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the postulates of quantum mechanics and spectroscopy. (Understanding)
CO 2: Apply the postulates to a few model systems and to the Hydrogen atom (Applying)
CO 3: Apply principles of spectroscopy to obtain structural information of small molecules (Applying)
CO 4: Compare spectroscopic techniques, theories of chemical bonding. (Evaluating)

Module 1: Quantum Chemistry (25 hours)
   a. Postulates of quantum mechanics, quantum mechanical operators and commutation rules, Schrödinger equation and its application to free particle and —particle-in-a-box (rigorous treatment), quantization of energy levels, zero-point energy and Heisenberg Uncertainty principle; wave functions, probability distribution functions, nodal properties, Extension to two- and three-dimensional boxes, separation of variables, degeneracy.
   Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions. Vibrational energy of diatomic molecules and zero-point energy.
   Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrödinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression). Average and most probable distances of electron from nucleus. Setting up of Schrödinger equation for many-electron atoms (He, Li). Need for approximation methods. Statement of variation theorem and application to simple systems (particle-in-a-box, harmonic oscillator, hydrogen atom).

Module 2: Molecular Spectroscopy (20 hours)
Interaction of electromagnetic radiation with molecules and various types of spectra; Born Oppenheimer approximation.
Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.
Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies.
Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.
Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.
Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and pre-dissociation, calculation of electronic transitions of polyenes using a free electron model.

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low-resolution spectra, different scales (δ and ω), spin-spin coupling and high-resolution spectra, interpretation of PMR spectra of organic molecules.

Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals.

Suggested Readings
5. Atomic & Molecular Spectroscopy, R. Kakkar, Cambridge University Press.

Mapping of COS to Syllabus

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CHSQ306L: PHYSICAL CHEMISTRY III: QUANTUM CHEMISTRY AND SPECTROSCOPY LAB
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
In this course, students get to learn to use the phenomenon of light absorption by some molecules to determine chemical properties associated with them and the reactions in which they participate.

Course /Learning Outcomes
At the end of this course students will be able to:

CO 1: Remember the laws to apply when carrying out UV-visible absorbance measurements. (Remembering)

CO 2: Explain how the laws can be used to determine concentrations or molar extinction coefficients of molecules. (Understanding)

CO 3: Carry out measurements of molecular absorption in the lab. (Applying)

CO 4: Analyze vibrational spectra of diatomic molecules. (Analyzing)

CO 5: Suggest alternative ways of carrying out experiments or analysis of data. (Creating)

Module I:
UV/Visible spectroscopy
a. Study the 200-500 nm absorbance spectra of KMnO4 and K2Cr2O7 (in 0.1 M H2SO4) and determine the λmax values. Calculate the energies of the two transitions in different units (J molecule⁻¹, kJ mol⁻¹, cm⁻¹, eV).

b. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of K2Cr2O7.

c. Record the 200-350 nm UV spectra of the given compounds (acetone, acetaldehyde, 2-propanol, acetic acid) in water. Comment on the effect of structure on the UV spectra of organic compounds.

Colorimetry
a. Verify Lambert-Beer’s law and determine the concentration of CuSO4/KMnO4/K2Cr2O7 in a solution of unknown concentration.

b. Determine the concentrations of KMnO4 and K2Cr2O7 in a mixture.

c. Study the kinetics of iodination of propanone in acidic medium.

d. Determine the amount of iron present in a sample using 1, 10-phenanthroline.

e. Determine the dissociation constant of an indicator (phenolphthalein).

f. Study the kinetics of interaction of crystal violet/phenolphthalein with sodium hydroxide.

Vibrational Spectroscopy
Analysis of the given vibration-rotation spectrum of HCl(g).

Suggested Readings
Mapping of COs to Syllabus

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CHOS307T: ORGANIC CHEMISTRY IV: ORGANIC SPECTROSCOPY
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to make the students familiar with different spectroscopic techniques, carbohydrates, dyes, polymer

Course /Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the principles of UV, IR and NMR spectroscopy. (Remembering)
CO 2: Explain absolute configuration of carbohydrates; mutarotation. (Understanding)
CO 3: Apply different mechanisms to the polymerization reactions. (Applying)
CO 4: Analyse the application of different types of dyes. (Analysing)

Module I: Organic Spectroscopy (17 lectures)
General principles Introduction to absorption and emission spectroscopy.
UV Spectroscopy: Types of electronic transitions, \( \lambda_{\text{max}} \), Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward Rules for calculation of \( \lambda_{\text{max}} \) for the following systems: \( \alpha, \beta \)-unsaturated aldehydes, ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.
IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O, N and S containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis.
NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple compounds.
Applications of IR, UV and NMR for identification of simple organic molecules.

Module II: Carbohydrates (12 lectures)
Occurrence, classification and their biological importance.
Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani- Fischer synthesis and Ruff degradation.
Disaccharides – Structure elucidation of maltose, lactose and sucrose.
Polysaccharides – Elementary treatment of starch, cellulose and glycogen.

Module III: Dyes (6 lecture)
Classification, Colour and constitution; Mordant and Vat Dyes; Chemistry of dyeing; Synthesis and applications of: Azo dyes – Methyl orange; Triphenyl methane dyes -Malachite green and Rosaniline; Phthalin Dyes – Phenolphthalein; Natural dyes –structure elucidation and synthesis of Alizarin and Indigotin; Edible Dyes with examples.

Module IV: Polymers (10 lectures)
Introduction and classification including di-block, tri-block and amphiphilic polymers; Polymerisation reactions -Addition and condensation -Mechanism of cationic, anionic and free radical addition polymerization; Metallocene-based Ziegler-Natta polymerisation of alkenes; Preparation and applications of plastics – thermosetting (phenol-formaldehyde, Polyurethanes) and thermo softening (PVC, polythene); Fabrics – natural and synthetic (acrylic, polyamido, polyester); Rubbers – natural and synthetic: Buna-S, Chloroprene and Neoprene; Vulcanization; Polymer additives; Introduction to; Biodegradable and conducting polymers with examples.

Suggested Readings
5. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), I. L. Finar, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Mapping of COs to Modules

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CHOS308L: ORGANIC CHEMISTRY IV: ORGANIC SPECTROSCOPY LAB
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course is intended to explain the concept of qualitative organic analysis, extraction of compounds from natural products, synthesis of some polymers

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the principals involved in the extraction of organic compounds. (Remembering)
CO 2: Explain the procedure for the preparation of organic molecules. (Understanding)
CO 3: Analyse unknown organic compounds. (Analysing)

Module I
a. Extraction of caffeine from tea leaves.
b. Preparation of urea formaldehyde resin.
c. Qualitative analysis of unknown organic compounds containing monofunctional groups (carbohydrates, aryl halides, aromatic hydrocarbons, nitro compounds, amines and amides) and simple bifunctional groups, e.g. salicylic acid, cinnamic acid, nitrophenols etc.

Suggested Readings

Mapping of COs to Syllabus

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CHBO309T: Inorganic Chemistry III: BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course will explain the biological systems containing metal ions, basic principles of inorganic qualitative analysis, classification and preparation of organometallic compounds.

Course/ Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the role of metal ions in biological systems (Remembering)
CO 2: Explain the analysis and separation of ions from mixture. (Understanding)
CO 3: Make use of the properties of metal ions for effective target binding (Applying)
CO 4: Concept of electron contribution from metals and ligands in analysing reactivity and stability of organometallic compounds. (Analysing)

Module I: Bioinorganic Chemistry (10 lectures)
Metal ions present in biological systems, classification of elements according to their action in biological system, Geochemical effect on the distribution of metals, Sodium / K-pump, carbonic anhydrase and carboxypeptidase, Excess and deficency of some trace metals, Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug, Iron and its application in bio-systems, Haemoglobin, Myoglobin; Storage and transfer of iron.

Module II: Basic Principles of inorganic Qualitative Analysis (10 lectures)
Basic principles involved in analysis of cations and anions, solubility products, common ion effect, principles involved in separation of cations into groups and choice of group reagents, interfering anions (fluoride, borate, oxalate, phosphate) and removal.

Module III: Organometallic Compounds (20 lectures)
Definition and classification of organometallic compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series, structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT.π-acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding. Zeise’s salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls. Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds. Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation). structure and aromaticity, comparison of aromaticity and reactivity with that of benzene.

Module IV: Catalysis by Organometallic Compounds (5 lectures)
Study of the following catalytic mechanisms:
1. Alkene hydrogenation (Wilkinson’s Catalyst).
2. Synthetic gasoline (Fischer Tropsch reaction).

Suggested Readings
1. Vogel’s Qualitative Inorganic Analysis, G. Svehla, Prentice Hall.

Mapping of COs to Syllabus

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CHBO310L: INORGANIC CHEMISTRY III: BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY LAB
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course helps the students to understand clearly about the qualitative analysis of some acidic and basic radicals and also about the principles involved in chromatographic separation.

Course Outcomes
At the end of this course students will be able to:
CO 1: Recall the principles of separating and identifying ions in a mixture. (Remembering)
CO 2: Interpret the chemistry of the reactions for separation and identification of ions. (Understanding)
CO 3: Apply the principles to carry out the separation of ions in a mixture in the laboratory. (Applying)
CO 4: Analyse the experimental results in the laboratory. (Analysing)
CO 5: Evaluate the process of chromatographic separations of metal ions. (Evaluating)

Qualitative analysis: Qualitative semi-micro analysis of mixtures containing 3 anions and 3 cations. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

\(\text{CO}_3^2-, \text{NO}_2-, \text{S}_2\text{O}_3^2-, \text{S}_2\text{O}_4^2-, \text{CH}_4\text{COO}^-, \text{F}^-, \text{Cl}^-, \text{Br}^-, \text{I}^-, \text{NO}_3-, \text{BO}_3^3-, \text{C}_2\text{O}_4^2-, \text{PO}_4^3-, \text{NH}_4^+, \text{K}^+, \text{Pb}^{2+}, \text{Cu}^{2+}, \text{Cd}^{2+}, \text{Bi}^{3+}, \text{Sn}^{2+}, \text{Sb}^{3+}, \text{Fe}^{3+}, \text{Al}^{3+}, \text{Cr}^{3+}, \text{Zn}^{2+}, \text{Mn}^{2+}, \text{Co}^{2+}, \text{Ni}^{2+}, \text{Ba}^{2+}, \text{Sr}^{2+}, \text{Ca}^{2+}, \text{Mg}^{2+}\).

Mistakes should preferably contain one interfering anion, or insoluble component (\(\text{BaSO}_4, \text{SrSO}_4, \text{PbSO}_4, \text{CaF}_2\) or \(\text{Al}_2\text{O}_3\)) or combination of anions e.g.\(\text{CO}_3^2-\) and \(\text{SO}_4^2-\), \(\text{NO}_2-\) and \(\text{NO}_3-\), \(\text{Cl}^-\), and \(\text{Br}^-, \text{I}^-\) or \(\text{Br}^-, \text{I}^-\).

Spot tests should be done whenever possible.

Chromatography: Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions:
1. \(\text{Ni (II)}\) and \(\text{Co (II)}\).
2. \(\text{Cu(II)}\) and \(\text{Cd(II)}\).

Suggested Readings
1. Vogel's Qualitative Inorganic Analysis, Revised by G. Svehla.
2. A Textbook of Quantitative Analysis, A. I. Vogel, ELBS.

Mapping of COs to Module

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CHEL311T: Physical Chemistry IV: Electrochemistry
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course helps the students to understand clearly about the theories of electrochemistry and electrochemical cells.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Recall fundamental concepts of electrochemistry. (Remembering)
CO 2: Explain principles associated with Faraday’s laws of electrolysis. (Understanding)
CO 3: Application of theories of conductance measurements. (Applying)
CO 4: Distinguish between different types of electrochemical cells, electrodes. (Analysing)

Module I: Conductance (20 lectures)

Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

Module II: Electrochemistry (25 lectures)
Quantitative aspects of Faraday’s laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry.

Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass and SbO/Sb2O3 electrodes.

Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).
Suggested Readings
5. Physical Chemistry, T. Engel and P. Reid Prentice-Hall.

Mapping of COs to Modules

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CHEL312L: Physical Chemistry IV: Electrochemistry Lab
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course helps the students to understand clearly about practical application of electrochemistry.

Course / Learning Outcomes:
At the end of this course students will be able to:
CO 1: Recall the basic concepts of conductometry and potentiometry. (Remembering)
CO 2: Explain the principles of conductometric and potentiometric titrations. (Understanding)
CO 3: Determine the cell constant, conductivity, equivalence points through conductometry. (Applying)
CO 4: Analysing and the data obtained from conductometric and potentiometric titrations. (Analysing)

Module I:
Conductometry
a. Determination of cell constant.
b. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
c. Perform the following conductometric titrations:
   1. Strong acid vs. strong base.
   2. Weak acid vs. strong base.
   3. Mixture of strong acid and weak acid vs. strong base.
   4. Strong acid vs. weak base.

Potentiometry:
a. Perform the following potentiometric titrations:
   1. Strong acid vs. strong base.
   2. Weak acid vs. strong base.
   3. Dibasic acid vs. strong base.
   4. Potassium dichromate vs. Mohr’s salt.

Suggested Readings

Mapping of COs to Syllabus

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<tr>
<th>Course Outcomes</th>
<th>Conductometry</th>
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CHA/400T: Inorganic chemistry IV: Advanced Inorganic Chemistry
(4 Credits – 60 hours)

Objectives
This course helps the students to understand clearly about the inorganic reaction mechanisms including photochemical, chemistry of main group compounds and organometallic compounds. Special focus given to solid state chemistry.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Demonstrate the mechanism of Inorganic photochemical reactions (Understanding)

CO 2: Make use of the properties of metals/non-metals for synthesizing organometallic compounds and catalytic activity study (Applying)

CO 3: Analyse the structure, bonding and synthesis of some inorganic solids. (Analysing)

Module I: Descriptive Inorganic Chemistry (20 lectures)

a. Structure and bonding in polyhedral boranes and carboranes, styx notation, Wade’s rules, electron count in polyhedral boranes, synthesis of polyhedral boranes, isolobal analogy, boron halides, phosphine-boranes, boron heterocycles, borazine.

b. Silanes, silicon halides, silicates, silicones, silanols, zeolites, germanium, tin and lead organyls, silenes, germanes, stannenes, phosphorous halides, phosphazenes, sulphur halides, structural features and reactivity of S-N heterocycles.

c. Preparation and reactivity of aluminium organyls, carbalumination, hydro alumination, chemistry of Ga (I) and In (I), reduction of Al, Ga and In organyls, Metal organic framework structures (MOFs).

Module II: Mechanism of Inorganic Reactions (10 lectures)

Substitution in octahedral and square planar complexes, lability, trans-effect, conjugate base mechanism, racemisation, electron transfer reactions - inertness and lability, inner sphere and outer sphere mechanism, Marcus theory, solid state reactions – topotactic and epitactic mechanisms.

Module III: Inorganic Photochemistry (5 lectures)

Photosubstitution and photoredox reactions of chromium, cobalt and ruthenium compounds, Ligand field and charge transfer state (Thexi and DOSENCO states), cis-trans isomerization, photocatalysis and solar energy conservation by ruthenium complexes.

Module IV: Organometallic Chemistry (15 lectures)

a. Valence electron count (16/18 electron rules), synthesis, structure, bonding and reactivity of mono and polynuclear metal carbonyls, substituted metal carbonyls, vibrational spectra of metal carbonyls, metal-metal bonding.

b. Types of M-C bonds, synthesis and reactivity of metal alkyls, carbenes, alkenes, alkynes, and arenne complexes, metallocenes and bent metallocenes, isolobal analogy.

c. Reactions of organometallic complexes: Substitution, oxidative addition, reductive elimination, insertion and de insertion, catalysis, hydrogenation, hydroformylation, Wacker process, alkene polymerization.

Module V: Introduction to Solid State Chemistry (10 lectures)

Structure of simple solids – metals, alloys and compounds; common structure types; synthesis of solid-state compounds - ceramic method, microwave synthesis, sol-gel, precursor method, hydrothermal synthesis, CVD and intercalation; characterization of solids, bonding in solids – free-electron and molecular orbital theory; bands in solid state compounds, properties of solids – optical, magnetic and electrical properties of solids.

Suggested Readings
4. Education.
Mapping of COs to Modules

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CHAI401: Inorganic chemistry IV: Advanced Inorganic Chemistry Lab
(1 Credit - 30 hours) (L-T-P: 0-0-1)

Objectives
This course helps the students to understand clearly about the qualitative and quantitative analysis and spectroscopic characterization of coordination compounds after synthesis.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the procedures followed to carry out the qualitative and quantitative analysis. (Remembering)
CO 2: Explain the reason behind each step for Analysing mixtures and preparing compounds and metal nanoparticles. (Understanding)
CO 3: Apply different spectroscopic methods to characterize coordination compounds. (Applying)

Module I:
- Qualitative analysis (tertiary mixtures, alloys, ores).
- Quantitative analysis (binary mixtures, alloys, ores).
- Inorganic preparation (crystallization, precipitation, calcination).
- Coordination compounds through ligand synthesis and spectroscopic characterization, magnetic properties.
- Metal Nanoparticle synthesis and characterization.

Suggested readings
2. Vogel’s Qualitative Inorganic Analysis, G. Svehla and S. Mittal, Pearson Education.

Mapping of COs to Syllabus

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CHQC402T: QUANTUM CHEMISTRY AND GROUP THEORY
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective
In this course students learn quantum mechanics methods (including a few approximation methods) necessary to calculate the energy eigen values and wavefunctions of systems like the H atom and atoms more complex than the H atom as well as to classify molecules into groups based on their symmetry properties.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the postulates and principles of quantum chemistry and group theory. (Understanding)
CO 2: Apply the principles of quantum chemistry to simple model systems and to the Hydrogen atom (Applying)
CO 3: Apply the rules of group theory to assign molecules to different point groups and to set up character tables (Applying)
CO 4: Examine methods to calculate eigenvalues and eigenfunctions of model systems, the H atom and He atom as well as to assign molecules to different point groups. (Analyzing)
CO 5: Evaluate the uses of approximation methods in quantum chemistry and of representations of groups (Evaluating)

Module I: Quantum Chemistry I
Planck’s theory, wave-particle duality, uncertainty principle, operators, eigen functions and eigen values in quantum mechanics, postulates of quantum mechanics, Schrodinger equation, free particle, particle in a box, degeneracy, harmonic oscillator, angular momentum, rigid rotator, the hydrogen atom.
Module II: Quantum Chemistry II
Approximate methods in quantum mechanics - the variation theorem, linear variation principle and perturbation theory (first order and non-degenerate), application of variation method and perturbation theory to the Helium atom, electron spin, the spin statistics theorem (antisymmetry), the Pauli exclusion principle, Slater determinants, many electron atoms and spin-orbit coupling, term symbols and spectroscopic states

Module III: Chemical Applications of Group Theory
Symmetry elements and operations, equivalent symmetry elements and equivalent atoms, identification of symmetry point groups with examples, groups of very high symmetry, molecular dissymmetry and optical activity, systematic procedure for symmetry classification of molecules and illustrative examples, brief review of matrix representation of groups, reducible and irreducible representations, rules about irreducible representations as derived from great orthogonality theorem, relationship between reducible and irreducible groups, character tables.

Suggested readings
3. Introduction to Quantum mechanics, D. J. Griffiths, Pearson Education Ltd.

Mapping of COs to Modules

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CHAP403T: PHYSICAL CHEMISTRY V: ADVANCED PHYSICAL CHEMISTRY
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective
This course helps the students to understand clearly about the theories of chemical kinetics, molecular reaction dynamics and electrochemistry.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the interactions of ionic species with solvent molecules. (Understanding)
CO 2: Apply the knowledge of chemical kinetics to some important types of reactions. (Applying)
CO 3: Analyse the application of electrochemistry in different fields. (Analysing)
CO 4: Calculate the rate of different types of chemical reactions. (Evaluating)

Module I: Chemical Kinetics (15 lectures)

Module II: Study of Fast Reactions (8 lectures)
Stopped flow technique, temperature and pressure jump methods, NMR studies in fast reactions, shock tube kinetics, relaxation kinetics, Linearized rate equation, relaxation time in single step fast reactions, determination of relaxation time.

Module III: Molecular Reaction Dynamics (15 lectures)
Collisions of real molecules- trajectory calculations, Laser techniques, reactions in molecular beam, estimation of activation energy and calculation of potential energy surface, the transition state theory (TST) of bimolecular gaseous reactions, statistical and thermodynamic formulations. Comparison between TST and hard sphere collision theory, kinetics of reactions in solution-diffusion controlled and chemically controlled reactions, TST of reactions in solution- Bronsted and Bjerrum equation, effect of ionic strength, kinetic salt effect.
Module IV: Electrochemistry - I (10 lectures)

a) Ion-solvent interaction: the Born model, Thermodynamic parameters of ion solvent interactions: structural treatment, the ion-dipole model-its modifications, ion-quadrupole and ion-induced dipole interactions.

b) Primary solution: determination of hydration number, compressibility method and viscosity-mobility method, Debye-Huckel theory of ion-ion interactions, derivation, validity and limitations, extended Debye-Huckel-Onsager equation, random walk model of ionic Diffusion-Einstein Smoluchowski reaction.

Module V: Electrochemistry – II (12 lectures)

a) Theories of Electrical Interface: Electrocapillary phenomena - Lippmann equation, electron transfer at interfaces, polarizable, non-polarizable and non-polarisable interfaces, Butler-Volmer equation, Tafel plot.

b) Systems for Electro-Chemical Energy Storage and Conversion: Types of Batteries, Lead- acid batteries, Nickel-cadmium batteries and Li-ion batteries, electrical double layer capacitor, pseudo-capacitor, fuel cells.

Suggested readings
2. Physical chemistry, I. R. Levine, Mcgraw Hill Education.

Mapping of COs to Syllabus

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CHAP403T: Physical Chemistry V: Advanced Physical Chemistry Lab
(1Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course helps the students to understand clearly about the application of different theories of physical Chemistry

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the theoretical concepts of experiments related to chemical kinetics and electrochemistry etc. (Remembering)
CO 2: Explain the principles and the procedures for spectrophotometry-based experiments. (Understanding)
CO 3: Apply the theoretical knowledge for determination of rate constant, pH, emf etc. (Applying)
CO 4: Analyse the practical utility of different theories of chemical kinetics, electrochemistry, adsorption etc. (Analysing)

Module I:
- Chemical Kinetics based experiments.
- Electrochemistry based experiments.
- Spectrophotometry based experiments.
- pH-metric Titrations.
- Adsorption on porous materials - equilibrium, kinetic and thermodynamic studies.

Suggested readings

Mapping of COs to Modules

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<th>Course Outcomes</th>
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CHRO404T: ORGANIC CHEMISTRY V: REAGENTS IN ORGANIC SYNTHESIS AND MECHANISTIC STUDIES
(4 Credits-60 hours) (L-T-P: 4-0-0)

Objective
This course is aimed at familiarizing students with the concepts of different reagents in organic synthesis and their mechanistic studies

Course / Learning Outcomes:
At the end of this course students will be able to:
CO 1: Apply the practical utility of metal and metal-free oxidising agents in organic synthesis. (Applying)
CO 2: Compare various kinds of reducing agents in chemo selective and stereo selective synthesis. (Analysing)
CO 3: Recall various concepts associated with the kinetics of organic reaction mechanisms. (Remembering)

Module I: Kinetics and Energetics of Reaction Mechanism (15 lectures)
Transition state theory of reaction rates - kinetics and thermodynamics of activation, reaction profiles for multistep reactions, Hammond postulate, Curtin-Hammet Principle, kinetic and thermodynamic control, Linear free energy relationships (LFER), Hammett equation - substituent and reaction constants, the Taft treatment of polar and steric effects in aliphatic compounds, kinetic isotope effects in organic reactions, effects of conformation on reactivity, stereoelectronic effects, neighbouring group participation, anomer effect.

Module II: Oxidation Reactions (15 lectures)
Metal and non-metal based oxidations (Cr, Mn, Al, Ag, Os, Ru, Se, DMSO, hypervalent iodine), reagents (Fremy’s salt, silver carbonate, peroxides/per-acids), Sharpless asymmetric epoxidation, Jacobsen epoxidation, Shi epoxidation, Sharpless asymmetric dihydroxylation, Baeyer-Villiger oxidation, Wacker oxidation, hydroboration-oxidation, Prevost reaction and Woodward modification.

Module III: Reduction Reactions (15 lectures)
Catalytic hydrogenation (Pd/Pt/Rh/Ni), Wilkinson catalyst, Noyori asymmetric hydrogenation, metal based reductions using Li/Na/Ca in liquid ammonia, Sodium, Magnesium, Zinc, Titanium and Samarium (Birch, Pinacol formation, McMurry, Acyloan formation, dehalogenation and deoxygenations), Hydride transfer reagents from Group III and Group IV in reductions (NaBH4triacetoxyborohydride, L-selectride, K-selectride, Luche reduction, LiAlH4, DIBAL-H, and Red-Al, Trialkylsilanes and Trialkylstannane, Meerwein-Pondorff-Verley reduction), stereo/enantioselective reductions (Chiral Boranes, Corey-Bakshi-Shibata).

Suggested readings
7. Modern Synthetic Reaction, H. O. House, W. A. Benjamin Inc.

Mapping of COs to Syllabus

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CHRO405L: ORGANIC CHEMISTRY V: REAGENT IN ORGANIC SYNTHESIS AND MECHANISTIC STUDIES LAB
(1 Credit -30 hours) (L-T-P: 0-0-1)

Objective
This course is aimed at familiarizing students with the concepts of calculation of saponification value, iodine number of oil/fat and preparation of some indicator

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Apply the concept of organic reagents synthesis of known compounds (understanding)
CO 2: Evaluate some important parameters in some common substance (Evaluating)
CO 3: Apply the solubility concept for isolation active components (Applying)
Module I:
Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy (Spectra to be provided).

- Preparation of methyl orange.
- Saponification value of an oil or a fat.
- Determination of iodine number of an oil/fat.
- Isolation and characterization of DNA from onion/cauliflower/peas.

Suggested Readings:

Mapping of COs to Modules

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## MINOR COURSES

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**CHAS104T: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY AND ALIPHATIC HYDROCARBONS**

(3 Credits- 45 hours) (L-T-P: 3-0-0)

**Objective**

This course is intended to explain the fundamental concepts of inorganic chemistry (like atomic structure, chemical bonding) and organic chemistry (Like basics of organic chemistry and hydrocarbons) together.

**Course / Learning Outcomes**

At the end of this course students will be able to:

CO 1: Recall the fundamental concept of inorganic and organic chemistry. (Remembering)

CO 2: Explain various concepts of atomic structure and chemical bonding. (Understanding)

CO 3: Predict the structure and properties of molecules. (Applying)

CO 4: Evaluate the role of quantum mechanics in inorganic chemistry. (Evaluate)
Module I: Inorganic Chemistry (23 lectures)
a. Atomic Structure (10 lectures)
What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of quantum numbers, orbital angular momentum and quantum numbers \(m_l\) and \(m_s\). Shapes of \(s\), \(p\) and \(d\) atomic orbitals, nodal planes. Discovery of spin, spin quantum number \((s)\) and magnetic spin quantum number \((m_s)\).
b. Chemical Bonding and Molecular Structure (13 lectures)
Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Born-Haber cycle and its applications, polarizing power and polarizability. Fajan’s rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.
Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR (H\(_2\)O, NH\(_3\), PCl\(_5\), SF\(_6\), SF\(_4\)) and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral. Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for \(s-s\), \(s-p\) and \(p-p\) combinations of atomic orbitals, nonbonding combination of orbitals.

Module II: Organic Chemistry (22 lectures)
a. Fundamentals of Organic Chemistry (10 lectures)
Aromaticity: Benzenoids and Hückel’s rule.
b. Aliphatic Hydrocarbons (12 lectures)
Functional group approach for the following reactions (preparations physical property & chemical reactions) to be studied with mechanism in context to their structure.
Alkenes: Preparation: Elimination reactions: Dehydration of alcohols and dehydrohalogenation of alkyl halides (Saytzeff’s rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO\(_4\)) andtrans-addition (bromine), Addition of HX (Markownikoff’s and anti-Markownikoff’s addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.
Alkynes: Preparation: Acetylene from CaC\(_2\) and conversion into higher alkenes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. Reactions: formation of metal acetylides and acidity of alkynes, addition of bromine and alkaline KMnO\(_4\), ozonolysis and oxidation with hot alk. KMnO\(_4\), Hydration to form carbonyl compounds.

Suggested Readings
1. A new Concise Inorganic Chemistry, J. D. Lee, E L. B. S.
8. Organic Chemistry (Vol I and II), I. L. Finar, E. L. B. S.

Mapping of COs to Syllabus

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DEPARTMENT OF CHEMISTRY

CHAS105L: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY AND ALIPHATIC HYDROCARBONS LAB
(1 Credit -30 hours) (L-T-P: 0-0-1)

Objective
This course is design to make the students to understand the fundamental application of inorganic and organic chemistry.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the concept of titration and chromatography for estimation and separation. (Remembering)
CO 2: Explain the principles of titration and chromatography. (Understanding)
CO 3: Applying the concept of titration and chromatography to the estimation of samples. (Application)
CO 4: Decide the method for appropriate chromatographic separation of organic molecules in a mixture. (Analysis)

Module I:
Section A: Inorganic Chemistry - Volumetric Analysis
a. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
b. Estimation of oxalic acid by titrating it with KMnO4.
c. Estimation of water of crystallization in Mohr’s salt by titrating with KMnO4.
d. Estimation of Fe (II) ions by titrating it with K2Cr2O7 using internal indicator.
e. Estimation of Cu (II) ions iodometrically using Na2S2O3.

Section B: Organic Chemistry
a. Purification of OC by crystallisation (from water and alcohol) and distillation.
c. Detection of extra elements (N, S, Cl, Br, I) in organic compounds.
d. Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)
e. Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
f. Identify and separate the sugars present in the given mixture by paper chromatography.

Suggested Readings
1. Vogel’s Qualitative Inorganic Analysis, A. I. Vogel, Prentice Hall.

Mapping of COs to Syllabus

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CHGC106T: GREEN CHEMISTRY
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course is intended to explain the principles of green chemistry and its application.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the principles, goals and limitations of green chemistry. (Remembering)
CO 2: Understand how the principles of green chemistry apply to chemical synthesis. (Understanding)
CO 3: Analyse the benefits of green reactions. (Analysing)
CO 4: Assess the overall impact on research and the environment. (Evaluating)

Module I: Introduction to Green Chemistry (4 lectures)
What is Green Chemistry? Need for Green Chemistry, goals of green chemistry, limitations/ obstacles in the pursuit of the goals of Green Chemistry.
Module II: Principles of Green Chemistry and Designing a Chemical synthesis (21 lectures)

Twelve principles of Green Chemistry with their explanations and special emphasis on the following with examples:

a. Designing a Green Synthesis using these principles; Prevention of Waste/ by-products; maximum incorporation of the materials used in the process into the final products, Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions.

b. Prevention/ minimization of hazardous/ toxic products reducing toxicity risk = (function) hazard x exposure; waste or pollution prevention hierarchy Green solvents.


d. Selection of starting materials; avoidance of unnecessary derivatization—careful use of blocking/protecting groups.

e. Use of catalytic reagents, comparison of heterogeneous and homogeneous catalysis, bio catalysis, asymmetric catalysis and photo catalysis.

f. Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD — subdivision of ISD, minimization, simplification, substitution, moderation and limitation.

g. Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

Module III: Examples of Green Synthesis/ Reactions and some real-world cases (12 lectures)

a. Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis).

b. Microwave assisted reactions

c. Ultrasound assisted reactions

d. Surfactants for Carbon Dioxide – replacing smog producing and ozone depleting solvents with CO₂ for precision cleaning and dry cleaning of garments.

e. Designing of Environmentally safe marine antifoulant.

f. Right fit pigment: synthetic azo-pigments to replace toxic organic and inorganic pigments.

g. An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn.


i. Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting.

Module IV: Future Trends in Green Chemistry (8 lectures)

Oxidation reagents and catalysts, biomimetic, multifunctional reagents; combinatorial green chemistry; Proliferation of solvent free reactions; co crystal controlled solid state synthesis (C₃S₂); Green chemistry in sustainable development.

Suggested Readings


3. Introduction to Green Chemistry, A. S. Matlack, Marcel Dekker.


Mapping of COs to Syllabus

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CHGC107L: GREEN CHEMISTRY LAB

(1Credit – 30 hours) (L-T-P: 0-0-1)

Objective

This course is design to make the students to learn the application of principles of green chemistry in laboratory.

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Understand the principles. (Understanding)
CO 2: Apply the principles of green chemistry in the laboratory. (Applying)
CO 3: Analyse and interpret experimental data. (Analysing)

Module I:
Safer starting materials
a. Preparation and characterization of nano particles of gold using tea leaves.

Using renewable resources
a. Preparation and characterization of biodiesel from vegetable oil/waste cooking oil.

Avoiding waste
b. Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.
c. Preparation of propene by two methods can be studied.
   1. Triethylamine ion + OH- → propene + trimethyl propene + water H_2SO4/H_2O
   2. 1-propanol propene + water
The other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.

Use of enzymes as catalysts
a. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.

Alternative Green solvents
a. Extraction of D-limonene from orange peel using liquid CO2 prepared from dry ice.
b. Mechano chemical solvent free synthesis of azomethines.

Alternative sources of energy
a. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
b. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Suggested Readings
2. Greener approaches to undergraduate chemistry experiment, M. Kirchoff, and M. A. Ryan, American Chemical Society, Washington DC.
3. Introduction to Green Chemistry, M. A. Ryan, American Chemical Society, Washington DC.
5. Real world cases in Green Chemistry, M. C. Cann and M. E. Connelly, American Chemical Society.
6. Real world cases in Green Chemistry, M. C. Cann and P. Thomas, American Chemical Society.

Mapping of COs to Syllabus

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CHSP108T: CHEMISTRY OF S- AND P- BLOCK ELEMENTS, STATES OF MATTER AND CHEMICAL KINETICS.
(3 Credits- 45 hours) (L-T-P: 3-0-0)

Objective
This course is intended to explain the chemistry of s- and p- block elements and states of matter.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the properties of s- and p- block elements. (Understanding)
CO 2: Understand the concept of an ideal gas, real gas and properties of matter. (Understanding)
CO 3: Apply the Kinetic Theory of gases and Chemical kinetics to solve problems. (Applying)
CO 4: Analyse different techniques to extract metals from their respective ores. (Analysing)

Module I: Inorganic Chemistry (22 lectures)
a. General Principles of Metallurgy (4 lectures)
Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent. Hydrometallurgy with reference to cyanide process for silver and gold. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, van Arkel-de Boer process and Mond’s process.

b. s- and p- block Elements (18 lectures)
Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling, Mulliken, and Alfred-Rochow scales). Allotropy in C, S, and P.
Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides, inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.
Compounds of s- and p-Block Elements.
Hydrides of nitrogen (NH$_3$, N$_2$H$_4$, N$_3$H, NH$_2$OH) Oxoacids of P, S and Cl.
Halides and oxohalides: PCl$_3$, PCl$_5$, SOCl$_2$ and SO$_2$Cl$_2$.

Module II: Physical Chemistry (23 lectures)

b. Kinetic Theory of Gases (4 lectures)
Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.
Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation.
Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

c. Liquids (5 lectures)
Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

d. Solids (5 lectures)

e. Chemical Kinetics (9 lectures)
Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Suggested Readings
1. Physical Chemistry, G. M. Barrow, Tata McGraw Hill.
6. A New Concise Inorganic Chemistry, J. D. Lee, E.L.B.S.

Mapping of COs to Module

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CHSP109L: CHEMISTRY OF S- AND P- BLOCK ELEMENTS, STATES OF MATTER AND CHEMICAL KINETICS LAB.
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course will make the students to understand about qualitative analysis and kinetics experiments.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Gain knowledge about semi-micro qualitative analysis of salt. (Remembering)
CO 2: Explanation of group analysis for basic radicals present in salt. (Understanding)
CO 3: Apply the concept of salt analysis to identify ions present in a mixture of salts. (Applying)
CO 4: Comparison of acidic strength by studying the kinetics of hydrolysis of the ester. (Analysing)

Module I:
a. Inorganic Chemistry
Semi-micro qualitative analysis of mixtures using H2S or any other scheme- not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:
Cations: NH4+
Pb2+, Cu2+, Fe3+, Al3+, Co2+, Ni2+, Mn2+, Zn2+, Ba2+, Sr2+, Ca2+, K+
Anions: CO32–, S2–, SO32–, NO3–, Cl–, Br–, I–, NO2–, SO42–, PO43–, BO33–, C2O42–, F– (Spot tests should be carried out wherever feasible)
b. Physical Chemistry
1. Surface tension measurement (use of organic solvents excluded).
   i. Determination of the surface tension of a liquid or a dilute solution using a stalagmometer.
   ii. Study of the variation of surface tension of a detergent solution with concentration.
2. Viscosity measurement (use of organic solvents excluded).
   i. Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald’s viscometer.
   ii. Study of the variation of viscosity of an aqueous solution with concentration of solute.
3. Chemical Kinetics: Study the kinetics of the following reactions.
   i. Initial rate method: Iodide-persulphate reaction.
   ii. Integrated rate method:
      - Acid hydrolysis of methyl acetate with hydrochloric acid.
      - Saponification of ethyl acetate.
      - Compare the strengths of HCl and H2SO4 by studying kinetics of hydrolysis of methyl acetate.

Suggested Readings
1. Qualitative Inorganic Analysis, A. I. Vogel, Prentice Hall.
2. Quantitative Chemical Analysis, A. I. Vogel, Prentice Hall.
3. Senior Practical Physical Chemistry, B. D. Khosla, R. Chand & Co.

Mapping of COs to Syllabus

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CHIM110T: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE
(3 Credit – 45 hours) (L-T-P: 3-0-0)

Objective
This course will make the students to learn about the different types of inorganic materials of industrial importance.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Remember the composition of some industrially important materials. (Remembering)
CO 2: Understand the processes involved in the preparation of silicates materials. (Understanding)
CO 3: Know the principle involved in the preparation and applications of fuel cells, industrial application of catalysts. (Applying)
CO 4: Know the differences between different types of surface coatings; know how to paint formulations are made. (Analysing)
Module I: Silicate Industries (15 lectures)
a. Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass, composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.
b. Ceramics: Brief introduction to types of ceramics, superconducting and semiconducting oxides, fullerenes, carbon nanotubes and carbon fibre.
c. Cements: Manufacture of cement and the setting process, quick setting cements.

Module II: Fertilizers (10 lectures)
Different types of fertilizers (N, P and K). Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates, superphosphate of lime.

Module III: Surface Coatings (5 lectures)

Module IV: Batteries (10 lectures)
Working of the following batteries: Pb acid, Li-Battery, solid state electrolyte battery, fuel cells, solar cell and polymer cell.

Module V: Catalysis (10 lectures)
General principles and properties of catalysts, homogenous catalysis and heterogenous catalysis and their industrial applications, deactivation or regeneration of catalysts.
Application of zeolites as catalysts.

Module VI: Chemical explosives (10 lectures)
Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX), Introduction to rocket propellants.

Suggested Readings
1. Industrial Chemistry, Vol I, E. Stocchi, Ellis Horwood Ltd. UK.

Mapping of COs to Syllabus

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CHIM111L: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE LAB
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
This course will make the students to learn analysis of industrially important inorganic materials.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the aforementioned principles. (Understanding)
CO 2: Apply knowledge and understanding in carrying out lab experiments. (Applying)
CO 3: Analyse and interpret experimental data. (Analysing)

Module I:
a. Determination of free acidity in ammonium sulphate fertilizer.
b. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
c. Estimation of phosphoric acid in superphosphate fertilizer.
d. Analysis of Nitrogen in unknown sample.
e. Determination of composition of dolomite (by complexometric titration).
f. Analysis of Phosphate in unknown sample
g. Analysis of Cement.
h. Preparation of pigment (zinc oxide).

Suggested Readings
1. Industrial Chemistry, Vol I, E. Stocchi, Ellis Horwood Ltd. UK.

Mapping of COs to Syllabus

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CHFG210T: CHEMICAL ENERGETICS, EQUILIBRIA AND FUNCTIONAL GROUP ORGANIC CHEMISTRY
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to make the students familiar with important concepts of physical chemistry (like chemical energetics, chemical and ionic equilibrium) and organic chemistry (like functional group chemistry) together.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the thermodynamics of chemical reactions. (Understanding)
CO 2: Calculate the change in free energy accompanying a chemical reaction. (Applying)
CO 3: Explain the mechanism of nucleophilic substitution reaction. (Analysing)
CO 4: Learn the methods of preparation, reactions and mechanism of some organic compounds. (Creating)

Module I: Physical Chemistry (23 lectures)
a. Chemical Energetics (9 lectures)
Review of thermodynamics and the Laws of Thermodynamics.
Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff’s equation.
Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.
b. Chemical Equilibrium (4 lectures)
c. Ionic Equilibria (10 lectures)

Module II: Organic Chemistry (22 lectures)
Functional group approach for the following reactions (preparations physical properties and Chemical reactions) to be studied in context to their structure with mechanism.
a. Aromatic hydrocarbons (6 lectures)
Preparation (benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.
b. Alkyl and Aryl Halides (6 lectures)
1. Alkyl Halides
Preparation: from alkenes and alcohols.
Reactions: Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions, hydrolysis, nitrile & nitro formation, nitrile & isonitrile formation. Williamson’s ether synthesis: Elimination vs substitution.

2. Aryl Halides
Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.
Reactions (Chlorobenzene): Aromatic electrophilic and nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH$_2$/NH$_3$ (or NaNH$_2$/NH$_3$).

2. Alcohols, Phenols and Ethers (10 lectures)

1. Alcohols:
Preparation: Preparation of 1$^\circ$, 2$^\circ$ and 3$^\circ$ alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.
Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO$_4$, acidic dichromate, conc. HNO$_3$), factors affecting acidity, Oppeneauer oxidation.

2. Phenols:

d. Ethers (aliphatic and aromatic).
Preparation: Williamson ether synthesis.
Reactions: Cleavage of ethers with HI.

e. Aldehydes and ketones (aliphatic and aromatic):
Preparation: from acid chlorides and from nitriles.

Suggested Readings
5. Physical Chemistry, G. M. Barrow, Tata McGraw Hill.

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CHFG211L: CHEMICAL ENERGETICS, EQUILIBRIA AND FUNCTIONAL GROUP ORGANIC CHEMISTRY LAB
(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective
The objective of this course is to make the students familiar with laboratory experiments related to thermochemistry, ionic equilibria, Preparation of some organic compounds and also qualitative analysis of organic compounds

Course /Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall principles and methods used to measure heats of reaction. (Remembering)
CO 2: Explain methods and underlying principles used to carry out the experiments related to Ionic equilibria. (Understanding)
CO 3: Learn to prepare specific organic compounds using appropriate procedures. (Applying)
CO 4: Analyses of organic compounds possessing monofunctional groups. (Analysing)

Module I: Physical Chemistry
Thermochemistry:
1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO3, NH4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of H.

Ionic equilibria
1. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter.
2. Preparation of buffer solutions
   i. sodium acetate-acetic acid.
   ii. Ammonium chloride-ammonium hydroxide.
   iii. Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Module II: Organic Chemistry
1. Preparations: Mechanism of various reactions involved to be discussed, recrystallization, determination of melting point and calculation of quantitative yields to be done.
   i. Bromination of phenol/aniline.
   ii. benzyolation of amines/phenols.
   iii. Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone.
2. Systematic qualitative organic analyses of organic compounds possessing monofunctional groups (alcohols, phenols, carbonyl, -COOH) and preparation of one suitable derivative.

Suggested Readings
3. Senior Practical Physical Chemistry, B. D. Khosla, S. Chand & Co.

Mapping of COs to Syllabus

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CHPC212T: POLYMER CHEMISTRY
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to make the students familiar with fundamental concepts of polymers and polymerization process.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the different processes by which polymers are formed. (Understanding)
CO 2: Apply the methods to measure the molecular weights of polymers. (Applying)
CO 3: Analyse polymers based on their physical, thermal, flow and mechanical properties. (Analysing)
CO 4: Based on the properties predict possible applications or uses of the polymer. (Evaluating)

Module I: Introduction and history of polymeric materials (4 hours)
Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Module II: Functionality and its importance (8 hours)

Module III: Kinetics of Polymerization (8 hours)
Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Module IV: Crystallization and crystallinity (4 hours)
Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.
Module V: Nature and structure of polymers and Molecular weight determination of polymers (10 hours)
Structure Property relationships. Determination of molecular weight of polymers (Mn, Mw, etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Module VI: Glass transition temperature (Tg), determination of Tg, Polymer Solution and properties of Polymers (26 hours)
Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly (vinyl chloride) and related polymers, poly (vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline, poly (p-phenylene sulphide polyprrole, polythiophene)].

Suggested Readings
1. Seymour’s Polymer Chemistry, Marcel Dekker, Inc.

Mapping of COs to Syllabus

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CHPC213L: POLYMER CHEMISTRY LAB
(1 credit – 30 hours) (L-T-P: 0-0-1)

Objective
The objective of this course is to make the students familiar with laboratory experiments related to Synthesis and characterization of Polymer molecules

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Carry out preparations and characterization of polymers in the lab. (Applying)
CO 2: Analyse and interpret experimental results. (Analysing)

Module I: Polymer synthesis
a. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
   1. Purification of monomer.
   2. Polymerization using benzyol peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN).
b. Preparation of nylon 66/6.
c. Interfacial polymerization, preparation of polyester from isophthaloyl chloride (IPC) and phenolphthalein.
   1. Preparation of IPC.
   2. Purification of IPC.
   3. Interfacial polymerization.
d. Redox polymerization of acrylamide.
e. Precipitation polymerization of acrylonitrile.
f. Preparation of urea-formaldehyde resin.
g. Preparations of novolac resin/resold resin.
h. Microscale Emulsion Polymerization of Poly(methylacrylate).

Module II: Polymer characterization
a. Determination of molecular weight by viscometry:
   1. Polyaacrylamide-aq. NaNO₂ solution.
2. (Poly vinyl propylidene (PVP) in water.

b. Determination of the viscosity-average molecular weight of poly (vinyl alcohol) (PVOH) and the fraction of —head-to-head|] monomer linkages in the polymer.

c. Determination of molecular weight by end group analysis: Polyethylene glycol (PEG) (OH group).
d. Testing of mechanical properties of polymers.
e. Determination of hydroxyl number of a polymer using colorimetric method.

Suggested Readings

Mapping of COs to Modules

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CHSP214T: SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course will discuss solutions, phase equilibrium, electrochemistry, biomolecules like amino acid, carbohydrate and some N- and O-containing functional groups.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the concepts of solutions, electrochemistry and phase equilibrium. (Remembering)
CO 2: Explain the properties and reactivity of different organic compounds. (Understanding)
CO 3: Solve problems on electrochemistry, phase equilibrium, solutions etc. (Applying)
CO 4: Differentiating between the primary, secondary, tertiary and quaternary structure of proteins. (Analysing)

Module I: Physical Chemistry (23 Lectures)

a. Solutions (7 lectures)

b. Phase Equilibrium (6 lectures)

c. Conductance (5 lectures)
Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid base).

d. Electrochemistry (5 lectures)

Module II: Organic Chemistry (22 Lectures)

a. Carboxylic acids and their derivatives (4 lectures)
b. Amines and Diazonium Salts (5 Lectures)
Amines (Aliphatic and Aromatic): (Upto 5 carbons) Preparation: from alkyl halides, Gabriel’s Phthalimide synthesis, Hofmann Bromamide reaction.
Diazonium salts: Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes.

c. Amino Acids, Peptides and Proteins (8 Lectures)

d. Carbohydrates (5 Lectures)
Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disaccharides (sucrose, maltose) and brief idea about polysaccharides.

Suggested Readings
1. Physical Chemistry, G. M. Barrow, Tata McGraw-Hill.

Mapping of COs to syllabus

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CHSP215L: SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP
ORGANIC CHEMISTRY-II LAB
(1 credit – 30 hour) (L-T-P: 0-0-1)

Objective
The objective of this course is to make the students familiar with laboratory experiments related to Distribution, Phase equilibria, conductance, chromatographic techniques, qualitative organic analysis and other related experiments of organic chemistry.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the concepts of phase equilibria and electrochemistry. (Remembering)
CO 2: Explain the chemistry behind the qualitative analysis of unknown organic compounds. (Understanding)
CO 3: Apply chromatography to separate a mixture of two or more amino acids. (Applying)
CO 4: Analyse unknown organic compounds with the help of different chemical tests. (Analysing)

Module I: Physical Chemistry
Distribution
Study of the equilibrium of one of the following reactions by the distribution method:

\[ I_2(aq) + I^- (aq) \rightleftharpoons I^- (aq) \text{Cu}^{2+}(aq) + x\text{NH}_3(aq) \rightleftharpoons [\text{Cu}^+(\text{NH}_3)_x]^{2+} \]

Phase equilibria
1. Construction of the phase diagram of a binary system (simple eutectic) using cooling curves.
2. Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it.
3. Study of the variation of mutual solubility temperature with concentration for the phenol water system and determination of the critical solubility temperature.

**Conductance**
1. Determination of cell constant.
2. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
3. Perform the following conductometric titrations:
   - Strong acid vs. strong base.
   - Weak acid vs. strong base.

**Module II: Organic Chemistry**
1. Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.
2. Separation of amino acids by paper chromatography.
3. Determination of the concentration of glycine solution by formylation method.
4. Titration curve of glycine.
5. Action of salivary amylase on starch.
7. Determination of the saponification value of an oil/fat.
8. Determination of the iodine value of an oil/fat.
9. Differentiation between a reducing/nonreducing sugar.
10. Extraction of DNA from onion/ cauliflower.

**Suggested Readings**
3. Senior Practical Physical Chemistry, B. D. Khosla, R. Chand & Co.

**Mapping of CO to Syllabus**

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**CHRO216T: ORGANIC CHEMISTRY V: REAGENTS IN ORGANIC SYNTHESIS AND MECHANISTIC STUDIES**
(4 credits – 75 hours) (L-T-P: 4-0-0)

**Objective**
The objective of this course is to make the students familiar with kinetics and energetics of reaction mechanism and oxidation and reduction reaction.

**Course / Learning Outcomes**
CO 1: Apply the practical utility of metal and metal-free oxidising agents in organic synthesis. (Applying)
CO 2: Compare various kinds of reducing agents in chemo selective and stereo selective synthesis. (Analysing)
CO 3: Recall various concepts associated with the kinetics of organic reaction mechanisms. (Remembering)

**Module I: Kinetics and Energetics of Reaction Mechanism (15 lectures)**
Transition state theory of reaction rates - kinetics and thermodynamics of activation, reaction profiles for multistep reactions, Hammond postulate, Curtin-Hammett Principle, kinetic and thermodynamic control, Linear free energy relationships (LFER), Hammett equation - substituent and reaction constants, the Taft treatment of polar and steric effects in aliphatic compounds, kinetic isotope effects in organic reactions, effects of conformation on reactivity, stereoelectronic effects, neighbouring group participation, anomeric effect.

**Module II: Oxidation Reactions (15 lectures)**
Metal and non-metal based oxidations (Cr, Mn, Al, Ag, Os, Ru, Se, DMSO, hypervalent iodine), reagents (Fremy's salt, silver carbonate, peroxides/per-acids), Sharpless asymmetric epoxidation, Jacobsen epoxidation, Shi epoxidation, Sharpless asymmetric dihydroxylation, Baeyer-Villiger oxidation, Wacker oxidation, hydroboration-oxidation, Prevost reaction and Woodward modification.
Module III: Reduction Reactions (15 Lectures)
Catalytic hydrogenation (Pd/Pt/Rh/Ni), Wilkinson catalyst, Noyori asymmetric hydrogenation, metal based reductions using Li/Na/Ca in liquid ammonia, Sodium, Magnesium, Zinc, Titanium and Samarium (Birch, Pinacol formation, McMurry, Acyloin formation, dehalogenation and deoxygenations), Hydride transfer reagents from Group III and Group IV in reductions (NaBH4triacetoxyborohydride, L-selectride, K-selectride, Luche reduction, LiAlH4, DIBAL-H, and Red-Al, Trialkylsilanes and Trialkylstannane, Meerwein-Pondorff-Verley reduction), stereo/enantioselective reductions (Chiral Boranes, Corey-Bakshi-Shibata).

Suggested readings
6. Modern Synthetic Reaction, H. O. House, W. A. Benjamin Inc.

Mapping of COs to Syllabus

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CHDQ314T: Chemistry of d-block elements, Quantum Chemistry & Spectroscopy
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
The objective of this course is to make the students familiar with coordination chemistry, quantum chemistry, spectroscopy and photochemistry

Course /Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall properties of d- and f- block elements. (Remembering)
CO 2: Explain the principles of quantum mechanics and spectroscopy. (Understanding)
CO 3: Calculate positions of absorption lines of molecules and energies and wavefunctions. (Applying)
CO 4: Differentiate between theories behind the formation of coordination compounds. (Analysing)

Module I: Inorganic Chemistry (22 Lectures)
a. Transition Elements (8 Lectures)
General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.
Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).
b. Coordination Chemistry (6 Lectures)
c. Crystal Field Theory (8 Lectures)
Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectrochemical series. Jahn-Teller distortion, Square planar coordination.

Module II: Physical Chemistry (23 Lectures)
a. Quantum Chemistry & Spectroscopy (19 Lectures)
Microwave (pure rotational) spectra of diatomic molecules. Selection rules. Structural information derived from rotational spectroscopy.

Vibrational Motion: Schrödinger equation of a linear harmonic oscillator and brief discussion of its results (solution not required). Electronic Spectroscopy

b. Photochemistry (4 Lectures)


Suggested Readings
1. Physical Chemistry, G. M. Barrow, Tata McGraw-Hill.
6. A New Concise Inorganic Chemistry, J. D. Lee, E.L.B.S.

Mapping of COs to Syllabus

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CHDQ315L: CHEMISTRY OF D-BLOCK ELEMENTS, QUANTUM CHEMISTRY & SPECTROSCOPY LAB

(1 credit – 30 hours) (L-T-P: 0-0-1)

Objective

This course will make the students familiar with the laboratory experiments related to uv-visible spectroscopy, colourimetry and estimation of metal ions.

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Recall principles and methods for gravimetric analysis of inorganic compounds. (Remembering)

CO 2: Explain the principle involved in gravimetric estimation. (Understanding)

CO 3: Apply the principles to perform complexometric titration. (Applying)

CO 4: Analyse the given vibration-rotation spectrum of HCl(g). (Analysing)

Module I:

a. Inorganic Chemistry

1. Estimation of the amount of nickel present in a given solution as bis(dimethylglyoximato) nickel (II) or aluminium as oxinate in a given solution gravimetrically.

2. Estimation of (i) Mg²⁺ or (ii) Zn²⁺ by complexometric titrations using EDTA.

3. Estimation of total hardness of a given sample of water by complexometric titration.

4. To draw calibration curve (absorbance at λmax vs. concentration) for various concentrations of a given coloured compound and estimate the concentration of the same in a given solution.

5. Determination of the composition of the Fe³⁺ - salicylic acid complex / Fe²⁺ -phenanthroline complex in solution by Job’s method.


b. Physical Chemistry

UV/Visible spectroscopy:

1. Study the 200-500 nm absorbance spectra of KMnO₄ and K₂Cr₂O₇ (in 0.1 M H₂SO₄) and determine the λmax values. Calculate the energies of the two transitions indifferent units (J molecule⁻¹, kJ mol⁻¹, cm⁻¹, eV).

2. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of K₂Cr₂O₇.

3. Record the 200-350 nm UV spectra of the given compounds (acetone, acetaldehyde, 2-propanol, acetic acid) in water. Comment on the effect of structure on the UV spectra of organic compounds.

Colourimetry:
1. Verify Lambert-Beer’s law and determine the concentration of CuSO₄/KMnO₄/K₂Cr₂O₇ in a solution of unknown concentration.
2. Analyse the given vibration-rotation spectrum of HCl(g).

Suggested Readings
1. Qualitative Inorganic Analysis, A. I. Vogel, Prentice Hall.
2. Quantitative Chemical Analysis, A. I. Vogel, Prentice Hall.
3. Senior Practical Physical Chemistry, B. D. Khosla, R. Chand & Co.

Mapping of COs to Syllabus

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CHAC316T: INORGANIC CHEMISTRY IV: ADVANCED INORGANIC CHEMISTRY
(4 credits – 75 hours) (L-T-P: 4-0-0)

Objective

This course aims at helping the students to become acquainted with the basic concept of transition metals, organometallics, mechanism of Inorganic Reactions, solid state chemistry.

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Recall the properties of main group and transition elements for needful applications. (Remembering)

CO 2: Demonstrate the mechanism of inorganic photochemical reactions (Understanding)

CO 3: Make use of the properties of metals/non-metals for synthesizing organometallic compounds and catalytic activity study (Applying)

CO 4: Analyse the structure, bonding and synthesis of some inorganic solids. (Analysing)

Module I: Descriptive Inorganic Chemistry (20 lectures)

a. Structure and bonding in polyhedral boranes and carboranes, styx notation, Wade’s rules, electron count in polyhedral boranes, synthesis of polyhedral boranes, isolobal analogy, boron halides, phosphine-boranes, boron heterocycles, borazine.

b. Silanes, silicon halides, silicates, silicones, silanols, zeolites, germanium, tin and lead organyls, silenes, germanenes, stannenes, phosphorous halides, phosphazenes, sulphur halides, structural features and reactivity of S-N heterocycles.

c. Synthesis and reactivity of organo-lithium, beryllium and magnesium compounds, calixarines, cryptands and crown ethers in complexation chemistry.

d. Preparation and reactivity of aluminium organyls, carbalumination, hydro alumination, chemistry of Ga (I) and In (I), reduction of Al, Ga and In organyls, Metal organic framework structures (MOFs).

Module II: Mechanism of Inorganic Reactions (10 lectures)

Substitution in octahedral and square planar complexes, lability, trans-effect, conjugate base mechanism, racemisation, electron transfer reactions - inertness and lability, inner sphere and outer sphere mechanism, Marcus theory, solid state reactions – topotactic and epitactic mechanisms.

Module III: Inorganic Photochemistry (5 lectures)

Photosubstitution and photoredox reactions of chromium, cobalt and ruthenium compounds, Ligand field and charge transfer state (Theki and DOSENCO states), cis-trans isomerization, photocatalysis and solar energy conservation by ruthenium complexes.

Module IV: Organometallic Chemistry (15 lectures)

a. Valence electron count (16/18 electron rules), synthesis, structure, bonding and reactivity of mono and polynuclear metal carbonyls, substituted metal carbonyls, vibrational spectra of metal carbonyls, metal-metal bonding.

b. Types of M-C bonds, synthesis and reactivity of metal alkyls, carbenes, alkenes, alkynes, and arene complexes, metallocenes and bent metallocenes, isolobal analogy.


Module V: Introduction to Solid State Chemistry (10 lectures)
Structure of simple solids – metals, alloys and compounds; common structure types; synthesis of solid state compounds - ceramic method, microwave synthesis, sol-gel, precursor method, hydrothermal synthesis, CVD and intercalation; characterization of solids, bonding in solids – free-electron and molecular orbital theory; bands in solid state compounds, properties of solids – optical, magnetic and electrical properties of solids.

**Suggested Readings**

4. Education.

**Mapping of CoS to Syllabus**

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**CHBC317T: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY**

(3 credits – 45 hours) (L-T-P: 3-0-0)

**Objective**

*This course aims at helping the students to become acquainted with the basic concept of transition elements, organometallics, bioinorganic chemistry, active methylene compounds, polynuclear hydrocarbons and organic spectroscopy*

**Course / Learning Outcomes**

At the end of this course students will be able to:

CO 1: Explain the role of metal ions present in biological systems. (Understanding).
CO 2: Apply the 18-electron rule for organometallic compounds. (Applying)
CO 3: Compare the reactivity of polynuclear and heteronuclear aromatic molecules. (Analysing)
CO 4: Evaluate the structure of organic compounds from the UV-Visible and IR-Spectroscopy. (Evaluate)

**Module I: Inorganic Chemistry (22 lectures)**

**a. Chemistry of 3d metals (4 lectures)**

Oxidation states displayed by Cr, Fe, Co, Ni and Co.

A study of the following compounds (including preparation and important properties):

- Peroxo compounds of Cr, K₄Cr₂O₇, KMnO₄, K₃[Fe(CN)₆], K₄[Fe(CN)₆], sodium nitroprusside, [Co(NH₃)₆]Cl₃, Na₃[Co(NO₂)₆].

**b. Organometallic Compounds (10 lectures)**

Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, σ, π and multicentre bonds). Structures of methyl lithium, Zeise’s salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach).

**c. Bio-Inorganic Chemistry (8 lectures)**

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na+, K+ and Mg²⁺ ions: Na/K pump; Role of Mg²⁺ ions in energy production and chlorophyll. Role of iron in oxygen transport, haemoglobin, myoglobin, storage and transport of iron.

**Module II: Organic Chemistry (23 lectures)**

**a. Structure, preparation and properties of some aromatic molecules (8 lectures)**

Structure elucidation of naphthalene, properties of naphthalene. Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Furan, Pyrrole, Thiophene, and Pyridine.

**b. Active methylene compounds (4 lectures)**


Reactions: Synthetic uses of ethylacetoacetate (preparation of non-hetero molecules having upto 6 carbon).
c. Application of Spectroscopy to Simple Organic Molecules (11 lectures)

Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, \( \lambda_{\text{max}} \) and \( \varepsilon_{\text{max}} \), chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating \( \lambda_{\text{max}} \) of conjugated dienes and \( \alpha, \beta \) unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on \( >C=O \) stretching absorptions).

Suggested Readings
3. A New Concise Inorganic Chemistry, J. D. Lee, E.L.B.S.

Mapping of CoS to Syllabus

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CHBC318L: ORGANO METALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY LAB

(1 Credit – 30 hours) (L-T-P: 0-0-1)

Objective

This course aims at helping the students to become acquainted with the basic experimental concepts on Transition metal complex synthesis and their conductance, systematic qualitative organic analysis, separation by Chromatography.

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Qualitative analysis of the organic sample. (Remembering)
CO 2: Explain the concepts of retention factors in chromatographic techniques. (Understanding)
CO 3: Application of paper chromatography techniques. (Applying)
CO 4: Preparation of transition metal complex and comparison of their conductance. (Analysing)

Module I: Inorganic Chemistry

1. Separation of mixtures by chromatography: Measure the \( R_f \) value in each case. (Combination of two ions to be given)
   I. Paper chromatographic separation of Fe\(^{3+} \), Al\(^{3+} \) and Cr\(^{3+} \).
   II. Paper chromatographic separation of Ni\(^{2+} \), Co\(^{2+} \), Mn\(^{2+} \) and Zn\(^{2+} \).
2. Preparation of any two of the following complexes and measurement of their conductivity:
   I. Tetraaminecarbonatocobalt (III) nitrate.
   II. Tetraaminecopper (II) sulphate.
   III. Potassiumtrioxalatoferrate (III) trihydrate.
   IV. Compare the conductance of the complexes with that of M/1000 solution of NaCl, MgCl\(_2\) and LiCl\(_3\).

Module II: Organic Chemistry

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, alcoholic, phenolic, carbohydrates, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

Suggested Readings
1. Qualitative Inorganic Analysis, A. I. Vogel, Prentice Hall.
2. Quantitative Chemical Analysis, A. I. Vogel, Prentice Hall
Mapping of COs to Modules

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CHAP319T: PHYSICAL CHEMISTRY V: ADVANCED PHYSICAL CHEMISTRY
(4 credits – 75 hours) (L-T-P: 4-0-0)

Objective
This course aims at helping the students to become acquainted with the concepts of chemical kinetics, molecular reaction dynamics, electrochemistry

Course / Learning Outcomes
CO 1: Explain the interactions of ionic species with solvent molecules. (Understanding)
CO 2: Apply the knowledge of chemical kinetics to some important types of reactions. (Applying)
CO 3: Analyse the application of electrochemistry in different fields. (Analysing)
CO 4: Calculate the rate of different types of chemical reactions. (Evaluating)

Module I: Chemical Kinetics (15 lectures)

Module II: Study of Fast Reactions (8 lectures)
Stopped flow technique, temperature and pressure jump methods, NMR studies in fast reactions, shock tube kinetics, relaxation kinetics, Linearized rate equation, relaxation time in single step fast reactions, determination of relaxation time.

Module III: Molecular Reaction Dynamics (15 lectures)
Collisions of real molecules- trajectory calculations, Laser techniques, reactions in molecular beam, estimation of activation energy and calculation of potential energy surface, the transition state theory (TST) of bimolecular gaseous reactions, statistical and thermodynamic formulations. Comparison between TST and hard sphere collision theory, kinetics of reactions in solution-diffusion controlled and chemically controlled reactions, TST of reactions in solution- Bronsted and Bjerrum equation, effect of ionic strength, kinetic salt effect.

Module IV: Electrochemistry - I (10 lectures)
a. Ion-solvent interaction- the Born model, Thermodynamic parameters of ion solvent interactions- structural treatment, the ion-dipole model-its modifications, ion-quadrupole and ion-induced dipole interactions.
b. Primary solution- determination of hydration number, compressibility method and viscosity-mobility method, Debye-Huckel theory of ion-ion interactions, derivation, validity and limitations, extended Debye-Huckel-Onsager equation, random walk model of ionic Diffusion-Einstein Smoluchowski reaction.

Module V: Electrochemistry – II (12 lectures)
a. Theories of Electrical Interface: Electrocapillary phenomena - Lippmann equation, electron transfer at interfaces, polarizable, non-polarizable and non-polarisable interfaces, Butler-Volmer equation, Tafel plot.
b. Systems for Electro-Chemical Energy Storage and Conversion: Types of Batteries, Lead- acid batteries, Nickel-cadmium batteries and Li-ion batteries, electrical double layer capacitor, pseudo-capacitor, fuel cells.

Suggested readings
2. Physical chemistry, I. R. Levine, Mcgraw Hill Education.
CHAM406T: ANALYTICAL METHODS IN CHEMISTRY
(3 credits – 45 hours) (L-T-P: 3-0-0)

Objective
This course aims at helping the students to become acquainted with Qualitative and quantitative aspects of analysis, different methods of analysis.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Define principles of different methods of analysis. (Remembering)
CO 2: Explain different optical methods of analysis. (Understanding)
CO 3: Identify kinds of errors in chemical analysis. (Applying)
CO 4: Analyse the techniques of thermogravimetry to estimate ions in a mixture. (Analysing)

Module I: Qualitative and quantitative aspects of analysis (5 hours)
Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution of indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Module II: Optical methods of analysis (15 hours)
UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument.
Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers.
Flame Atomic Absorption and Emission Spectrometry: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Module III: Thermal methods of analysis (5 hours)
Theory of thermogravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.

Module IV: Electroanalytical methods (10 hours)
Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pKa values.

Module V: Separation techniques (10 hours)
Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation.
Technique of extraction: batch, continuous and counter current extractions.
Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and non-aqueous media.

Suggested Readings
2. Instrumental Methods of Analysis, H. H. Willard, Wadsworth Publishing Company, Belmont, California, USA.
Mapping of COs to Syllabus

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CHRM407T: RESEARCH METHODOLOGY
(2 credits – 30 hours) (L-T-P: 2-0-0)

Objective
This course aims at helping the students to become acquainted with different methods of scientific research, data analysis, way to write project proposal

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the different methods of scientific Research. (Understanding)
CO 2: Explain how to use e-resources for research. (Understanding)
CO 3: Explain the analysis and presentation of data. (Understanding)
CO 4: Apply the knowledge of chemical safety and handle chemicals safely in the lab. (Applying)
CO 5: Construct a proposal for project funding. (Creating)

Mode of Assessment:
Modules I-II will be assessed based on a written examination (2 credits) while Module III will be assessed on the basis of a seminar (1-credit).

Module I: Methods of Scientific Research and Chemical Safety (10 lectures)
a. Print resources, digital resources, information technology and library resources, reporting practical and project work, writing literature surveys and reviews, organizing a poster display, giving an oral presentation, writing scientific papers – justification for scientific contributions, bibliography, description of methods, conclusions, the need for illustration, style, publication of scientific work; writing ethics – avoiding plagiarism.
b. Safe working procedure and protective environment, protective apparel, emergency procedure and first aid, laboratory ventilation. Safe storage and use of hazardous chemicals, procedure for working with substances that pose hazards, flammable or explosive hazards, procedures for working with gases at pressures above or below atmospheric – safe storage and disposal of waste chemicals, recovery, recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, incineration and transportation of hazardous chemicals, overview of chemical regulations in India.

Module II: Data Analysis (10 lectures)
The Investigative Approach: Making and Recording Measurements. SI Units and their use. Scientific method and design of experiments.

Module III: Project Proposal Writing (Seminar Module) (10 lectures)
In this module, students will be reviewing scientific articles, writing reports on the papers they have read and finally prepare a research proposal.

Suggested Readings
4. Quantitative chemical analysis, D. C. Harris, Freeman.
5. How to use Excel in analytical chemistry and in general scientific data analysis, R. de Leve, Cambridge Univ. Press.
7. OSU safety manual 1.01.
### Mapping of COs to Syllabus

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### CHML408T: MOLECULES OF LIFE

**Objective**

This course aims to introduce properties of molecules involved in various physiological processes.

**Course / Learning Outcomes**

At the end of this course students will be able to:

CO 1: Explain the properties and functions of the biomolecules they study. (Understanding)

CO 2: Write mechanisms of biomolecular reactions. (Applying)

CO 3: Differentiate between different biomolecules. (Analysing)

CO 4: Assess the importance of biomolecules in specific processes. (Evaluating)

**Module I: Carbohydrates (8 lectures)**


**Module II: Amino Acids, Peptides and Proteins (8 lectures)**

Classification of Amino Acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Determination of primary structure of peptides, determination of N-terminal amino acid (by DNFB and Edman method) and C–terminal amino acid (by thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides.

**Module III: Enzymes and correlation with drug action (8 lectures)**

Mechanism of enzyme action, factors affecting enzyme action, Coenzymes and cofactors and their role in biological reactions, Specificity of enzyme action (including stereospecificity), Enzyme inhibitors and their importance, phenomenon of inhibition (Competitive and Non-competitive inhibition including allosteric inhibition). Drug action-receptor theory. Structure –activity relationships of drug molecules, binding role of –OH group, -NH2 group, double bond and aromatic ring.

**Module IV: Nucleic Acids (10 lectures)**

Components of Nucleic acids: Adenine, guanine, thymine and Cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (types of RNA), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation.

**Module V: Lipids (5 lectures)**

Introduction to lipids, classification. Oils and fats: Common fatty acids present in oils and fats, Omega fatty acids, Trans fats, Hydrogenation, Saponification value, Iodine number.

**Module VI: Concept of Energy in Biosystems (6 lectures)**


**Suggested Readings**

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SKILL ENHANCEMENT COURSES

CHBC112L: BASIC ANALYTICAL CHEMISTRY

(3 Credits - 45 hours) (L-T-P: 1-0-2)

Objective
This course is intended to explain the fundamental concepts analytical chemistry and its applications.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall concept of data analysis and principles of chromatography. (Remembering)
CO 2: Explain terms associated with analytical measurements. (Understanding)
CO 3: Determining various parameters of soil and water samples. (Applying)
CO 4: Analyse a mixture of metal ions through paper chromatography. (Analysis)

Module I:
Introduction to Analytical Chemistry and its interdisciplinary nature, concept of sampling, importance of accuracy, precision and sources of error in analytical measurements, Presentation of experimental data and results, from the point of view of significant figures.
Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators.
a. Determination of pH of soil samples.
b. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.
Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.
a. Determination of pH, acidity and alkalinity of a water sample.
b. Determination of dissolved oxygen (DO) of a water sample.

Module II:
Chromatography: Definition, general introduction on principles of chromatography, paper chromatography, TLC etc. Paper chromatographic separation of mixture of metal ion (Ni\(^{2+}\) and Co\(^{2+}\)).
Ion-exchange: Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).

Suggested Instrumental demonstrations:
a. Estimation of macro nutrients: Potassium, Calcium, Magnesium in soil samples by flame photometry.
b. Spectrophotometric determination of Iron in Vitamin / Dietary Tablets.
c. Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drink.

Suggested Readings
6. Vogel's Qualitative Inorganic Analysis, G. Svehla, Prentice Hall.

Mapping of COs to Syllabus

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CHCH113L: CHEMOINFORMATICS

(3 Credits - 45 hours) (L-T-P: 1-0-2)
Objective
This course is intended to explain concepts of molecular modelling and its application in drug designing.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the principles of molecular modelling. (Remembering)
CO 2: Explain principles of molecular modelling. (Understanding)
CO 3: Predict properties of molecular compounds, build models. (Applying)
CO 4: Elucidate structure and properties, carry out the computer-assisted synthesis of drugs. (Creating)

Module I:

a. Introduction to Chemoinformatics: History and evolution of chemoinformatics, Use of chemoinformatics, Prospects of chemoinformatics, Molecular Modelling and Structure elucidation.
   Representation of molecules and chemical reactions: Nomenclature, Different types of notations, SMILES coding, Matrix representations, Structure of Mol files and Sd files, Libraries and toolkits, Different electronic effects, Reaction classification.
   Searching chemical structures: Full structure search, sub-structure search, basic ideas, similarity search, three-dimensional search methods, basics of computation of physical and chemical data and structure descriptors, data visualization.

b. Applications: Prediction of Properties of Compounds; Linear Free Energy Relations; Quantitative Structure-Property Relations; Descriptor Analysis; Model Building; Modelling Toxicity; Structure-Spectra correlations; Prediction of NMR, IR and Mass spectra; Computer Assisted Structure elucidations; Computer Assisted Synthesis Design, Introduction to drug design; Target Identification and Validation; Lead Finding and Optimization; Analysis of HTS data; Virtual Screening; Design of Combinatorial Libraries; Ligand-Based and Structure Based Drug design; Application of Chemoinformatics in Drug Design.

Hands-on Exercises

Suggested Readings

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CHIP217L: INTELLECTUAL PROPERTY RIGHTS
(3 Credits- 45 hours) (L-T-P: 3-0-0)

Objective
This course is intended to explain the concepts intellectual property rights and its need.

Course /Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall the basic concepts of intellectual property. (Remembering)
CO 2: Explain the need for protection of intellectual property. (Understanding)
CO 3: Develop the knowledge of different types of intellectual property. (Applying)
CO 4: Distinguish between different types of intellectual property. (Analysing)

Module I: Introduction to Intellectual Property
Historical Perspective, different Types of IP, importance of protecting IP.

Module II: Copyrights, Trade Marks, Patents
a. Introduction, how to obtain, differences from Patents.
b. Introduction, how to obtain, Different types of marks – Collective marks, certification marks, service marks, Trade names, etc., differences from designs.
c. Historical Perspective, Basic and associated right, WIPO, PCT system, Traditional Knowledge.
d. Patents and Healthcare – balancing promoting innovation with public health, Software patents and their importance for India, geographical indications.
Module III: Trade Secrets
Introduction and Historical Perspectives, Scope of Protection, Risks involved and legal aspects of Trade Secret Protection.

Module IV: Different International agreements
World Trade Organization (WTO):
1. General Agreement on Tariffs & Trade (GATT), Trade Related Intellectual Property Rights (TRIPS) agreement.
2. General Agreement on Trade related Services (GATS).
WIPO and TRIPS, IPR and Plant Breeders Rights, IPR and Biodiversity.

Suggested Readings

Mapping of COs to Syllabus

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INTERNSHIPS

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CHIN114I/ CHIN218I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 Credits: 120 hours)

CHIN320I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits-60 Hours)

Internship programme
Objectives:
1. To help students in gaining experience in their chosen professional field and hence building their own network.
2. To prepare students for the job market.
3. To help students in developing their interpersonal skills.
4. To offer students the real world exposure.

Keeping in mind about the above objectives, the department of chemistry, ADBU is planning for student’s internship as per the following strategies
1. Finding of suitable organization/ institutions/ industries offering internship programme by the students.
2. Students must seek consent from the project supervisor/departmental head for application.
3. After due approval, students should appear in the internship interview.
4. Confirmation from the respective institutions end for allowing the internship.
5. After being selected, students should apply to the Director of school or Dean (academics) supported by the industry offer letter.
6. An office order will be issued to the students from academic section on recommendation by the Director/Dean.
7. Finally, a student can proceed to an internship only after receiving an office order from academic section.
8. Internship report submission at the department by the interns and notification of completion by the department.

Note: The internships of 8-10 weeks of 10 credits, after 2nd or 4th semester, will be mandatory for the students desirous of exiting with a certificate or Diploma, respectively. [Source: Internship policy of NEP].

RESEARCH PROJECT /DISSERTATION

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CHDI409P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)
In the project Phase I, the students will be trained to carry out literature survey. In addition, proper training will be provided to learn the uses of various software and tools for enhancing their skills in the field of research and development.
CHDI410P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)
After successful completion of the Literature Review work, the students will be trained to carry out both Theoretical and Experimental based research projects. Finally, they will report and submit their dissertation thesis. Research training in Phase II will definitely help them in their future research study.

BSC CHEMISTRY (Honours) with Research

CHDI411P: DISSERTATION I
(18 Credits -540 Hours) (L-T-P: 0-0-36)
In the Dissertation Phase I, the students will be trained to carry out literature survey. In addition, proper training will be provided to learn the uses of various software and tools for enhancing their skills in the field of research and development. Along with their Literature review work, they will also carry out the research problem as assigned by the supervisor.

CHDI412P: DISSERTATION II
(20 Credits -600 Hours) (L-T-P: 0-0-40)
In the Dissertation Phase II, the students will complete and summarize their research work. They will present their research work in front of faculty members and external examiner and will finally submit the dissertation thesis.
DEPARTMENT OF MATHEMATICS

PROGRAMME: BACHELOR OF SCIENCE in MATHEMATICS (BSC)

DEGREE: BSC MATHEMATICS (HONOURS)/ BSC MATHEMATICS (HONOURS) WITH RESEARCH

VISION:
Be a globally recognized Department of Mathematics with a reputation for excellence in teaching, research, and outreach; imparting the best possible education to the students to nurture their talent and creativity in the pursuit of truth with the vision of the Assam Don Bosco University to prepare socially aware citizens.

MISSION:
1. To provide adequate understanding of Mathematical laws by means of both conventional techniques and skilful approaches.
2. To familiarize students as well as faculty members with the state-of-the-art by means of talks, workshops, symposia.
3. To stimulate curiosity mixed with enthusiasm for further investigation into research in Mathematics and relevant fields.

PROGRAM OUTCOMES – UG PROGRAMME

PO 1: **Disciplinary Knowledge**: Capable of demonstrating comprehensive knowledge and understanding of one or more other disciplines that form a part of an undergraduate programme of study.

PO 2: **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO 3: **Communication Skills**: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully; and present complex information in a clear and concise manner to different groups.

PO 4: **Social Interaction**: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO 5: **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 6: **Moral and Ethical Awareness**: Ability to embrace moral/ethical values in conducting one’s life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 7: **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO 8: **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes. Critical sensibility to lived experiences, with self-awareness and reflexivity of both and society.

PO 9: **Information and Digital Literacy**: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 10: **Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Ability to apply one’s learning to real life situations.

Programme Specific Outcomes - B. Sc (Hons) Mathematics

PSO 1: **Solid Foundation in Knowledge**: Bachelor Degree in Mathematics is the culmination of in-depth knowledge of the core branches of mathematics, and some related areas like Computer Science, Programming Languages, Statistics and Data Science. Thus, this programme helps students in building a solid foundation for further higher studies and research in Mathematics and allied fields.

PSO 2: **Competency in Skills**: The skills and knowledge gained leads to proficiency in analytical reasoning, critical understanding, analysis and synthesis in order to solve theoretical and practical problems in Mathematics and relevant areas.
PSO 3: **Problem Solving:** Students undergoing this programme learn to logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. This helps them to learn behave responsibly in a rapidly changing interdependent society.

PSO 4: **Interdisciplinary and Research Skills:** Students completing this programme will be able to present mathematics clearly and precisely, make real-life problems precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians.

PSO 5: **Proficiency in Employments:** This programme will help students to enhance their employability in teaching, research and other jobs in different public and private sectors.

### Mapping of Courses to POs and PSOs

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DEPARTMENT OF MATHEMATICS

DETAILED SYLLABUS

MAJOR COURSES

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<th>Category</th>
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MACA100T: CALCULUS

(3 Credits – 45 hours) (L-T-P: 3-0-1)

Objective(s)

The objective of the course is to introduce to a student the fundamental and advanced notion of calculus. Apart from that, analogous notion in case of vector valued function will also be introduced.

Course/Learning Outcomes:

At the end of this course students will be able to:

CO 1: Explain the fundamental concepts of differentiation and integration to solve some of the important problems of calculus (Understanding).

CO 2: Apply the formulae of differential and integral calculus, to solve problem related to asymptote, curve tracing, conics, reduction formulae, volumes, arc length, surface area of revolution etc and vector function with applications. (Applying).

CO 3: Classify various curves along with their properties in both Cartesian and polar equations (Analysing).

Module I: (10 hours)

Hyperbolic functions, higher order derivatives, Leibniz rule and its applications to problems of type, concavity and inflection points, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, Hospital’s rule, applications in business, economics and life sciences.

Module II: (10 hours)

Reduction formulae, derivations and illustrations of reduction formulae of the type, volumes by slicing, disks and Washer’s methods, volumes by cylindrical shells, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, area of surface of revolution.

Module III: (12 hours)

Techniques of sketching conics, reflection properties of conics, rotation of axes and second-degree Equations, classification into conics using the discriminates, polar equations of conics.

Module IV: (13 hours)

Introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler’s second law.
Suggested Readings

Mapping of COs to Modules

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MAAL102T: ALGEBRA
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course introduces the fundamentals of algebra and its applications in varieties of physical contexts. Additionally, this course also provides a thorough method for numerically resolving various issues that arise in their field.

Course/Learning Outcomes:
At the end of the course students will be able to:
CO 1: Demonstrate various results of complex numbers, functions and matrices. (Understanding)
CO 2: Solve problems related to trigonometric, basic algebra, and number system. (Applying)
CO 3: Inspect the properties of system of linear equations, and inequalities. (Analysing)

Module I: (12 hours)
Polar representation of complex numbers, nth roots of unity, De Moivre’s theorem for rational indices and its applications.

Module II: (15 hours)
Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

Module III: (18 hours)
Inequalities involving arithmetic, geometric and harmonic means, Cauchy Schwarz inequality, relations between roots and coefficients of polynomial equation of degree n, roots of symmetric functions, Cardon’s methods solution of cubic equation.

Module IV: (15 hours)
Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence. Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of Rn , dimension of subspaces of Rn and rank of a matrix, Eigenvalues, Eigen Vectors and Characteristic Equations of a matrix.

Suggested Readings
3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Indian Reprint, Pearson Education Asia,

Mapping of COs to Modules

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MAMC200T: MULTIVARIATE CALCULUS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course introduces notions of vector operations in three and higher dimensions, partial derivatives in terms of matrices, methods for integrating over surfaces and curves and Stokes’ and Green’s theorem.
Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Illustrate differentiation and integration of functions of several variables. (Understanding).
CO 2: Determine area, volume using double and triple integration. (Evaluating).
CO 3: Analyse multiple integrals by changing the variables. (Analysing).
CO 4: Make use of Green's, Stokes' and Gauss' theorem in some physical applications. (Applying).

Module I: (15 hours)
Functions of several variables, limit and continuity of functions of two variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.

Module II: (15 hours)
Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar coordinates, Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical coordinates.

Module III: (15 hours)
Change of variables in double integrals and triple integrals. Line integrals, Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservative vector fields, independence of path, Definition of vector field, divergence and curl.

Module IV: (15 hours)
Green’s theorem, surface integrals, integrals over parametrically defined surfaces. Stoke’s theorem, The Divergence theorem.

Suggested Readings
4. James Stewart, Multivariable Calculus, Concepts and Contexts, Brooks/Cole, Thomson Learning, USA.

Mapping of COs to Modules

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MADE201T: DIFFERENTIAL EQUATIONS
(3 Credits – 45 hours) (L-T-P: 3-0-1)

Objective(s)
The course aims to introduce the theory of ordinary differential equation. The course focuses not only at how to formulate a physical problem using differential equation but also at different methods of solution.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Solve linear and non-linear differential equation of first and higher order using various techniques. (Applying).
CO 2: Apply these techniques to solve and analyse various mathematical models. (Analysing).

Module I: (15 hours)
Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.

Module II: (15 hours)
Introduction to compartmental model, exponential decay model, lake pollution model (case study of Lake Burley Griffin), drug assimilation into the blood (case of a single cold pill, case of a course of cold pills), exponential growth of population, limited
growth of population, limited growth with harvesting.

**Module III: (15 hours)**
General solution of homogeneous equation of second order, principle of superposition for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler’s equation, method of undetermined coefficients, method of variation of parameters. Equilibrium points, Interpretation of the phase plane, predator-prey model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.

**Suggested Readings**

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**MARA203T: REAL ANALYSIS**
(5 Credits – 75 hours) (L-T-P: 4-1-0)

**Objective(s)**
This course aims to introduce analysis of the real number system and covers the basic aspects on the fundamentals of real analysis including all the essential ideas of mathematical analysis in general.

**Course/Learning Outcomes:**
At the end of this course students will be able to:
- CO 1: Illustrate the concept of limit point, limit of a function, sequence and series of real functions. (Understanding).
- CO 2: Examine convergence of sequence and series of real numbers and functions. (Analysing).
- CO 3: Explain the continuity, uniform continuity and differentiability of functions. (Evaluating.)
- CO 4: Make use of various convergence tests for sequence, series of real numbers and functions. (Applying).

**Module I: (10+5 hours)**
Real number system as a complete ordered field, Archimedean property, supremum, infimum. Open and closed sets, limit points, interior points, Euclidean space, compact spaces, Bolzano Weierstrass theorem, Heine Borel theorem in R only. Sequence of real numbers, bounded sequence, limsup, liminf, Cauchy sequences, Series, convergence of series, root and ratio tests, absolute convergence.

**Module II: (18+5 hours)**
Limit, Continuity, types of discontinuity, Intermediate value theorem, Fixed point theorem, uniform continuity, Monotonic functions. Limits of functions (approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.

**Module III: (16+2 hours)**
Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle’s theorem, Mean value theorem, intermediate value property of derivatives, Darboux’s theorem. Applications of mean value theorem to inequalities and approximation of polynomials, Taylor’s theorem to inequalities. Cauchy’s mean value theorem. Taylor’s theorem with Lagrange’s form of remainder, Taylor’s theorem with Cauchy’s form of remainder, application of Taylor’s theorem to convex functions, relative extrema.

**Module IV: (16+3 hours)**
Sequence and series of real valued functions, Point wise and uniform convergence, uniform convergence and continuity, uniform convergence and differentiation, uniform convergence and integration. Cauchy criteria for uniform convergence. Series of functions and convergence, Weierstrauss M-test.

**Suggested Readings**

Mapping of COs to Modules

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MANM204T: NUMERICAL METHODS AND COORDINATE GEOMETRY
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
This course introduces various numerical methods of solutions. It also covers various conic section along with their properties.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Illustrate the concept of numerical methods on algebraic, transcendental equation, differentiation, integration and differential equations. (Understanding).
CO 2: Utilize appropriate methods to solve interpolation, differentiation, integration, and ordinary differential equations problems. (Applying).
CO 3: Classify the various forms of conic sections in cartesian and polar coordinates. (Analysing).
CO 4: Discuss the graphs of some special curves by using polar coordinates on the plane. (Creating).

Module I: (10 +4) hours)

Module II: (15+3) hours)

Module III: (12+3) hours)

Module IV: (11+3) hours)
Transformation of coordinates, pair of straight lines. Parabola, parametric coordinates, tangent and normal, ellipse and its conjugate diameters with properties, hyperbola and its asymptotes

Module V: (12+2) hours)
Techniques of sketching conics, reflection properties of conics, rotation of axes and second-degree equations, classification into conics using the discriminates, polar equations of conics.

Suggested Readings

Mapping of COs to Modules

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MAAA205T: ABSTRACT ALGEBRA
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course introduces the ideas of algebraic structures, symmetry properties of specific geometric objects and also to equip students with the knowledge necessary to draw conclusions about a problem’s solution from its associated algebraic structure’s characteristics.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Interpret the properties of basic algebraic structures. (Understanding).
CO 2: Solve problems of algebraic structures, sub-structures and their mappings. (Applying).
CO 3: Classify the properties of groups, rings. (Analysing).

Module I: (18 hours)
Groups, Basic properties, Symmetries of a square, Dihedral group, Order of a group, Order of an element, Subgroups, Center of a group, Centralizer of an element, Cyclic groups and properties, Generators of a cyclic group, Classification of subgroups of cyclic groups. Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group, properties of cosets, Lagrange’s theorem and consequences including Fermat’s Little theorem.

Module II: (18 hours)
Normal subgroups, factor groups, Cauchy’s theorem for finite abelian groups. Group homomorphisms, properties of homomorphisms, Cayley’s theorem, properties of isomorphisms, First, Second and Third isomorphism theorems.

Module III: (12 hours)
Automorphisms and Properties: Automorphism groups, Automorphism groups of finite and infinite cyclic groups, Characteristic subgroups, Commutator subgroup and its properties; Applications of factor groups to automorphism groups.

Module IV: (12 hours)
Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

Suggested Readings

Mapping of COs to Modules

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MALA300T: LINEAR ALGEBRA
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The goal is to introduce students to the fundamentals of linear algebra and its application in computational and applied mathematics.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Interpret the concepts of finite dimensional vector spaces and inner product spaces. (Understanding).
CO 2: Formulate linear transformations, matrix representation, rank, nullity. (Creating).
Module I: (12+4 hours)
Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Module II: (15+4 hours)
Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

Module III: (15+3 hours)
Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators, Eigenspaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator.

Module IV: (18+4 hours)
Inner product spaces and norms, Gram-Schmidt orthogonalization process, orthogonal complements, Bessel’s inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

Suggested Readings:

Mapping of COs to syllabus

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MAPS301T: PDE AND SYSTEMS OF ODE
(4 Credits – 60 hours) (L-T-P: 4-0-1)

Objective(s)
The objective of this course is to present the main results in the context of ordinary and partial differential equations that allow learning about the different methods of solving practical problems analytically.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Explain the different types of differential equations and relationship of various functions in differential problems. (Understanding).
CO 2: Develop derivative techniques to predict the behaviour of nonlinear phenomena and find solution. (Applying).
CO 3: Analyse boundary conditions of problems which are not solvable initially. (Analysing).
CO 4: Assess various higher order methods for the solution of complex problem. (Evaluating).

Module I: (15 hours)

Module II: (15 hours)

Module III: (12 hours)
Derivation of Heat equation, Wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms.
Module IV: (18 hours)

Suggested Readings

Mapping of COs to Modules

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MAPB303T: PROBABILITY AND STATISTICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to introduce fundamental notions of probability and statistical methods. It aims to introduce tools at an advanced to intermediate level that will help to address successfully a range of issues in the discipline.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the ideas of probability, random variables and distribution functions along with their properties. (Understanding).
CO 2: Apply the basic ideas of the measures of central tendency, correlation and regression to solve social and scientific related problems. (Applying).
CO 3: Use appropriate statistical methods to summarize and analyse data using testing of hypothesis. (Analysing).

Module I: Basic Probability and Continuous Probability Distributions (12+6 hours)
Probability spaces, conditional probability, independence; Discrete and Continuous random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev’s Inequality, distribution function and densities, normal, exponential and gamma densities.

Module II: Bivariate Distribution (9+3 hours)
Bivariate distributions and their properties, distribution of sums and quotients, conditional densities.

Module III: Applied Statistics (12+3 hours)
Measure of Central tendency: Moments, skewness and Kurtosis-Probability distribution: Binomial, Poisson and Normal-evaluation of statistical parameters for these three distributions, Correlation and regression-Rank correlation. Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves.

Module IV: (12+3 hours)
Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Suggested Readings
MAMS304T: METRIC SPACES AND COMPLEX ANALYSIS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course introduces the basic properties of metric spaces, complex system and their properties.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate the basic concepts of metric spaces, complex numbers and properties. (Understanding).
CO 3: Discuss analytic functions and their integrations. (Creating).
CO 4: Interpret Cauchy integral formulae, power/Laurent series, Cauchy Residue theorem. (Evaluating).

Module I: (12 hours)

Module II: (18 hours)

Module III: (15 hours)
Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability. Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions.

Module IV: (15 hours)

Suggested Readings
MARI305T: RIEMANN INTEGRATION AND SERIES OF FUNCTIONS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
In this course Riemann integral theory is discussed to understand the sequences and series of functions.

Course/Learning Outcomes:
At the end of this course students will be able to:
CO 1: Discuss the properties of Riemann integrable functions and fundamental theorems of integration. (Creating).
CO 2: Interpret improper integrals including Beta and Gamma functions. (Evaluating).
CO 3: Make use of different tests to check the convergence of the functions and improper integrals. (Applying).
CO 4: Examine uniform convergence and convergence of power series. (Analysing).

Module I: (18 hours)
Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions; Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorems of Calculus.

Module II: (12 hours)
Improper integrals; Convergence of Beta and Gamma functions.

Module III: (15 hours)
Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test.

Module IV: (15 hours)
Power series, radius of convergence, Abel’s Theorem; Weierstrass Approximation Theorem.

Suggested Readings

Mapping of COs to Modules

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MANT306T: NUMBER THEORY
(4 Credits – 40 hours) (L-T-P: 4-0-0)

Objective(s)
This course is designed to provide students with an opportunity to work with conjectures, proofs, and analysing mathematics. Also, the course provides an introduction to some basic cryptographic techniques, with a main emphasis on asymmetric cryptography.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Develop the ideas of congruences, primitive roots, residue system, partitions, Euler-Pentagon number system. (Applying).
CO 2: Discuss importance of results like Chinese remainder theorem, Fermat’s little theorem etc. (Creating).
CO 3: Interpret the use of primitive roots in congruence relations. (Evaluating).
CO 4: Analyse different schemes of classical cryptography. (Analysing).

Module I: (15 hours)
Divisibility, Congruences, complete residue system, reduced residue system, Chinese remainder theorem., Arithmetic modulo p, Fermat’s little theorem, Wilson’s theorem. Arithmetic functions-Mobius function, Euler function.
Module II: (15 hours)
Quadratic residues and congruences of second degree in one unknown, Legendre symbol, Jacobi symbol, congruences of second degree with prime modulus and with composite modulus.

Module III: (18 hours)
Primitive roots and indices, order, necessary and sufficient condition for the existence of primitive roots, construction of reduced residue system. Continued fractions, simple continued fractions, approximation of irrational numbers by continued fractions, solution of Pell's equation. Introduction to partitions, geometric representation, generating functions, Euler's Pentagonal number theorem.

Module IV: (12 hours)
Basic of Cryptography: History of cryptography, terminologies used in cryptography; Substitution Techniques - The Caesar Cipher, One Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques-Encipherment/Decipherment Complexity,

Suggested Readings

Mapping of COs to Modules

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MAMP307P: Minor Project
(4 Credits – 75 Hours) (L-T-P: 4-0-0)

Objective(s):

Course Outcomes
At the end of this course students will be able to

MAAB400T: ADVANCED ABSTRACT ALGEBRA
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The main goal is to introduce the advanced concepts and results of abstract algebra. Additionally, the course lays the strong foundations to study some advanced subjects like Field theory and Galois theory.

Course/Learning Outcomes:
At the end of this course students will be able to:

CO 1: Explain basic concepts of automorphisms, conjugacy, class equation. (Understanding).
CO 2: Make use of simple groups in Galois theory. (Applying).
CO 3: Inspect finite groups in fundamental theorem of finite abelian groups. (Analysing).
CO 4: Explain basic concepts of polynomial rings and domains. (Understanding).

Module I: (12+3 hours)
External direct products of groups, Properties of external direct products, internal direct products, classifications of groups of order $p^2$, $p$ is prime, Fundamental Theorem of finite abelian groups.

Module II: (12+6 hours)
Group actions: Group actions and permutation representations; stabilizers and kernels, permutation representation associated with a given group action, Applications of group actions, Conjugacy class, The class equation, $p$-groups, Sylow’s theorems and
applications of Sylow theorems; Finite simple groups, non-simplicity tests; Generalized Cayley’s theorem, Index theorem, Embedding theorem and applications. Simplicity of An for n ≥ 5.

Module III: (12+3 hours)
Subnormal, normal series, derived group, solvable groups, composition series, nilpotent groups, Jordan-Holder theorem, free group, rank of a free group, fundamental theorem of free groups, presentation of groups.

Module IV: (12+3 hours)
Polynomial rings over commutative rings, division algorithms and consequences, principal ideal Domains. factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, unique factorization in \( \mathbb{Z}[x] \). Divisibility in integral domains, irreducible, primes, unique factorization domains, Euclidean domains.

Module V: (12 hours)
Field extensions, algebraic and transcendental elements, geometrical constructions, splitting field, finite fields, structure of finite fields, normal, separable and inseparable extension of fields

Suggested Readings:

Mapping of COs to Modules

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MAAP401T: APPLIED ANALYSIS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)

In this course we aim to impart the knowledge of advanced mathematical techniques to solve various problems related to calculus of variation, transform analysis and some special functions.

Course/Learning Outcomes

At the end of this course students will be able to:

CO 1: Illustrate fundamentals concepts of calculus of variation and integral equations, Integral transforms, special functions and their applications. (Understanding).

CO 2: Apply the various method in solving science and engineering problems. (Applying).


CO 4: Determine the solutions of various classes of differential equations and special functions with their properties. (Evaluating).

Module I: (10+3 hours)
Linear functional, minimal functional theorem, general variation of a functional, Euler- Lagrange equation, Necessary and sufficient conditions for extrema, strong extremum and weak extremum, broken extremum; Weirstrass Erdmann corner conditions.

Module II: (8+2 hours)
Linear integral equation of the first and second kind of Fredholm and Volterra type Reduction of ordinary differential equations into integral equations, Solution of integral Equations with separable kernels, Characteristic numbers and eigenfunctions, resolvent kernel.

Module III: (12+4 hours)
Module IV: (12+3 hours)
Laplace Transform and its properties, Convolution theorem, Inverse Laplace Transform, Application of Laplace Transform to solution of ordinary and partial differential equations of initial boundary value problems.

Module V: (18+2 hours)
General solution of Bessel equation, Recurrence relations, Orthogonal sets of Bessel functions, Modified Bessel functions, Applications. General solution of Legendre equation, Legendre polynomials, Associated Legendre polynomials, Rodrigues formula, Orthogonality of Legendre polynomial, Concept and calculation of green’s function, Approximate Green’s function, Green’s function method for differential equations.

Suggested Readings
4. Debnath L., Bhatta D., Integral Transforms & their applications, Chapman & Hall/CRC.

Mapping of COs to Modules

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MATP402T: TOPOLOGY
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The primary goal of this course is to introduce students to the concept, results and applications of topology, which serve as the overarching framework for all types of mathematical analysis.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Demonstrate the basic characteristics and properties of metric spaces. (Understanding).
CO 2: Categorize the various properties related to Topological Spaces. (Creating).
CO 3: Examine the Connectedness and Compactness of Topological Spaces. (Analysing).
CO 4: Explain basic results related to Normed linear spaces, Banach spaces and Hilbert spaces. (Understanding).

Module I: (15+3 hours)
Metric spaces, open and closed sets, limit points, interior points, convergence, Cauchy sequence, completeness, completion in metric spaces, separable spaces.

Module II: (18+4 hours)
Topological Spaces, Basis for a topology, the order topology, the product topology, the subspace topology, Closed sets and limit points, convergent sequence, Continuous function, homeomorphism, metric topology.

Module III: (12+3 hours)
Connected spaces, connected subspaces of real line, Components, local connectedness, Compact spaces, compact spaces of real line, limit point compactness, local compactness.

Module IV: (15+5 hours)
The countability axioms, the separation axioms, Urysohn Lemma, Urysohnmetrization theorem. Tychonoff ‘s theorem, Stone-Cech Compactification.Local finiteness, the Nagata Smirnov Metrization theorem, precompactness, the Smirnov Metrization theorem, space of continuous function.

Suggested Readings
MAFA403T: FUNCTIONAL ANALYSIS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The primary goal of this course is to introduce the advanced knowledge of abstract analysis including various types of functional spaces and their properties which generate the strong foundation for research in pure and applied mathematics.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Demonstrate the basic characteristics and properties of normed linear spaces, (Understanding).
CO 2: Categorize the various properties related to Hilbert Spaces. (Creating).
CO 3: Deduct various results on Strong and weak convergence. (Evaluation).
CO 4: Explain basic results related to orthonormal set. (Understanding).

Module I: (15+4 hours)
Normed linear spaces, properties of normed linear spaces, Banach space, Hahn-Banach theorem, Open mapping theorem, Closed graph theorem, Principle of uniform boundedness,

Module II: (18+4 hours)
Hilbert spaces, Orthogonal complements, orthonormal sets, the Reisz representation theorem, Bessel's inequality, Parseval's identity, The dual space, self – adjoint, normal and unitary operators.

Module III: (12+3 hours)
Strong and weak convergence, fundamental properties, weak* convergence,

Module IV: (15+4 hours)
Orthonormal set and Fourier analysis, Functional and operators on Banach and Hilbert Spaces.

Suggested Readings
2. Kreyszig E., Introductory functional analysis with application, John Willey and Sons.
LIST OF PRACTICALS (USING ANY SOFTWARE)

- Plotting of Graphs of functions $e^{ax+b}$, $\log(ax+b)$, $\frac{1}{ax+b}$, $\sin(ax+b)$, $\cos(ax+b)$, $|ax+b|$, and to illustrate the effect of $a$ and $b$ on the graph.
- Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.
- Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid)
- Obtaining surface of revolution of curves.
- Tracing of conics in cartesian coordinates/polar coordinates.
- Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, hyperbolic paraboloid using cartesian coordinates.

Mapping of COs to Modules

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Lab Course: MADE202L: DIFFERENTIAL EQUATIONS

(2 Credits – 30 hours) (L-T-P: 0-0-2)

Objective(s)

This course provides an in-depth understanding to the students for inbuilt software tools and how to use them for Plotting of solution family of first, second and third order differential equations; and applications of different mathematical models along with their solutions.

Course/Learning Outcomes

At the end of this course students will be able to:

CO 1: Classify Initial Value Problems (IVPs) and Boundary Value Problems (BVPs) and representing them through graphical representation. (Understanding).
CO 2: Apply software tools to solve nth order ODEs (Applying).
CO 3: Analyse accuracy of analytical solution by software tools. (Analysing)
CO 4: Evaluate solution of curve and verifying them graphically using software tools. (Evaluating)

LIST OF PRACTICALS (USING ANY SOFTWARE)

- Plotting of second order solution family of differential equation.
- Plotting of third order solution family of differential equation.
- Growth model (exponential case only).
- Decay model (exponential case only).
- Lake pollution model (with constant/seasonal flow and pollution concentration).
- Case of single cold pill and a course of cold pills.
- Limited growth of population (with and without harvesting).
- Predatory-prey model (basic volterra model, with density dependence, effect of DDT, two prey one predator).
- Epidemic model of influenza (basic epidemic model, contagious for life, disease with carriers).
- Battle model (basic battle model, jungle warfare, long range weapons).

Mapping of COs to Modules

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Lab Course: MAPS302L: PDE AND SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS
(2 Credits – 30 Hours)(L-T-P: 0-0-2)

Objective(s)
This course provides solution by using software in solving Cauchy problem for first order PDE, and different Initial Boundary Value problems, finding the characteristics for the first order PDE, Plotting the integral surfaces of a given first order PDE with initial data.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Classifying various initial value and boundary value points and representing them through graphical representation. (Understanding)
CO 2: Apply software tools to solve higher order ODEs and PDEs. (Applying).
CO 3: Analyse complex differential equations using the software tools. (Analysing)
CO 4: Evaluate complex functions within a short span of time. (Evaluating)

LIST OF PRACTICALS (USING ANY SOFTWARE)
- Solution of Cauchy problem for first order PDE.
- Finding the characteristics for the first order PDE.
- Plot the integral surfaces of a given first order PDE with initial data.
- Solution of wave equation $u_{tt} - c^2 u_{xx} = 0$ for the following associated conditions
  a) $u(x,0) = \phi(x)$, $u_t(x,0) = \psi(x)$, $x \in \mathbb{R}$, $t > 0$
  b) $u(x,0) = \phi(x)$, $u_t(x,0) = \psi(x)$, $u(0,t) = 0$, $x \in (0,\infty)$, $t > 0$
  c) $u(x,0) = \phi(x)$, $u_t(x,0) = \psi(x)$, $u_x(0,t) = 0$, $x \in (0,\infty)$, $t > 0$
  d) $u(x,0) = \phi(x)$, $u_t(x,0) = \psi(x)$, $u(0,t) = 0$, $u(l,t) = 0$, $0 < x < l$, $t > 0$

Mapping of COs to Modules

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MINOR COURSES

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MAEC103T: ELEMENTARY CALCULUS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The objective of the course is to present the fundamental notions of derivatives, higher order derivatives, partial derivatives, indefinite and definite integrals and their applications in solving various problems like Curve tracing, Indeterminate form, reduction formulae, area of surface of revolution, volume, arch length and sketching of conics etc.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the concept of derivatives up to higher order and their applications. (Understanding).
CO 2: Evaluate indefinite and definite integrals. (Evaluating).
CO 3: Make use of integrations to determine areas and volumes. (Applying).

Module I: (15 hours)
Derivatives, higher order derivatives, successive differentiation and Leibnitz’s rule and its applications; Mean value Theorem, Taylor’s Theorem, tangents and normal, concavity and inflection points, curvature, L’ Hospital’s rule.

Module II: (18 hours)
Partial differentiations, partial derivative as a slope, partial derivative as a rate, higher order partial derivatives (two and three variables), Euler’s theorem on homogeneous functions. Maxima, minima and saddle points; Method of Lagrange multipliers; Jacobians.

Module III: (15 hours)
Standard methods of integration, integration of irrational function, reduction formulae, derivations and illustrations of the type.

Module IV: (12 hours)
Applications of Integrals: Area of plane curves, volume and surface area of solids of revolution, parametrization of a curve, arc length of parametric curves.

Suggested Readings
MAEA104T: ELEMENTS OF ALGEBRA
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The goal of this course is to introduce the fundamentals of algebra and the fundamental characteristics of matrices, as well as their use in various physical situations. Additionally, this course provides a comprehensive method for numerically resolving various types of problems that arise in their field of study.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate complex numbers and their various expansions. (Understanding).
CO 2: Develop reduced echelon form, rank of matrices and solve systems of linear equations. (Applying).
CO 3: Categories the fundamental concepts of groups, rings and vector space. (Analysing).

Module I: (12 hours)
Polar representation of complex numbers, nth roots of unity, De Moivre’s theorem for rational indices and its applications; expansion of \( \cos x \), \( \sin x \) and \( \tan x \) in positive integral powers of \( x \), exponential and trigonometric function of a complex variable, Euler’s expansion for cosine and sine; Gregory’s Series; Hyperbolic functions.

Module II: (18 hours)
Matrices, elementary matrices, row reduction and echelon forms, rank of matrix, linear independence, inverse of matrix, system of linear equations, the matrix equation \( Ax=b \), solution sets of linear systems, applications of linear systems, characteristic equation of a matrix. Eigen values, Eigen Vectors, Diagonalizing matrices.

Module III: (15 hours)
Binary operations, associative and commutative binary operations; Equivalence relations, Integer modulo \( n \); Groups; elementary properties of groups; subgroups and examples of subgroups, permutation groups, cyclic groups and properties of cyclic groups, cosets, order of groups, Lagrange’s theorem of finite group, normal subgroups, quotient groups, homomorphism and isomorphism of groups.

Module IV: (15 hours)
Rings and subrings, examples and properties; Definition and examples of a vector space, Sub-space and its properties, Linear independence, Basis and dimension of a vector space.

Suggested Readings
2. J. B. Fraleigh, A First Course in Abstract Algebra Pearson.7th Ed.
5. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Burkhouse, 2006.

MAON206T: ODE AND NUMERICAL METHODS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The objective of the course is to introduce the fundamental notions of mathematical models, linear and nonlinear differential equations and their solutions by analytical methods. It also introduces the interpolation and numerical solutions of algebraic and transcendental equations.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Learn basics of differential equations and formulate Differential Equations for various Mathematical models. (Creating).

CO 2: Solve first order non-linear differential equation and linear differential equations of higher order using various techniques. (Evaluating).

CO 3: Develop the different numerical methods to solve a set of ordinary differential equations, interpolation problems, algebraic and transcendental equations. (Applying).

Module I: (12 hours)
Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations.

Module II: (10 hours)
Introduction to compartmental model, exponential decay model, lake pollution model (case study of Lake Burley Griffin), drug assimilation into the blood (case of a single cold pill, case of a course of cold pills), exponential growth of population, limited growth of population, limited growth with harvesting.

Module III: (12 hours)
General solution of homogeneous equation of second order, principle of superposition for homogeneous equation, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler’s equation, method of undetermined coefficients, method of variation of parameters.

Module IV: (16 hours)

Module V: (10 hours)
Numerical differentiation: First and second order derivatives; Numerical integration: Trapezoidal Rule, Simpson’s rule, finding eigenvalues by Iterations.

Suggested Readings
5. Chapra, Steven C. Applied Numerical Methods with MATLAB for Engineers and Scientists -

Mapping of COs to Modules

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MASD207T: STATICS AND DYNAMICS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The objective of the course is to present the basic principles of statics and dynamics and help to develop proficiency in applying these proficiency to formulate and solve different problems of mechanics.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Discuss the fundamental concepts of statics and dynamics. (Understanding).

CO 2: Analyse the equilibrium and motions of particles in different coordinate system (Analysing).

CO 3: Make use of different laws to study planetary orbital motion and forces. (Applying).
Module I: (20 hours)

Module II: (20 hours)
Dynamics. Motion of a particle in two dimensions. Velocities and accelerations in Cartesian, polar, and intrinsic coordinates. Equations of motion referred to a set of rotating axes. Motion of a projectile in a resisting medium. Motion of a particle in a plane under different laws of resistance.

Module III: (20 hours)
Central Forces, Stability of nearly circular orbits. Motion under the, inverse square law. Kepler’s laws. Time of describing an arc and area of any orbit. Slightly disturbed orbits. Motion of artificial satellites. Problems of motion of varying mass such as falling raindrops and rockets. Tangential and normal accelerations. Motion of a particle on a smooth or rough curve. Principle of conservation of energy. Motion of a particle in three dimensions. Motion on a smooth sphere, cone, and on any surface of revolution.

Suggested Readings

Mapping of COs to Modules

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MARC208T: REAL AND COMPLEX ANALYSIS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The course aims at giving the student a fundamental knowledge, tools and methods on the topics of real and complex analysis. The course also aims at giving a deeper theoretical understanding, but even more how the theory may be applied in science and technology.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Summarize the properties of IR, sequence, series and analytic functions. (Understanding).
CO 2: Apply various convergence tests in infinite sequence and series of real numbers. (Applying).
CO 3: Determine power series, residue, integration of complex functions. (Evaluating).

Module I: (15 hours)

Module II: (15 hours)
Sequence and Series: Sequences, theorems on limit of sequences, Cauchy’s convergence criterion, infinite series, series of nonnegative terms, Absolute convergence, tests for convergence, comparison test, Cauchy’s root Test, ratio Test, Rabbe’s, Logarithmic test, De Morgan’s Test, Alternating series, Leibnitz’s theorem.

Module III: (15 Hours)
Analytic Functions: Properties of complex numbers, regions in the complex plane Functions of complex variable, Mappings; Mappings by the exponential function, Limits, Theorems on limits, Limits involving the point at infinity, Continuity, Derivatives, Differentiation formulae, Cauchy-Riemann equations, Sufficient conditions for differentiability; Analytic functions and their examples.

Module IV: (15 hours)
Cauchy’s Theorems: Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula, Consequences of Cauchy integral formula, Liouville’s theorem and the fundamental
theorem of algebra, Residues.

Suggested Readings

Mapping of COs to Modules

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MAGT209T: GRAPH THEORY
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The goal of the course is to elucidate the basic concept of graph theory and how to model for many common problems using the theory of graphs. It also discusses the various algorithms that can be used to find the best solution to some practical problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate the types and properties various graphs and digraphs. (Understanding).
CO 2: Categorize different types of graphs based on their properties. (Analysing).
CO 3: Deduct results associated to simple graphs, trees, blocks, planar graphs and colourability of graphs. (Evaluating).
CO 4: Discuss various algorithms to solve problems of minimal spanning tree, travelling salesman problem, shortest path problem. (Creating).

Module I: (15 Hours)
Graph: Types of Graphs, Subgraphs, walk, paths, cycles, intersection graphs, Degrees, Degree sequences, Partition, operations on graphs, Isomorphism, Cut Vertices, Cut Edges and Blocks. Trees, Spanning trees, cycle space, cocycle spaces, Kruskal’s and Prim’s algorithm for minimal spanning tree.

Module II: (15 Hours)
Eulerian graph and its Characterization, Hamiltonian graphs and its characterization, Necessary and sufficient conditions for a graph to be Hamiltonian. Connectivity, connectivity parameters, Menger’s theorem. Factorization; Basic concepts, 1-factorization, 2-factorization. Matching and covers.

Module III: (15 Hours)

Module IV: (15 Hours)
Weighted graph, Travelling salesman problem, shortest path problem, Dijkstra’s algorithm, Floyd-Warshall algorithm, Bellman-Ford algorithm.

Suggested Readings
1. Harary, Graph theory, Narosa Publishing House, Delhi, 1969.

Mapping of COs to Modules

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MAVC308T: VECTOR CALCULUS AND CO-ORDINATE GEOMETRY  
(4 Credits – 60 hours) [L-T-P: 4-0-0]

Objective(s)  
This course is meant to give students in-depth knowledge of co-ordinates geometry, general equation of second degree and the conditions for representing a pair of straight lines, general conics and their properties. Moreover, the course also introduces vector valued functions along with applications.

Course/Learning Outcomes  
At the end of this course students will be able to:
CO 1: Summarize the various concepts of transformation of coordinate system and second-degree equation and properties. (Understanding).
CO 2: Apply various methods related to vector calculus for determining arc length, surface area, volume. (Applying).
CO 3: Solve practical problems using Green’s theorem and Stoke’s theorem. (Creating).

Module I: (20 hours)  
Transformation of co-ordinate axes. Pair of straight lines. General equation of second degree and the conditions for representing a pair of straight lines, a parabola, an ellipse, a hyperbola and a circle.

Module II: (20 Hours)  
General conics: tangent, condition of tangency, pole and polar, centre of a conic, equation of pair of tangents, reduction to standard forms, central conics, equation of the axes, and length of the axes, polar equation of a conic, tangent and normal and properties.

Module III: (10 hours)  
Scalar triple product, vector triple product; Introduction to vector functions, operations with vector valued functions, limits and continuity of vector functions, differentiation and integration of vector functions; partial derivatives of vector point function.

Module IV: (10 hours)  
Differential operator-Del, Gradient, Divergence and Curl. Line, Surface and volume integrals, Simple applications of Gauss divergence theorem, Green’s theorem and Stokes theorem (without proof).

Suggested Readings  

Mapping of COs to Modules

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MALP309T: LINEAR PROGRAMMING AND APPLICATIONS  
(4 Credits – 60 hours) [L-T-P: 4-0-0]

Objective(s)  
To get familiarize with the mathematical formulation of the real-world problems, theoretical and graphical solution of the LPP and applications of various forms of LPP.

Course/Learning Outcomes  
At the end of this course students will be able to:
CO 1: Explain the concept of convex set and extreme points. (Understanding).
CO 2: Apply the concept of LPP to game problems. (Understanding).
CO 3: Analyse the primal and dual problems, and sensitivity analysis of LPP. (Analysing).
CO 4: Formulate an optimization problem from its physical consideration to Linear programming problem. (Analysing).

Module I: (15 hours)
The Linear Programming Problem: Standard, Canonical and matrix forms, Graphical solution. Hyperplanes, Extreme points, Convex and polyhedral sets. Basic solutions; Basic Feasible Solutions; Reduction of any feasible solution to a basic feasible solution; Correspondence between basic feasible solutions and extreme points.

Module II: (15 hours)
Introduction to linear programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison.

Module III: (12 hours)
Duality, Formulation of Dual problem; Primal-Dual relationships; economic interpretation of the dual.

Module IV: (18 hours)
Transportation Problem: Basic concept and Mathematical formulation of transportation problem; Methods of finding initial basic feasible solutions; North West corner rule. Least cost method; Vogel’s Approximation method; Algorithm for solving Transportation Problem; Assignment Problem: Mathematical formulation and Hungarian method of solving.

Game Theory: Basic concept, Formulation of two-person zero-sum games, Games with mixed strategies, Linear Programming method of solving a game.

Suggested Readings

Mapping of COs to Modules

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MABI310T: BIO- MATHEMATICS

(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course aims to provide a fruitful introduction to the Mathematical and computational topics appropriate for the understanding of biological processes. The course extends the range of usage of mathematical models in biology, ecology and evolution.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: How to put the relationship of different parameters, and then their physical interpretation. (Remembering).
CO 2: For a given mathematical problem, classify the problems based on solution procedure and then study their significance in the practical fields. (Analysing).
CO 3: Derive the solution of a problem by using the existed methods and interpret the results. (Creating).
CO 4: Evaluate the mathematical and biological system solution procedure and analyse the results. (Evaluating).
CO 5: Develop the new solution methods for the new problems and models. (Creating).

Module I: (15 hours)
Module II: (11 hours)

Module III: (12 hours)

Module IV: (12 hours)
Dynamics of Infectious Diseases: Historical Aside on epidemics, Simple Epidemic Models and Practical Applications, Modelling the Population Dynamics of Acquired Immunity to Parasite Infection, Age-Dependent Epidemic Model and Threshold Criterion, Simple Drug Use Epidemic Model and Threshold Analysis.

Module V: (12 hours)

Suggesting Readings
6. https://nptel.ac.in/courses/111/107/111107113/

Mapping of COs to Modules

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MAFE311T: FINITE ELEMENT METHODS
(4 Credits-60 hours) (L-T-P:4-0-0)

Objective(s)
The goal of this course is to let the students understand finite element models for different ordinary and partial differential equations. Also by using these models, the students will be able to approximate the solutions of real life problems.

COURSE OUTCOME
CO 1: Illustrate the role and significance of shape functions in finite element formulations and its interpolation. (Understanding)
CO 2: Develop the ability to generate the governing finite elements governed by ordinary differential equations. (Applying)
CO 3: Analyse finite element method in higher order problems. (Analysing)

Module I: (25 hours)
Introduction to finite element methods, comparison with finite difference methods, Methods of weighted residuals, collocations, least squares and Galerkin’s method. Variational formulation of boundary value problems equivalence of Galerkin and Ritz methods.

Module II: (20 hours)
Applications to solving simple problems of ordinary differential equations. Linear, quadratic and higher order elements in one dimensional and assembly, solution of assembled system.

Module III: (25 hours)
Simplex elements in two and three dimensions, quadratic triangular elements, rectangular elements, serendipity elements and
isoperimetric elements and their assembly, discretization with curved boundaries.

**Module IV: (20 hours)**
Interpolation functions, numerical integration, and modelling considerations. Solution of two-dimensional partial differential equations under different Geometric conditions.

**Suggested Readings**

**Mapping of COs to Modules**

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**MAEL312T: METRIC SPACES AND LINEAR ALGEBRA**
(4 Credits – 60 hours) (L-T-P: 4-0-0)

**Objective(s)**

*This course introduces basic properties of metric spaces and linear algebra up to finite dimensions.*

**Course/Learning Outcomes**
At the end of this course students will be able to:
- CO 1: Demonstrate basic concepts of metric spaces. (Understanding).
- CO 2: Formulate linear transformations, matrix representation, rank, nullity. (Creating).
- CO 3: Elaborate the concept of finite dimensional vector space. (Evaluate).

**Module I: (20 hours)**

**Module II: (20 hours)**
Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

**Module III: (20 hours)**
Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

**Suggested Readings**

**Mapping of COs to Modules**

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MAAF313T: ELEMENTARY FUZZY MATHEMATICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
This course provides an understanding of the basic mathematical elements of the theory of fuzzy sets. It provides also an emphasis on the differences and similarities between fuzzy sets and classical sets theories. The main objective of this course is to establish thorough background knowledge on evolutionary algorithms and enable the students to pursue individual research in solving real world optimization problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Apply fuzzy set theory in modelling and analysing uncertainty in a decision problem (Applying).
CO 2: Classify the difference between the classical logic and fuzzy logic (Understanding).
CO 3: Analyse and examine the difference between the crisp set and fuzzy set concepts. (Analysing).
CO 4: Determine fuzzy set theory and uncertainty concepts (Evaluating).

Module I: (12+6hours)
Internal arithmetic, Definition of fuzzy sets, α-level sets, convex fuzzy sets, Basic operations on fuzzy sets, types of fuzzy sets, t-norms and t-conorms, Fuzzy numbers, arithmetic with fuzzy numbers

Module II (10+2hours)
Basic properties of fuzzy relations, fuzzy relations, properties of the Min-Max compositions, fuzzy equivalence relations, fuzzy function on fuzzy sets.

Module III (12+4hours)
Possibility Theory: Fuzzy measures, evidence theory, necessity measure, probability measure, possibility theory and fuzzy sets, fuzzy event, probability of fuzzy event.

Module IV: (12+3hours)
An overview of classical logic, multivalued logics, Linguistic variables, Linguistic modifiers, truth, and propositions of fuzzy logic, fuzzy quantifies, fuzzy implications.

Suggested Readings

Mapping of COs to Modules

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MAMC314T: MECHANICS
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
The course aims to provide the students with a solid conceptual and mathematical understanding of particle leading to various dynamical problems, conservative force fields and related areas. It also equips them with problem solving skills for further studies in applied sciences.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define basic mechanical concepts related to force and equilibrium of systems. (Remembering).
CO 2: Illustrate the laws and relation between discrete and continuous mechanical systems. (Understanding).
CO 3: Describe planar and spatial motion of a rigid body. (Remembering).
CO 4: Analyse the motion of a system of particles using conservation laws. (Analysing).

Module I: (20 hours)
Moment of a force about a point and an axis, couple and couple moment, Moment of a couple about a line, resultant of a force system, distributed force system, free body diagram, free body involving interior sections, general equations of equilibrium, two-point equivalent loading, problems arising from structures, static indeterminacy.
Module II: (20 hours)
Laws of Coulomb friction, application to simple and complex surface contact friction problems, transmission of power through belts, screw jack, wedge, first moment of an area and the centroid, other centres, Theorem of Pappus-Guldinus, second moments and the product of area of a plane area, transfer theorems, relation between second moments and products of area, polar moment of area, principal axes.

Module III: (20 hours)
Conservative force field, conservation for mechanical energy, work energy equation, kinetic energy and work kinetic energy expression based on centre of mass, moment of momentum equation for a single particle and a system of particles, translation and rotation of rigid bodies, Chasles’ theorem, general relationship between time derivatives of a vector for different references, relationship between velocities of a particle for different references, acceleration of particle for different references.

Suggested Readings
3. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.

Mapping of COs to Modules

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MADG315T: DIFFERENTIAL GEOMETRY
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s)
This course presents the students the principles, concepts and techniques of differential geometry, enabling them analyse and understand the geometrical structures to solve many real-life problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall various properties of space curves and their applications. (Remembering).
CO 2: Interpret geometrical orientation of parametric curves and surfaces. (Understanding).
CO 3: Develop the physical mapping and nature of geodesic curves. (Applying).
CO 4: Analyse the different characteristics of Christoffel symbols and their transformation. (Analysing).

Module I: (12 hours)

Module II: (15 hours)

Module III: (18 hours)

Module IV: (15 hours)
Tensors: Summation convention and indicial notation, Coordinate transformation and Jacobian, Contra-variant and Covariant vectors, Tensors of different type, Algebra of tensors and contraction, Metric tensor and 3-index Christoffel symbols, Parallel propagation of vectors, Covariant and intrinsic derivatives.

Suggested Readings
Mapping of COs to Modules

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MABA404T: BOOLEAN ALGEBRA
(3 Credits – 45 Hours) (L-T-P: 3-0-0)

Objective(s)
The primary objective of this course is to discuss the posets, lattices and their construction and properties. It also provides the solid background of Boolean algebra and its applications in various circuits.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain partial ordered sets and demonstrate their properties. (Understanding).
CO 2: Apply partially ordered sets in developing lattices. (Applying).
CO 3: Develop switching circuits utilizing Boolean algebra. (Creating).

Module I: (15 hours)
Definition with basic examples of partially ordered sets, maps between ordered sets, duality principle, maximal and minimal principles, construction and de-construction of ordered sets.

Module II: (15 hours)
Lattices as partially ordered sets and properties, complete lattices, lattices as algebraic structures, sublattices, products and homomorphisms, properties of modular and distributive lattices.

Module III: (15 hours)
Boolean algebra, Boolean polynomials, ideals, filters and equations, minimal forms of Boolean polynomials, Quinn-McCluskey method, Karnaugh diagrams, switching circuits and their applications.

Suggested Readings

Mapping of COs to Modules

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MAIG405T: INTRODUCTION TO GAME THEORY
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
Throughout the course, students will be expected to demonstrate their understanding of Game Theory by being able to do each of the following:
1. Understand the novel concept of a “game” and translate it into wide range of conflicts
2. Analyze and evaluate conflict dynamics and integrate increasing analytical skills into increasingly complex conflicts.
3. Review theoretical predictions obtained from Game Theory analyses against real world conflicts, formulate strategic alternatives which take into account the actions of others by identifying it and solve the games using various techniques.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define basics of game theory, concepts of players, strategies, payoff etc. (Remembering)
CO 2: Illustrate different types of game strategies. (Understanding)
CO 3: Make use of different methods to solve games and recommend which strategy to be implemented. (Applying)
CO 4: Determine the methods of solutions for real-life problem. (Evaluating)

Module I (8 hours)
Basics of game theory, Types of games, zero-sum games, non-zero-sum game, Simultaneous games, Sequential games, Prisoners Dilemma, Other Interesting two person games, Ultimate Game, Public Good Game, Theory of rational choice, Interacting decision makers, Solution of Game by Simplex method.

Module II (10 hours)

Module III (12 hours)
Strategic games with randomization, Mixed strategy Nash equilibrium: concept and examples, Correlated equilibrium, Expected Payoffs, Mixed Strategy Equilibrium, Dominated Actions, Formation of Players' beliefs, Information and Bayesian Games: examples, Bayesian game applications, Juries and Information Aggregation, Auctions with Private Information.

Module IV (15 hours)
Definitions, Subgame perfect equilibrium, the ultimatum game and the holdup game, Stackelberg's model of duopoly, buying vote, Extensive Games with Perfect Information: Extensions and Discussion, Coalitional Games and the Core, examples, Bayesian Games, Spence Signaling Game, Crawford and Sobel Cheap Talk Game.

Suggested Readings

Mapping of COs to Modules

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MARM406T: RESEARCH METHODOLOGY FOR MATHEMATICAL SCIENCES
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s)
This course aims to introduce the idea of research in mathematics, which includes importance, literature surveys, identification of problems and proper execution. It also aims to give proper ideas of writing research reports, articles etc and select appropriate journals for publications.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Learn and understand some basic concepts of research and its methodologies. (Remembering).
CO 2: Compare different results and identify appropriate research topics with the help of literature review. (Understanding).
CO 3: Select and define appropriate research problem and parameters. (Applying).
CO 4: Organize and conduct research (advanced project) in a more appropriate manner. (Evaluating).
CO 5: Design and write a research proposal, research report and thesis. (Creating).

Module I: (10 hours)
Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, literature survey of a research topic, Importance of knowing how Research is done, Research Process, Criteria of good Research, Problems encountered by Researchers in India.
Defining the Research problem: Selecting the Problem, Necessity of Defining the Problem, Techniques involved in defining a problem.

Module II: (12 hours)

Module III: (8 hours)

Suggested Readings:

Mapping of COs to Modules

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MADS407T: DISCRETE MATHEMATICS
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The goal of this course is to introduce the student to the fundamentals of discrete mathematics and probability theory, which have uses in computer science and the improvement of logical thought. Algebraic structures, combinatorial mathematics, and graph theory are introduced to students through discrete mathematics. To give the students a foundation for many fundamental computer-related concepts, the necessary abstract mathematical material must be addressed and explained in the context of computer science.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the concepts of various types of relations, partial ordering and lattices. (Understanding)
CO 2: Develop the concept of logic in mathematics. (Applying)
CO 3: Interpret problems using recurrence relations and recursion to analyse algorithms and programs. (Analysing)
CO 4: Apply knowledge of graph theory in real life problems. (Applying)

Module I: (10 hours)
Sets, set operations; Set identities, Generalized union and intersections. Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations, binary relations. Hasse and lattice diagrams for posets;

Module II: (12 hours)

Module III: (10 hours)
Combinatorics: Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of generating functions, solution of recurrence relation using generating functions, solution of combinatorial problem using generating functions).

Module IV: (13 hours)
Introduction to graphs, representation of graphs, graph isomorphisms, subgraphs, directed and undirected graphs; Eulerian paths and circuits; Hamiltonian paths and circuits; Trees, shortest path problem, Matrices of graph.

Suggested Readings

Mapping of COs to Modules

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MACT408T: CODING THEORY

(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
This course introduces the basic aspects of coding theory by introducing the linear and nonlinear error correcting codes. Also, the coding theory problem is discussed with the help of minimum distance and Hamming weight in the form of bounds.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Determine minimum distance and weight, error probability. (Evaluating).
CO 2: Classify linear and nonlinear codes, construct error-correcting codes. (Analysing).
CO 3: Develop special codes like Hamming, Golay, MDS, perfect, Reed-Muller etc. (Creating).
CO 4: Apply the main coding theory problem to estimate Hamming, Gilbert-Varshamov-Sacks bound etc. (Applying).

Module I: (10 hours)
Communication channels and transition error probabilities, block codes, maximum likelihood decoding, Hamming distance and weight, nearest neighborhood decoding.

Module II: (12 hours)
Types of codes (linear and nonlinear), generator matrix, encoding and decoding, standard array, equivalence of linear codes, dual codes, parity check matrix.

Module III: (12 hours)
Encoding in linear codes, syndrome decoding in linear codes, Hamming codes, extended Hamming codes, decoding of Hamming codes, Golay codes (binary and ternary).

Module IV: (11 hours)
The main coding theory problem, bounds (Hamming, Gilbert-Varshamov-Sacks, Singleton, Plotkin, Griesmer), perfect codes, MDS codes, Reed-Muller codes, some practical examples of codes.

Suggested Readings

Mapping of COs to Modules

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MAIC409T: INTRODUCTION TO CRYPTOGRAPHY

(3 Credits – 45 Hours) (L-T-P: 3-0-0)

Objective(s)
The objective of this course is to familiarise the student with the fields of cryptography and cryptanalysis. The purpose of this course is to equip students with a practical understanding of the mathematics used in cryptology.
Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate different schemes of symmetric and asymmetric key cryptography. (Understanding).
CO 2: Identify the importance of modular arithmetic, modulo operator and algebraic structures in cryptography. (Applying).
CO 3: Examine some primality test algorithms and their efficiencies. (Analysing).

Module I: (15 hours)

Module II: (15 hours)
Block cipher Principles, Shannon theory of diffusion and confusion, Data encryption standard (DES), AES. Fermat’s Little Theorem, Euler’s theorem, Polynomial Arithmetic, Introduction to finite field of the form GF(p) and GF(2n). Introduction to Public Key Cryptosystem: Diffie-Hellman Key Exchange, Knapsack Cryptosystem, RSA Cryptosystem, El Gamal Cryptosystem.

Module III: (15 hours)
Primality Testing: Probabilities Primality testing, Miller-Rabin Primality testing algorithm; Computing the Order of an element and generating primitive roots (and elements of a certain order); Discrete Logarithms. Digital signature, El Gamal Digital Signature algorithm. Introduction to Elliptic curves cryptography.

Suggested Readings

Mapping of COs to Modules

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SKILL ENHANCEMENT COURSES

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MAPC105T: PROGRAMMING IN C (2-0-1)
(2 Credits – 30 hours) (L-T-P: 2-0-1)

Objective(s)
This aims to develop the analytical skills of the students for creative problem-solving using computers. It also discusses the basic concepts of algorithms and programs and enables the students to develop solutions for common problems by familiarizing them with the syntax of C language and teach him/her to translate pseudo-code into C programs, understanding the steps involves in the execution of a C program, make the student well conversant with managing functions, array structures and files in C.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Interpret the concepts of C language’s syntax. (Understanding).
CO 2: Choose the loops and the decision-making statements to solve various problems (Applying).
CO 3: Implement standard algorithms and translate pseudo-codes into C programs (Applying).
CO 4: Apply their analytical skills for choosing the right data structure, function, data types and develop logic to solve various instances of problems. (Analyzing).

Module I: Introduction to Algorithms and Programming Languages (8 hours)
Introduction to structured programming and problem-solving methods: Algorithms, key features of algorithms, flowcharts, pseudocode, generation of programming languages, structured programming languages. Overview of C: Introduction to C, basic structure of a C program, compiling and executing C programs, comments, characteristics of a good program, character set, identifiers, keywords, data types, constants and variables, I/O statements, operators and expressions, precedence and associativity of operators, type conversion and typecasting.

Module II: Decision Control Statements, Loops and Functions (8 hours)
Decision Control Statements and Loops: Introduction to decision control statements, conditional branching statements, goto statements, while loop, do-while loop, for loop, nested loops, break and continue statements Functions: Need for functions, function declaration and definition, user defined and library functions, passing parameters to function, return statement, scope of variables, storage classes, recursive functions.

Module III: Arrays (7 hours)
Arrays: One-dimensional arrays, passing array to function, multidimensional arrays and their applications, character arrays, dynamic memory allocation. Some algorithms and programs on theory of matrices and numbers like Sieve method for primality test, generation of twin primes, solution of congruence using complete residue system, addition, subtraction and multiplication of matrices, transpose, and determinant.

Module IV: Structures, Files (7 hours)
Structures and Unions: Declaration of structures and simple implementation of structures, unions, enumerated data types. Files: Introduction to files, file managements-open, close, input/output operations, command line arguments.

Suggested Readings
4. Gottfried Byron S., Programming with C (Schaum’s outlines series), Tata Mcgraw Hill publishing company limited, New Delhi.

Mapping of COs to Modules

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MALS106T: LOGIC AND SETS
(Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The objective of this course is to acquaint a student with connectives, quantifiers, and the foundations of logic, to teach students about the various approaches to mathematical proof, including direct, indirect, and the method of contradiction and various operations involving sets and collections, equivalence relations, equivalence classes, and the use of these concepts in a variety of other problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Relate Mathematical statement into the language of logic. (Remembering).
CO 2: Explain the notion of logic and set which is fundamental in every branch of science. (Understanding).
CO 3: Use the methodologies of sets and logic in problems arising in other branches of Mathematics. (Applying).
CO 4: Examine validity of a given statements by means of principles of logic. (Analysing).

Module I: (15 hours)
Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contrapositive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables.

Module II: (15 hours)

Module III: (15 hours)
Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set, Composition of relations, Types of relations, Partitions. Equivalence Relations with example of congruence modulo relation, Partial ordering relations, binary relations.

Suggested Readings
2. Halmos P.R., Naive Set Theory, Springer.

MAIP107T: INTRODUCTION TO PYTHON
(3 Credits – 45 hours) (L-T-P: 2-0-1)

Objective(s)
The course provides an introduction to programming language using PYTHON. The course aims to cover programming syntax and constructs that are necessary for programming in PYTHON.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Demonstrate the basic principles of computers, binary computation, programming basics (operations, control structures, data types, etc.), in Python. (Understanding).
CO 2: Readily use the Python programming language and apply various data types and control structure (Applying).
CO 3: Apply the concepts of modularization and classes, file handling and regexising packages. (Analysing).
CO 4: Apply the concept of object-oriented program design and development, and begin to implement code (Creating).

Module I: (5 hours)
Introduction: Relationship between computers and programs, Basic principles of computers, File systems, Using the Python...
Section 1: Introduction to Binary Computation

- **Module I: (8 hours)**
  - Data types and control structures: Operators (unary, arithmetic, etc.), Data types, variables, expressions, and statements, Assignment statements, Strings and string operations, Control Structures: loops and decision

- **Module II: (5 hours)**

- **Module III: (7 hours)**
  - Exceptions and data structures: Data Structures (array, List, Dictionary), Error processing, Exception Raising and Handling

- **Module IV: (5 hours)**
  - Object oriented design: Programming types, Object Oriented Programming, Object Oriented Design, Inheritance and Polymorphism

**Suggested Readings**

**Mapping of COs to Modules**

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MALM210T: LaTeX FOR MATHEMATICS
(2 Credits – 30 hours) (L-T-P: 2-0-1)

**Objective(s)**
The objective of this course is to familiarize the text writing and editing tool used for Scientific research using LaTeX to the students.

**Course/Learning Outcomes**
At the end of this course students will be able to:
- **CO 1:** Recall different tools and steps required to write any documents in LaTeX. (Remembering).
- **CO 2:** Use various package and command required for compiling documents in LaTeX. (Understanding).
- **CO 3:** Interpret errors in editing any file in Latex. (Evaluating).
- **CO 4:** Develop research articles and presentations in LaTeX. (Creating).

**Module I: (15 Hours)**
Installation of LaTeX software and introduction to different offline and online LaTeX editing software, Class and Packages, Commands, Errors, Document class, page style, table of contents, Fonts, symbols, indenting, paragraphs, line spacing, word spacing, titles and subtitles, environments, declarations, comments within text.

**Module II: (15 Hours)**
Mathematical environments, math mode, mathematical symbols, Graphic package, multivalued functions, drawing matrices Tables, tables with captions, References to figures and tables in text, Drawing with LaTeX, picture environments other drawing packages.

**Module III: (15 Hours)**
Preparing research article, book, project report in LaTeX. Preparing Beamer presentation in LaTeX.

**Suggested Readings:**

**Mapping of COs to Modules**

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</table>
INTERNET:

Objectives:
1. To produce students with practical experience in problem-solving and working.
2. To facilitate the students' smooth transition from the Institute to the practical world.
3. To improve the students' employability.
4. To encourage Industry Institute interaction and to impart practical exposure to the students.

INTERNSHIP: GUIDELINES
1. Request Letter/ Email from the Department via Registrar office should go to organization/ institutions/ industries to take interns for 4-6 weeks.
2. Organization/ institutions/ industries will confirm the training slots and the number of seats allocated for interns via Confirmation Letter/ Email.
   In case the students arrange the training themselves the confirmation letter will be submitted by the students to the Department.
3. Students on joining Training at the concerned organization/ institutions/ industries, submit the Joining Report/Letters / Email.
4. Students will submit their progress report to the department in every week through Report/ Email.
5. Students will submit Training Report and Completion Certificate obtained from the organization/ institutions/ industries.
6. Students will give a presentation on their learning outcome in presence of the faculty members and the students.
7. List of students who have completed their internship successfully will be notified by the Department.

Requirement:
Students willing to exit the course after completing the first/second year are required to go for 4-6 weeks compulsory internship programme to receive their Certificate/Diploma.

RESEARCH PROJECT /DISSERTATION

BSC MATHEMATICS (Honours)

<table>
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BSC CHEMISTRY (Honours) with Research

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BSC MATHEMATICS (Honours)

MADI410P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)
MADI411P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)

BSC CHEMISTRY (Honours) with Research

MADI412P: DISSERTATION I
(18 Credits -540 Hours) (L-T-P: 0-0-36)

MADI413P: DISSERTATION II
(20 Credits -600 Hours) (L-T-P: 0-0-40)
DEPARTMENT OF PHYSICS

PROGRAMME: BACHELOR OF SCIENCE in PHYSICS (BSC)

DEGREE: BSC PHYSICS (HONOURS)/ BSC PHYSICS (HONOURS) WITH RESEARCH

VISION
To endow the students with profound understanding of physics, the foundation for all natural sciences, and drive them towards critical thought for further study and research, to pave the way for suitable career opportunities and enable them to be of service to the society as responsible human beings.

MISSION
To strengthen the fundamental concepts of physics, to provide advanced understanding of physical phenomena by emphasizing on the correlation between theory and observation, and to spark creative interest towards the pursuit of innovative research in fundamental and applied physics.

FOUR YEAR UNDERGRADUATE PROGRAMME IN PHYSICS (HONOURS/HONOURS WITH RESEARCH)

Programme Outcomes:
PO 1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more other disciplines that form a part of an undergraduate programme of study.
PO 2: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO 3: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one’s views and express herself/ himself; demonstrate the ability to listen carefully; and present complex information in a clear and concise manner to different groups.
PO 4: Social Interaction: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO 5: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 6: Moral and Ethical Awareness: Ability to embrace moral/ ethical values in conducting one’s life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO 7: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 8: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes. Critical sensibility to life experiences, with self-awareness and reflexivity of both individual and society.
PO 9: Information and Digital Literacy: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO 10: Research–related skills: A sense of inquiry and capability for asking relevant/ appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause- and- effect relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Ability to apply one’s learning to real life situations.

Programme Specific Outcomes:
PSO 1: Understand the core theoretical concept of physics: Understand the core theoretical principles of physics.
PSO 2: Acquire analytical and logical skill for higher Education: Acquire the ability to analyse critical problems logically.
PSO 3: Excel in experimental physics and learn good laboratory practices and safety: Learn to handle experiments perfectly and safely.
PSO 4: Trained to take up jobs in allied fields: Use the knowledge of physics to seek opportunities in other allied fields.

Mapping of Courses with POs/PSOs:
### Major Courses

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### Minor Courses

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### Skill Enhancement Courses

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DEPARTMENT OF PHYSICS

DETAILED SYLLABUS
MAJOR COURSES

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PSMC100T: MECHANICS

(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)

The objective of this course is to provide students with a comprehensive understanding of the fundamental principles and laws that govern the motion of objects and systems. Through theoretical concepts and practical applications, this course aims to develop students’ problem-solving skills, analytical thinking, and mathematical reasoning in the context of classical mechanics.

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Explain the concepts of Newtonian Mechanics. (Remembering)
CO 2: Explain the concepts of work, energy and forces. (Understanding)
CO 3: Explain the concepts of rotational and periodic motions. (Understanding)
CO 4: Analyze the concepts of Special Theory of relativity. (Analysis)

Module I: Fundamentals of Dynamics (10 hours)


Module II: Rotational Dynamics and Elasticity (8 hours)

Angular momentum of a particle and system of particles, Torque, Principle of conservation of angular momentum, Rotation about a fixed axis, Moment of Inertia, Calculation of moment of inertia for rectangular, cylindrical and spherical bodies, Kinetic energy of rotation, Motion involving both translation and rotation, Relation between Elastic constants, Twisting torque on a Cylinder or Wire.

Module III: Fluid Motion, Gravitation and Central Force Motion (8 hours)

Module IV: Oscillations and Non-Inertial Systems (9 hours)
SHM: Simple Harmonic Oscillations, Differential equation of SHM and its solution, Kinetic energy, potential energy, total energy and their time-average values, Damped oscillation, Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor, Non-inertial frames and fictitious forces, Uniformly rotating frame, Laws of Physics in rotating coordinate systems, Centrifugal force, Coriolis force and its applications, Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

Module V: Special Theory of Relativity (10 hours)

Suggested Readings
6. Introduction to Special Relativity, R. Resnick, John Wiley and Sons.

Mapping of COs to Syllabus

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PSMC101L: MECHANICS LABORATORY
(1 Credits – 30 hours) {L-T-P: 0-0-1}

Objective(s)
The objective of this course is to provide students with hands-on experience in conducting experiments related to classical mechanics. Through practical activities, analysis, and interpretation, this course aims to enhance students’ understanding of theoretical concepts and develop their skills in experimental techniques.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Measure distances and angles accurately. (Application)
CO 2: Measure various properties of solid matters. (Application)
CO 3: Measure acceleration due to gravity by different techniques. (Application)

At least 10 Experiments to be performed from the following:
1. Measurements of length (or diameter) using Vernier caliper, screw gauge and traveling microscope.
2. Study the random error in observations.
3. Study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
4. Determine the Moment of Inertia of a Flywheel.
6. Determine the Young’s Modulus of a Wire by Optical Lever Method.
7. Determine the Modulus of Rigidity of a Wire by Maxwell’s needle.
8. Determine the elastic Constants of a wire by Searle’s method.
9. Determine the value of \( g \) using Bar Pendulum.
10. Determine the value of \( g \) using Kater’s Pendulum.

Mapping of COs to the syllabus

<table>
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<th>Course Outcomes</th>
<th>Expt. 1</th>
<th>Expt. 2</th>
<th>Expt. 3</th>
<th>Expt. 4</th>
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PSMP102T: INTRODUCTION TO MODERN PHYSICS

(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of the course is to provide students with a comprehensive understanding of the fundamental principles and concepts that form the basis of modern physics. The students will develop a strong foundation in the theoretical aspects of quantum mechanics, enabling them to analyze and explain the behavior of matter and energy at the atomic and subatomic levels. They will also learn about lasers.

Course / Learning Outcomes
CO 1: Demonstrate an elementary knowledge of quantum mechanics. (Understanding)
CO 2: Explain the physics of an atomic nucleus. (Understanding)
CO 3: Summarize the basic principles of LASER. (Understanding)

Module I: Fundamentals of Quantum Mechanics-I (22 hours)
Planck’s quantum, Planck’s constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle-application to virtual particles and range of an interaction.

Module II: Fundamentals of Quantum Mechanics–II (14 hours)
Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

Module III: Nuclear Physics (16 hours)
Size and structure of atomic nucleus, Impossibility of an electron being in the nucleus, Nature of nuclear force, N-Z graph, Semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. Radioactivity, Law of radioactive decay, Mean life and half-life, Alpha decay, Beta decay, Gamma ray emission Fission and fusion, Nuclear reactor: slow neutrons interacting with Uranium 235; Thermonuclear reactions(brief qualitative discussions).

Module IV: Laser (8 hours)

Suggested Readings
3. Introduction to Quantum Mechanics, David J. Griffith, Pearson Education.

Mapping of COs to Syllabus

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**PSMA200T: MATHEMATICAL PHYSICS**  
(4 Credits – 60 hours) (L-T-P: 3-1-0)

**Objective(s)**  
The main objectives of a course on Mathematical Physics are to provide students with a solid foundation in mathematical methods and techniques that are essential for understanding and solving problems in theoretical physics.

**Course / Learning Outcomes**  
At the end of this course students will be able to:

- **CO 1:** Apply the concepts and theorems of vectors to different branches of Physics (Applying)
- **CO 2:** Solve physical problems using the concepts of differential equation and complex analysis. (Applying)
- **CO 3:** Apply the concepts of Beta function, Dirac delta function and curvilinear coordinates. (Applying)

**Module I: Vector Calculus (15 hours)**

**Module II: Differential Equation (15 hours)**

**Module III: Complex Analysis (15 hours)**

**Module IV: Some Special topics in MP (15 hours)**
Beta and Gamma Functions and Relation between them, Expression of Integrals in terms of Gamma Functions. Orthogonal Curvilinear Coordinates, Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. Definition of Dirac delta function, Properties of Dirac delta function.

**Suggested Readings**
6. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley India.

**Mapping of COs to Syllabus**

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PSEM201T: ELECTRICITY AND MAGNETISM
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The objective of the course is to teach the students about the fundamental concepts concerning electric field, magnetic field, electro-magnetic effects and electrical circuits.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Summarize the fundamental concepts of electric field, electric potential, capacitors and polarization. (Remember)
CO 2: Explain the concept of magnetic field, types of different magnetic materials and its associated phenomena. (Understand)
CO 3: Outline the laws governing electromagnetic induction and electrical circuits (Understand)

Module I: Electric Field and its related phenomena (15 hours)

Module II: Magnetic Field (15 hours)

Module III: Electromagnetic Induction and Electrical Circuits (15 hours)

Suggested Readings
2. Electricity and Magnetism, Edward M. Purcell, McGraw-Hill Education.
3. Introduction to Electrodynamics, D. J. Griffiths, Benjamin Cummings.
4. Feynman Hours, R. P. Feynman, R. B. Leighton and M. Sands, Pearson Education.

Mapping of COs to Syllabus

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PSET303L: ELECTRICITY AND MAGNETISM LABORATORY
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of this course is to provide students with hands-on experience in conducting experiments related to electricity and magnetism. Through practical activities, analysis, and interpretation, this course aims to enhance students’ understanding of theoretical concepts and develop their skills in experimental techniques.
Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Measure various parameters of electrical devices, circuits and apparatus. (Evaluating)
CO 2: Measure fields using electrical apparatus. (Evaluating)
CO 3: Demonstrate the validity of various network theorems in practical applications. (Understanding)
CO 4: Utilize the concept of induction to study various AC circuits. (Applying)

At least 5 experiments to be performed from the following:
1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. Study the characteristics of a series RC Circuit.
4. Determine an unknown Low Resistance using Carey Foster ’s Bridge.
5. Compare capacitances using De’Sauty ’s bridge.
6. Measurement of field strength $B$ and its variation in a solenoid (determine $dB/dx$)
7. Verify the Thevenin and Norton theorems.
8. Verify the Superposition, and Maximum power transfer theorems.
10. Study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor $Q$, and (d) Band width.

Mapping of COs to the syllabus

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PSTP203T: THERMAL PHYSICS AND STATISTICAL MECHANICS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The objective of the course is to provide students with a comprehensive understanding of the principles and concepts that govern the behavior of systems in equilibrium and non-equilibrium states. This course aims to equip students with the necessary tools and knowledge to analyze and explain the macroscopic properties of matter, as well as to understand the statistical behavior of particles at the microscopic level.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Summarize the various thermodynamical processes. (Understanding)
CO 2: Apply the kinetic theory of gases to different transport phenomena. (Applying)
CO 3: Summarize the various laws governing blackbody radiation. (Understanding)
CO 4: Combine the concepts of thermodynamics and statistical mechanics. (Creating)

Module I: Laws of Thermodynamics (20 hours)

Module II: Thermodynamical Potentials (15 hours)
Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell’s relations and applications - Joule-Thompson Effect, Clausius Clapeyron Equation, Expression for $(C_p - C_v)$, $C_p/C_v$, $TdS$ equations.

Module III: Kinetic Theory of Gases (15 hours)
Derivation of Maxwell’s law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

Module IV: Theory of Radiation (15 hours)

Module V: Statistical Mechanics (10 hours)
Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann distribution, Quantum statistics- Fermi-Dirac and Bose-Einstein distributions.

Suggested Readings

Mapping of COs to Syllabus

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PSQM204T: QUANTUM MECHANICS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The objective of the course is to make students aware of the basic concepts of quantum mechanics such as the state and behavior of a particle moving in space and time that is described by a complex wave function. Through the basic formulation in quantum mechanics, the students will be able to understand different phenomena in nature and recent technologies based on quantum mechanical effects.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Interpret the significance of the Schrödinger wave equation. (Understanding)
CO 2: Solve problems involving bound states in arbitrary potential. (Applying)
CO 3: Examine the quantum behaviour of the one-electron system and many-electron systems. (Analysing)

Module I: Time-Dependent and Independent Schrödinger Equation (26 hours)

Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time-independent Schrodinger equation; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wavefunction; Position-momentum uncertainty principle with proof.

Module II: Bound States in an Arbitrary Potential (17 hours)
Continuity of wave function, boundary condition and the emergence of discrete energy levels, application to the one-dimensional problem, infinite and finite rectangular potential well, potential barrier and quantum mechanical tunnelling. Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle.

Module III: Three-dimensional problems (15 hours)
Three-dimensional problems: Separation of variables; orbital angular momentum; spherical harmonics. Harmonic oscillator in Cartesian and polar coordinates. A free particle and a particle in a 3-D box in Cartesian and polar coordinates, Coulomb problem in spherical and parabolic coordinates - regular and irregular solutions.

Module IV: Quantum Theory of One-Electron and Many-Electron Systems (17 hours)
Hydrogen atom, angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum, quantum numbers l and m; s, p, d,.. shells. Spin-Orbit Interaction, Identical Particles, Ground State Energy of He atom. Elementary Idea of Hartree’s Field. Elementary idea of Heisenberg’s picture of quantum mechanics.

**Suggested Readings**
2. Quantum Mechanics, Robert Eisberg and Robert Resnick, Wiley.
4. Quantum Mechanics, G. Aruldhas, PHI Learning of India.
5. Quantum Mechanics, Bruce Cameron Reed, Jones and Bartlett Learning.
8. Quantum Mechanics, Eugen Merzbacher, John Wiley and Sons, Inc.
9. Introduction to Quantum Mechanics, D. J. Griffith, Pearson Education.
10. Quantum Mechanics, Walter Greiner, Springer.

**Mapping of COs to Syllabus**

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**PSEN205T: ELECTRONIC CIRCUITS, NETWORKS AND DEVICES**

(3 Credits – 45 hours) (L-T-P: 3-0-0)

**Objective(s)**
The objective of this course is to introduce the laws that govern the response of electrical circuits and networks, the various passive and active components used in these circuits. The course focuses on solving simple electrical networks using associated theorems and principles. The objective is also to learn the basic properties and principles of basic semiconductor materials, semiconductor junctions, electronic devices and electronic circuit design. The course will also help in understanding the operation of simple devices such as p-n junctions and optoelectronic devices and more complex devices such as Bipolar Junction Transistors (BJT) through theory and practice.

**Course / Learning Outcomes**
At the end of this course students will be able to:
- CO 1: Describe passive components and DC networks and electronic devices. (Remembering)
- CO 2: Discuss the principles of operation of analog and digital electronic devices. (Understanding)
- CO 3: Analysis of devices for solving simple mathematical problems. (Application, Analysis)

**Module I: Passive Components and DC Networks (15 hours)**
- a) Passive components: resistors, capacitors and inductors-types, characteristics and applications;
- b) DC networks: voltage and current sources, dependent sources, KCL, KVL, current division rule, voltage division rule, Y-Delta conversion, mesh analysis, node analysis, Thevenin’s theorem, Norton’s theorem, superposition theorem, maximum power transform theorem.

**Module II: Electronic Devices and Circuits (20 hours)**
- a) Semiconductor concepts: Semiconductor material basics, intrinsic semiconductor, extrinsic semiconductor, energy levels, concept of hole and electron, mobility, conductivity, n-type and p-type, majority and minority carriers, mechanism of current flow.
- b) Semiconductor diode: PN junction and various biasing conditions, V-I characteristics, diode equation, diode resistance, equivalent circuit, transition capacitance and diffusion capacitance; rectifier circuit with filter, clipper, clamper, voltage multiplier.
- c) Bipolar Junction Transistor: BJT: construction, npn, pnp, operation and configuration, V-I characteristics.
- d) Special purpose devices: Zener diodes, LED, Solar Cell, photo diode, photo transistor, Schottky diode, varactor diode, tunnel diode.

**Module III: Fundamentals of Digital Circuits (10 hours)**
Number systems: Definition, type and interconversion, Boolean algebra, De-Morgan’s law, AND, OR, NOT, Universal gates, combinational logic circuits.
Suggested Readings
3. Electronic Devices and Circuits, David A. Bell, Oxford University Press.
4. Digital electronics, Moris Mano, EEE.

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PSEN206L: ELECTRONIC CIRCUITS, NETWORKS AND DEVICES LAB
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of this course is to provide students with hands-on experience and practical skills in designing and analyzing electronic circuits and devices in order to complement the theoretical knowledge gained in related coursework.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Analyze electronic devices and tools used in the lab for various applications. (Analysing)
CO 2: Construct and evaluate electronic circuits using different devices and components to perform certain operations. (Creating)

At least 10 Experiments to be performed from the following:
1. Introduction to electronic lab components.
2. Introduction to electronic lab tools and equipment.
3. Verification of KCL using discrete components.
4. Verification of KVL using discrete components.
5. Study the Characteristics of PN junction Diodes.
6. Study the Characteristics of Zener Diodes.
7. Design half wave rectifier using diode and evaluate ripple factor with and without filter.
8. Design full wave rectifier using diodes and evaluate ripple factor with and without filter.
9. Design and study the clipper circuit.
10. Design and study the clamper circuit.
11. Design various multiplier circuits using diodes and capacitors.
12. Study Static Characteristics of a Bipolar Junction Transistor (CE Mode)
13. Study Static Characteristics of a Bipolar Junction Transistor (CB Mode)
14. Study the Characteristics of Light Emitting Diodes Diodes.

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PSCM300T: CONDENSED MATTER PHYSICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of the course is to provide the students to deal with the solid state of matter and its various physical properties. It is also required to pursue studies on specialised topic like electronics, nano-sciences, etc. Emphasis shall be laid upon the solution of numerical problems.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain crystal structure and the concepts of lattice vibrations (Understanding)
CO 2: Illustrate the dielectric and magnetic behavior of matter (Applying)
CO 3: Construct band theory and explain superconductivity (Applying)
Module I: Crystal Structure and Lattice Dynamics (17 hours)

Module II: Magnetic and Dielectric Properties of Matter (18 hours)

Module III: Ferroelectric Properties of Materials (10 hours)
Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop.

Module IV: Elementary Band Theory and Superconductivity (15 hours)

Suggested Readings
1. Charles Kittel, Introduction to Solid State Physics, Wiley India Pvt. Ltd.
2. J. P. Srivastava, Elements of Solid State Physics, Prentice-Hall of India

Mapping of COs to Syllabus:

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PSCM301L: CONDENSED MATTER PHYSICS LABORATORY
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of the course is to demonstrate experiments related to basic properties of solid state materials. Also it is aimed to explain few basic experiments related to semiconductors.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Learn about magnetic properties of matter. (Understanding)
CO 2: Analyse dielectric properties of materials. (Applying)
CO 3: Understand and analyse few topics related to semiconductor physics. (Analysing)

At least 5 experiments should be performed from the following:
1. Measurement of susceptibility of paramagnetic solution (Quinck’s Tube Method).
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency.
5. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
6. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150°C) and to determine its band gap.

7. To determine the Hall coefficient of a semiconductor sample.

Mapping of COs to the syllabus

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PSET302T: ELECTROMAGNETIC THEORY
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to provide students with a comprehensive understanding of the fundamental principles and laws governing electricity and magnetism. Through theoretical concepts, mathematical formalism, and practical applications, this course aims to develop students' knowledge and skills in analysing electromagnetic phenomena.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Apply Maxwell’s equations in solving problems related to various physical phenomena. (Applying)

CO 2: Explain physical phenomena involving electric charges and currents from the standpoint of electromagnetic theory. (Understanding)

CO 3: Analyze the behavior of physical systems using electromagnetic theory. (Analyzing)

Module I: Maxwell Equations (15 hours)

Module II: EM Wave Propagation in Unbounded Media (15 hours)
Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere.

Module III: EM Wave in Bounded Media (15 hours)

Module IV: Polarization of Electromagnetic Waves (15 hours)

Suggested Readings
1. Introduction to Electrodynamics, D. J. Griffiths, Benjamin Cummings.
DEPARTMENT OF PHYSICS

Mapping of COs to Syllabus

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PSET303L: ELECTROMAGNETIC THEORY LABORATORY
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of this course is to complement theoretical knowledge with practical skills, providing students with a deeper understanding of electromagnetic principles through hands-on experimentation. It encourages students to think critically, analyse data, and draw conclusions based on evidence specific to electromagnetism. The course also fosters skills in teamwork, communication, and laboratory safety awareness relevant to the field of electromagnetism.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: To Know about the physics of polarization of electromagnetic waves. (Understanding)
CO 2: To build a clear concept of wave properties of electromagnetic waves and its application to various systems / media. (Understanding and Applying)
CO 3: Analyze the physics of radiation. (Analyzing)

At least 8 experiments should be performed from the following
1. To verify the law of Malus for plane polarized light.
2. To determine the specific rotation of the sugar solution using Polarimeter.
3. To analyze elliptically polarized Light by using a Babinet’s compensator.
4. To study dependence of radiation on angle for a simple Dipole antenna.
5. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating.
6. To study the reflection, refraction of microwaves.
7. To study Polarization and double slit interference in microwaves.
8. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
9. To verify the Stefan’s law of radiation and to determine Stefan’s constant.
10. To determine the Boltzmann constant using V-I characteristics of PN junction diode.

Mapping of COs to the syllabus

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PSSD304T: SEMICONDUCTOR DEVICES
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The objective of this course is to provide basic analog electronic circuit design techniques and analytical skills using diodes, op-amps, FETs and BJTs. This course also introduces the concepts of digital and binary systems and how these concepts are connected to digital electronics. It also provides fundamental concepts used in the design of digital systems, the basic tools for the design and implementation of digital circuits, modules and subsystems through and practice.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Illustrate theoretical concepts related to analog electronics circuit analysis and digital electronics circuit design. (Understanding)
CO 2: Analyze transistors for optimum performance as amplifiers using load line, frequency response and feedback. (Analysing)
CO 3: Apply transistor operational knowledge for high gain operations and various logical and mathematical operations. (Applying)
CO 4: Design simple analog electronic circuits and digital electronic systems for various outcomes. (Applying)
Module I: Bipolar Junction Transistor (18 hours)

a. BJT biasing and stabilization: Load Line analysis of Transistors. DC Load line and Q-point and stability considerations, fixed bias, emitter feedback bias, collector feedback bias, voltage divider bias.

b. BJT modelling: Two port representation of BJT with h-parameter model for BJT for C-E, C-B, C-C configurations, calculation of voltage gain, current gain, input impedance and output impedance.

c. Frequency response of BJT amplifiers: Frequency response, Low frequency and high frequency response of BJT amplifiers, importance of coupling capacitors and bypass capacitors, cascading of amplifiers.

d. Feedback amplifiers: Concept of negative and positive feedback, impact of negative feedback, concept of sinusoidal and non-sinusoidal oscillators, 555 timers.

e. Operational Amplifier: Block diagram, ideal op-amp equivalent circuit, ideal characteristics, transfer curve, open loop and closed loop configuration, Common mode rejection ratio; Op-amp applications: inverting amplifier, non-inverting amplifier, adder, subtractor.

Module II: Field Effect Transistors (15 hours)

a. Introduction: Introduction to FET- JFET, MOSFET and CMOS; structure, operation, characteristic curves and equations.

b. FET biasing: Different biasing methods; self-bias, fixed bias, voltage divider bias, stabilization of Q-point.

c. JFET amplifiers: CS, CD amplifiers; enhancement mode MOSFET amplifier, depletion mode MOSFET amplifiers.

Module III: Digital Circuits (12 hours)

a. Number systems: Signed and unsigned representation, binary arithmetic on signed and unsigned integers and detection of overflow and underflow, weighted binary Codes: BCD, 2421, non- weighted codes: excess-3 codes, gray codes, error detecting codes, error correcting codes: ASCII code, EBCDIC codes.

b. Boolean algebra and Logic Gates: Logic gates (basic and universal), rules of Boolean algebra, sum of products and product of sums forms. Conversion between different forms, conversion between Boolean expression and truth table; implementing logic expressions with logic gates (logic circuits).

c. Combinational logic circuits: Simplification of Boolean expressions using algebraic method, Karnaugh map method and Don’t Care conditions. Designing Combinational logic circuits: half-adder, full-adder, encoder, decoder, Multiplexer, demultiplexer.

d. Digital logic families: Elementary idea of DTL, TTL, RTL, ECL, I2L logic family and characteristics.

Suggested Readings:
1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Lewis Nashelsky, Pearson Education.
5. Electronic Devices and Circuits, David A. Bell, Prentice Hall of India.
6. Op-amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI.
7. Digital Logic and computer Design, M. Mano, PHI.
8. Modern Digital Electronics, R. P. Jain, TMGH.

Mapping of COs to Syllabus:

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PSSD305L: SEMICONDUCTOR DEVICES LAB

(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of this course is to provide students with hands-on experience and practical skills in designing and analyzing electronic circuits and devices in order to complement the theoretical knowledge gained in related coursework.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Design and evaluate electronic circuits using different devices and components to perform certain operations. (Creating)

CO 2: Design and evaluate electronic circuits using electronic simulation software to perform certain operations. (Creating)

At least 10 Experiments to be performed from the following:

1. Design a CE amplifier using voltage divider biasing and find its Voltage Gain.
2. Design a CE amplifier using voltage divider biasing and plot and understand its frequency response curve.
3. Design Inverting amplifier using op-amp and calculate gain.
4. Design Non Inverting amplifier using op-amp and calculate gain.
5. Design a summing amplifier circuit using op-amp.
7. Design zero crossing detector and positive and negative comparators using op-amp.
8. Design 1st order low pass filters using op-amp.
10. Design 1st order high pass filters using op-amp.
11. Design 2nd order high pass filters using op-amp.
15. Use electronic simulation software like Multisim to design and simulate simple circuits

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PSQM306T: ADVANCED QUANTUM MECHANICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The main objectives of an advanced quantum mechanics course are to understand the Mathematical Framework, mastering the Principles of Quantum Mechanics, developing Analytical and Critical Thinking, connecting Quantum Mechanics to Applications etc. Good knowledge of advanced quantum mechanics course can serve as a stepping stone for students interested in pursuing research or further studies in quantum mechanics.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain different representations and postulates of quantum mechanics (Understanding)
CO 2: Discuss orbital and spin angular momentum (Understanding)
CO 3: Illustrate the concepts of perturbation and scattering theory (Applying)
CO 4: Develop concepts on relativistic quantum mechanics (Applying)

Module I: Representations, Postulates and Symmetries (10 hours)

Module II: Angular Momentum and Spinors (15 hours)

Module III: Perturbation Theory (12 hours)
Variational methods for bound states; lower and upper limits in simple cases. WKB approximation; Stationary perturbation theory: Non Degenerate case; first and second order of energy and wave functions, Time dependent perturbation theory; first order transition probabilities; constant perturbation. Transition to continuum; Harmonic perturbation; Fermi’s golden rule; Sudden and adiabatic approximations.

Module IV: Scattering Theory (10 hours)
Scattering theory: asymptotic behaviour of scattering wave function; relation to cross sections, Green’s function for scattering problem; Green’s function with different boundary conditions; scattering integral equations; Born approximation and its validity criteria; scattering by screened Coulomb potential; Born series. Partial waves and phase shifts. Scattering amplitude; optical theorem; low energy scattering. Effective range; scattering length; resonance.
Module V: Relativistic Quantum Mechanics (13 hours)

Suggested Readings
1. Quantum Mechanics, E. Merzbacher, John Wiley.
2. Quantum Mechanics, G. Ahruldas, Prentice Hall.
3. Quantum Mechanics, L. I. Schiff, McGraw Hill.
6. Principles of Non-Relativistics and Relativistic Quantum Mechanics, K. D. Krori, PHI.
8. Quantum Mechanics, Albert Messiah, Dover Publications.

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PSNP307T: ATOMIC AND NUCLEAR PHYSICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of the course is to provide students with an advanced understanding of the principles and theories that govern atomic and nuclear phenomena. Through theoretical concepts, experimental techniques, and mathematical formalism, this course aims to develop students’ knowledge and skills in analyzing the structure, properties, and interactions of atoms and nuclei.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain atomic spectra for single electron systems and many-electron system in details. (Understanding)
CO 2: Understand interaction of radiation with atoms. (Understanding)
CO 3: Understand the basic properties of nuclei, their reactions and different models to explain nuclear structure. (Understanding)
CO 4: Explain the phenomena of radioactive decays of different nuclei. (Analyzing)

Module I: (12 hours)

Module II: (14 hours)

Module III: General Properties of Nuclei (10 hours)
 Constituents of nucleus and their intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, NZ plot, angular momentum, parity, magnetic moment, electric moments, nuclear excited states.

Module IV: Nuclear Models (12 hours)
Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

Module V: Radioactivity Decay and Nuclear Reactions (12 hours)
Alpha decay: basics of α-decay processes, theory of α-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. β-decay: energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis. Gamma decay: Gamma rays emission & kinematics, internal conversion.
Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction.

Suggested Readings
1. Introduction to Atomic Spectra, H. E. White, Mc-Graw Hill.
3. Introductory nuclear Physics, Kenneth S. Krane, Wiley India Pvt. Ltd.
8. Quarks and Leptons, F. Halzen and A. D. Martin, Wiley India.

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PSCM308T: CLASSICAL MECHANICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to provide the basic knowledge of classical mechanics in terms of Lagrangian and Hamiltonian instead of Newtonian mechanics. Here the students will learn how to construct Lagrangian and Hamiltonian for a system and hence to obtain equation of motion. The course will also provide deep insights on relativistic mechanics and let the students learn the required mathematical tools and prepare them for higher studies. Emphasis shall be laid upon solving numerical problems.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Construct Lagrangian and Hamiltonian for different physical systems (Apply)
CO 2: Explain small oscillations (Understanding)
CO 3: Solve problems related to special theory of relativity (Analyzing)
CO 4: Apply the laws of fluid dynamics to build technologies (Applying)

Module I: Classical Mechanics of Point Particles (20 hours)
Review of Newtonian Mechanics, Generalized coordinates and velocities, constraints and degrees of freedom, Hamilton's variational principle; Lagrangian and the Euler-Lagrange equations, one-dimensional examples of the Euler-Lagrange equations-one-dimensional Simple Harmonic Oscillations and falling body in uniform gravity; Cyclic coordinates and conservation theorems, Canonical momenta & Hamiltonian, Hamilton's equations of motion, Applications: Hamiltonian for a harmonic oscillator, particle in a central force field- conservation of angular momentum and energy.

Module II: Small Amplitude Oscillations (10 hours)
Minima of potential energy and points of stable equilibrium, expansion of the potential energy around a minimum, small amplitude oscillations about the minimum, normal modes of oscillations example of N identical masses connected in a linear fashion to (N-1) - identical springs.
Module III: Special Theory of Relativity (20 hours)

Module IV: Fluid Dynamics (10 hours)
Density and pressure in a fluid, an element of fluid and its velocity, continuity equation and mass conservation, stream-lined motion, laminar flow, Poiseuille’s equation for flow of a liquid through a pipe, Navier-Stokes equation, qualitative description of turbulence, Reynolds number.

Suggested Readings
1. H. Goldstein, C. P. Poole and J. L. Safko, Classical Mechanics, Pearson Education.

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PSED400T: ELECTRODYNAMICS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The main objective of electrodynamics is to provide a comprehensive understanding of the behavior of electric and magnetic fields, as well as their interactions with charged particles and currents. It is a branch of physics that explores the fundamental principles and mathematical formalism underlying electromagnetic phenomena. Overall, the main objective of electrodynamics is to provide a comprehensive understanding of electromagnetic phenomena, enabling students to analyze and solve problems related to electric and magnetic fields and their interactions with matter.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Outline the origin and propagation of electromagnetic waves. (Understanding)
CO 2: Explain the nature of electromagnetic radiation. (Understanding)
CO 3: Infer the extension of classical electrodynamics to the generalized 4-dimensional case. (Analyzing)
CO 4: Apply the laws of electrodynamics to solve various physical problems. (Applying)

Module I: Introduction (16 hours)
Revision of Maxwell’s Equations; Electromagnetic waves: linear and circular polarisation; Stoke’s parameters; Poynting theorem of complex field vectors; frequency dispersion (normal and anomalous); characteristics of dielectrics, conductors and plasma and their interaction with electromagnetic waves.

Module II: Green’s Function and Radiating systems (25 hours)
a) Simple radiating systems: Gauge invariance; Green’s function for the wave equation; concept of retarded potential, radiation from an oscillating dipole and its polarisation. Electric dipole fields, magnetic dipole and electric quadrupole fields; centre fed linear antenna, scattering at long wavelengths – viz. by dipoles induced in a small scatterer, scattering by a small dielectric sphere.
b) Diffraction: Scalar diffraction theory; vectorial diffraction theory, Scattering in a short wavelength limit.
c) Guided waves: waveguides, TE waves in a rectangular waveguide, coaxial transmission lines.

Module III: Radiation by an accelerated Charge (17 hours)
Radiation from accelerated charge: Lienard-Wiechart potentials; radiated power from accelerated charge at low velocities. Larmor’s power formula. The fields of a point charge in arbitrary and uniform motion. Radiation from an ultra-relativistic particle. Angular and frequency distribution of radiation from moving charges.
Module IV: Covariant Form of Maxwell's Equations and Relativity (17 hours)
Special theory of relativity: Four dimensional Lorentz transformation, covariance of Maxwell's equations, electromagnetic field tensor; matrix representation of Lorentz transformation; infinitesimal generators; Thomas precession; invariance of electric charge; covariance of electrodynamics; transformation of electromagnetic fields.

Suggested Readings
4. Introduction to Electrodynamics, D. J. Griffiths, Prentice Hall of India.

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PSPP401T: PARTICLE PHYSICS AND ACCELERATORS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The main objectives of a course on Particle Physics and Accelerators are to provide students with a comprehensive understanding of the fundamental particles and their interactions, as well as the technology and principles behind particle accelerators. By accomplishing these objectives, the course on Particle Physics and Accelerators aims to equip students with a solid foundation in the field, enabling them to pursue further studies or careers in particle physics, accelerator science, or related disciplines.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explore different concepts of Linear and Cyclic accelerators (understanding)
CO 2: Explain superconductivity and its application in accelerators (understanding)
CO 3: Learn the basics of particle physics (understanding)

Module I: Introductions to Accelerators (15 hours)
Introduction to DC accelerators, Cockcroft-Walton, Van de Graaff, Tandem, Pelletron accelerators. Ion sources, high voltage generation, voltage stabilization, Charging systems (capacitive and inductive), Magnets, insulating gases and their characteristics.
Control systems, beam handling components, Focussing systems, interlocks, Voltage / Energy calibration, beam optics.

Module II: Introduction to LINACs (15 hours)
Introduction and basic principles of LINACs. Relativistic expressions. Propagation of electromagnetic waves through matter (relevant to LINACs only), boundary conditions, phase velocity, group velocity, wave equation. Generation of modes in a cavity/waveguide.
Application to the different types of LINACs including traveling and standing wave types. Transit time factor and the energy gained in a LINAC. General ideas of surface resistance, power loss, Quality factor, shunt impedance in cavities; Normal conducting LINAC structures.

Module III: Superconductivity in accelerators (10 hours)
Superconductivity in accelerators, advantages of Superconducting cavities, breakdown mechanisms in Superconducting cavities, Superconducting accelerating cavities

Module IV: Dynamics at LINACs (20 hours)
Longitudinal dynamics in LINACs: Longitudinal stability, stability criteria, separatrix, synchronous oscillation with small and large amplitudes. FD, FFDD focusing, Stability criteria, phase advance and stability in LINACs; Space charge effects in high intensity beams. Cyclotrons. Synchrocyclotron. AVF principle and concept of hills and valleys in magnetic field. Different applications of cyclotrons.
Equation of motion in magnetic field and concept of focusing, Weak and strong focusing, Quadrupole magnets, Principle of AG focusing, Edge focusing; particle acceleration , Proton storage ring; Basic concept of space charge and tune shift. Fixed target collision and colliding beams. Luminosity and circular colliders

Module V: Introduction to Particle Physics (15 hours)
Elementary Particle Physics: Fundamental forces, Elementary particles and their classification, characteristics of the elementary particles, quantum numbers, behaviour under charge conjugation, time reversal and parity operation, Isotopic multiplet and Gellmann-Nishijima scheme, SU (3) classification and Quark model, Standard model.

Suggested Readings
5. An Introduction to the Physics of Particle Accelerators - second edition (World Scientific 2008), Mario Conte and William M. MacKay
8. Principles of Charged Particle Acceleration – Stanley Humphries
9. Helmut Wiedemann, “Particle Accelerator Physics”, Springer

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PSSM402T: STATISTICAL MECHANICS

(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The objective of the course is to teach the students about the connection between statistical mechanics and thermodynamics, quantum statistical mechanics, phase transitions and non-equilibrium physics.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate the connection between statistical mechanics and thermodynamics. (Analyzing)
CO 2: Explain the concept of quantum statistical mechanics. (Understanding)
CO 3: Outline the physics of phase transition. (Understanding)
CO 4: Explain the importance of non-equilibrium physics. (Understanding)

Module I: Essentials (20 hours)
Probability theory: the random walk problem, binomial, Poisson and Gaussian distributions, central limit theorem; Classical equilibrium statistical mechanics: concept of equilibrium; Ergodic hypothesis; microcanonical, canonical and grand canonical Ensembles; partition functions and their relation to thermodynamics; Classical non-equilibrium statistical mechanics: approach to equilibrium, Liouville’s theorem, Boltzmann’s H theorem

Module II: Quantum Statistics (20 hours)
Quantum statistical mechanics: Schrödinger and Heisenberg Picture; pure and mixed states, the density matrix, quantum mechanical Liouville’s theorem; the fundamental postulates; Quantum statistics: quantum gases of independent particles; partition functions; Bose Einstein and Fermi Dirac’s distributions; electrons in metals; black body radiation; Bose Einstein’s Condensation

Module III: Phase Transitions (18 hours)
Phenomenology: first and second order phase transitions; elementary ideas of critical phenomena; universality of critical exponents; scaling of thermodynamic functions; Theory: the Landau theory of phase transition with examples. c) Exact solutions: Ising model in one dimension.

Module IV: Non Equilibrium Phenomena and Irreversible Processes (17 hours)
Non equilibrium phenomena: transport theory; Boltzmann equation; Maxwell-Boltzmann distribution; Irreversible processes: fluctuations; Brownian motion; Langevin’s equation; Wiener Khintchine relations, Nyquist theorem, Fluctuation-Dissipation theorem; Fokker Planck equation.
Suggested Readings
1. Fundamental of Statistical and Thermal Physics, Federick Reif, McGraw Hill, Singapore.

Mapping of COs to Syllabus

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PSAM403T: ADVANCED MATHEMATICAL PHYSICS
(5 Credits – 75 hours) (L-T-P: 4-1-0)

Objective(s)
The main objectives of a course on Advanced Mathematical Physics are to provide students with a deeper understanding of the mathematical methods and techniques used in theoretical physics and to develop their ability to apply advanced mathematical concepts to solve problems in physics.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the concepts and applications of the Fourier series, Laplace and Integral transformation and special functions (Applying)
CO 2: Illustrate some of the basic concepts of tensor analysis and its application to different branches of physics. (Understanding, Applying)
CO 3: Analyse some of the basic concepts of group theory and its application to different branches of physics. (Understanding, Applying)

Module I: Fourier Series (10 hours)

Module II: Integrals and Laplace Transforms (20 hours)
Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of 1st and 2nd order Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT.

Module III: Frobenius Method and Special Functions (15 hours)

Module IV: Tensor Calculus (15 hours)
Transformation of coordinates: Galilean and Lorentz transformations. Tangent vectors and gradients, inner and outer products, contraction, symmetric and antisymmetric tensors, metric tensor, covariant and contravariant derivatives. Metric tensor in different curved spaces. Four vectors and physical examples from special relativity and electrodynamics.
Module V: Group Theory (15 hours)
Group axioms, permutation groups ($S_2$ and $S_3$) and symmetry operations of equilateral triangle, multiplication table, subgroup, classes and characters, finite groups ($Z_n$), cosets, factor group, normal subgroup, point symmetry group, direct and semi direct product of groups, homomorphism and isomorphism, direct and semi-direct products, block diagonalisation - reducible and irreducible representation, group representation by matrix [unitary representation and conservation laws], Lie groups and algebras [generators, SO(2), SO(3) and SU(2)]; unitary group, special unitary group.

Suggested Readings

Mapping of COs to Syllabus

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## MINOR COURSES

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<td>Semiconductor Devices (3-1-0)</td>
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<td>Physics of Sensors and Actuators (3-0-0)</td>
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**PSAO103T: WAVES: ACOUSTICS AND OPTICS**

(4 Credits – 60 hours) (L-T-P: 3-1-0)

**Objective(s)**

The objective of the course is to provide students with a comprehensive understanding of the fundamental principles and properties of waves, with a specific focus on acoustics and optics. This course aims to equip students with the necessary knowledge and skills to analyze and explain the behavior of waves, both in the context of sound and light, and their applications in various fields.

**Course / Learning Outcomes**

At the end of this course students will be able to:

- CO 1: Make use of the superposition principle in different scenarios. (Applying)
- CO 2: Classify and illustrate different wave motions. (Understanding)
- CO 3: Analyze and interpret the wave nature of light. (Analyzing)

**Module I: Superposition of Harmonic Oscillations (10 hours)**

Simple harmonic motion, Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences. Lissajous Figures.

**Module II: Wave Motion (12 hours)**


**Module III: Standing Waves (8 hours)**


**Module IV: Interference (15 hours)**


**Module V: Diffraction (15 hours)**

Suggested Readings

Mapping of COs to Syllabus

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PSMP102T: Introduction to Modern Physics
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of the course is to provide students with a comprehensive understanding of the fundamental principles and concepts that form the basis of modern physics. The students will develop a strong foundation in the theoretical aspects of quantum mechanics, enabling them to analyze and explain the behavior of matter and energy at the atomic and subatomic levels. They will also learn about lasers.

Course / Learning Outcomes
CO 1: Demonstrate an elementary knowledge of quantum mechanics. (Understanding)
CO 2: Explain the physics of an atomic nucleus. (Understanding)
CO 3: Summarize the basic principles of LASER. (Understanding)

Module I: Fundamentals of Quantum Mechanics-I (22 hours)
Planck’s quantum, Planck’s constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photoelectric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle-application to virtual particles and range of an interaction.

Module II: Fundamentals of Quantum Mechanics-II (14 hours)
Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

Module III: Nuclear Physics (16 hours)
Size and structure of atomic nucleus, Impossibility of an electron being in the nucleus, Nature of nuclear force, N-Z graph, Semiempirical mass formula and binding energy, Nuclear Shell Model and magic numbers. Radioactivity, Law of radioactive decay, Mean life and half-life, Alpha decay, Beta decay, Gamma ray emission. Fission and Fusion, Nuclear reactor: slow neutrons interacting with Uranium 235; Thermonuclear reactions (brief qualitative discussions).

Module IV: Laser (8 hours)

Suggested Readings
3. Introduction to Quantum Mechanics, David J. Griffith, Pearson Education.
PSEM201T: ELECTRICITY AND MAGNETISM
(3 Credits – 45 hours) (L-T-P: 3-0-0)

**Objective(s)**
The objective of the course is to teach the students about the fundamental concepts concerning electric field, magnetic field, electro-magnetic effects and electrical circuits.

**Course / Learning Outcomes**
At the end of this course students will be able to:

- **CO 1:** Summarize the fundamental concepts of electric field, electric potential, capacitors and polarization. (Remember)

- **CO 2:** Explain the concept of magnetic field, types of different magnetic materials and its associated phenomena. (Understand)

- **CO 3:** Outline the laws governing electromagnetic induction and electrical circuits (Understand)

**Module I: Electric Field and its related phenomena (15 hours)**


**Module II: Magnetic Field (15 hours)**

**Module III: Electromagnetic Induction and Electrical Circuits (15 hours)**


**Suggested Readings**
2. Electricity and Magnetism, Edward M. Purcell, McGraw-Hill Education.
3. Introduction to Electrodynamics, D. J. Griffiths, Benjamin Cummings.
4. Feynman Hours, R. P. Feynman, R. B. Leighton and M. Sands, Pearson Education.
PSEM208L: ELECTRICITY AND MAGNETISM LABORATORY  
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s) 
The objective of this course is to provide students with hands-on experience in conducting experiments related to electricity and magnetism. Through practical activities, analysis, and interpretation, this course aims to enhance students’ understanding of theoretical concepts and develop their skills in experimental techniques.

Course / Learning Outcomes 
At the end of this course students will be able to:
CO 1: Measure various parameters of electrical devices, circuits and apparatus. (Evaluating)
CO 2: Measure fields using electrical apparatus. (Evaluating)
CO 3: Demonstrate the validity of various network theorems in practical applications. (Understanding)
CO 4: Utilize the concept of induction to study various AC circuits. (Applying)

At least 5 experiments to be performed from the following:
1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. Study the characteristics of a series RC Circuit.
4. Determine an unknown Low Resistance using Carey Foster’s Bridge.
5. Compare capacitances using De'Sauty ‘s bridge.
6. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
7. Verify the Thevenin and Norton theorems.
8. Verify the Superposition, and Maximum power transfer theorems.
9. Determine self inductance of a coil by Anderson’s bridge.
10. Study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q , and (d) Band width.

Mapping of COs to the syllabus

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PSMP209T: MATHEMATICAL PHYSICS II  
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s) 
The main objectives of a course on Mathematical Physics are to provide students with a solid foundation in mathematical methods and techniques that are essential for understanding and solving problems in theoretical physics.

Course / Learning Outcomes 
At the end of this course students will be able to:
CO 1: Explain the concepts and applications of the Fourier series, Laplace and Integral transformation and special function (Applying)
CO 2: Illustrate some of the basic concepts of tensor analysis and its application to different branches of physics. (Understanding, Applying)
CO 3: Analyse some of the basic concepts of group theory and its application to different branches of physics. (Understanding, Applying)

Module I: Fourier Series (8 hours)

Module II: Integrals and Laplace Transforms (8 hours)
Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of 1st and 2nd order Derivatives and Integrals of Functions, Derivatives and Integrals of LTs.

**Module III: Frobenius Method and Special Functions (18 hours)**

**Module IV: Tensor Calculus (12 hours)**
Transformation of coordinates: Galilean and Lorentz transformations. Tangent vectors and gradients, inner and outer products, contraction, symmetric and antisymmetric tensors, metric tensor, covariant and contravariant derivatives.

**Module V: Introduction to Group Theory (14 hours)**
Group axioms, permutation groups (S2 and S3) and symmetry operations of equilateral triangle, multiplication table, subgroup, classes and characters, finite groups (Zn), cosets, factor group, normal subgroup, point symmetry group, direct and semi direct product of groups, homomorphism and isomorphism, direct and semi-direct products, block diagonalisation - reducible and irreducible representation.

**Suggested Readings**

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**PSAP310T: INTRODUCTION TO ASTROPHYSICS AND PLASMA PHYSICS**
(4 Credits – 60 hours) (L-T-P: 3-1-0)

**Objective(s)**
The objective of this course is to give a basic understanding of Astrophysics and plasma physics. The course dealing with the stellar properties, the solar system and the fundamentals of plasma are important for the basic as well as advanced level studies in these areas. The knowledge of the fourth state of matter, plasma, is also useful in other branches of physics. Emphasis shall be laid upon the solution of numerical problems.

**Course / Learning Outcomes**
At the end of this course students will be able to:
CO 1: Explain the Stellar properties and the solar system (Applying)
CO 2: Explain the fundamentals of cosmology (Understanding)
CO 3: Illustrate the behaviour of a single charged particle in electric and magnetic fields (Applying)
CO 4: Analyse your knowledge of Plasma physics in laboratory (Applying)

**Module I: Stellar properties and the solar system (20 Hours)**
The Sun; properties of photosphere, chromosphere and corona. Solar system’s objects: Nebular hypothesis of the formation of the solar system (introductory idea only); physical properties of the planets- their distances, atmospheres, asteroid belt, meteorites and the comets; Introduction to exoplanets.

**Module II: Fundamentals of Cosmology (13 hours)**
Cosmic distance ladder; standard candles: cepheid variables, type 1a supernovae; cosmic expansion of the universe, Hubble’s law. Concept of hot Big Bang; cosmic microwave background radiation; dark matter (qualitative idea only), oscillating universe theory (qualitative idea only).
Module III: Plasma Single Particle Motion (17 hours)
Role of temperature in occurrence of plasma; definition of plasma: quasineutrality and collective behaviour of plasma; concept of temperature; Debye shielding; criteria for plasma
Single Particle Motion in Uniform electric and magnetic fields; non-uniform magnetic field: \( \text{grad-B drift, curvature drift, magnetic mirrors, the loss cone} \)

Module IV: Laboratory and Space Plasma (10 hours)
Glow discharge plasma; principle of DC, AC and high frequency discharges, RF plasmas, fusion plasma, sun and solar winds, Van Allen belts, the ionosphere, formation of accretion disks.

Suggested Readings
1. An Introduction to Astronomy and Astrophysics, P. Jain, CRC Press.

Mapping of COs to Syllabus:

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PSCM300T: CONDENSED MATTER PHYSICS
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The objective of the course is to quip the students to deal with the solid state of matter and its various physical properties. It is also required to pursue studies on specialized topics like electronics, nano-sciences, etc. Emphasis shall be laid upon the solution of numerical problems.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain crystal structure and the concepts of lattice vibrations (Understanding)
CO 2: Illustrate the dielectric and magnetic behavior of matter (Applying)
CO 3: Construct band theory and explain superconductivity (Applying)

Module I: Crystal Structure and Lattice Dynamics (13 hours)

Module II: Magnetic and Dielectric Properties of Matter (13 hours)

Module III: Ferroelectric Properties of Materials (7 hours)
Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop.
Module IV: Elementary Band Theory and Superconductivity (12 hours)

Suggested Readings
1. Charles Kittel, Introduction to Solid State Physics, Wiley India Pvt. Ltd.
2. J. P. Srivastava, Elements of Solid State Physics, Prentice-Hall of India

Mapping of COs to Syllabus:

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PSCM301L: CONDENSED MATTER PHYSICS LABORATORY
(1 Credits – 30 hours) (L-T-P: 0-0-1)

Objective(s)
The objective of the course is to demonstrate experiments related to basic properties of solid state materials. Also it is aimed to explain few basic experiments related to semiconductors.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Learn about magnetic properties of matter. (Understanding)
CO 2: Analyse dielectric properties of materials. (Applying)
CO 3: Understand and analyse few topics related to semiconductor physics. (Analysing)

At least 5 experiments should be performed from the following:
1. Measurement of susceptibility of paramagnetic solution (Quinck’s Tube Method).
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency.
5. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
6. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150°C) and to determine its band gap.
7. To determine the Hall coefficient of a semiconductor sample.

Mapping of COs to the syllabus

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PSED311T: ELECTRODYNAMICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of the course is to learn how to

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Outline the origin and propagation of electromagnetic waves. (Understanding)
CO 2: Explain the nature of electromagnetic radiation. (Understanding)
CO 3: Infer the extension of classical electrodynamics to the generalized 4-dimensional case. (Analysing)
CO 4: Apply the laws of electrodynamics to solve various physical problems. (Applying)

Module I: Introduction (14 hours)
Revision of Maxwell’s Equations; Electromagnetic waves: linear and circular polarisation; Stoke’s parameters; Poynting theorem of complex field vectors; frequency dispersion (normal and anomalous); characteristics of dielectrics, conductors and plasma and their interaction with electromagnetic waves.

Module II: Green’s Function and Radiating systems (14 hours)
Simple radiating systems: Gauge invariance; Green’s function for the wave equation; concept of retarded potential, radiation from an oscillating dipole and its polarisation. Electric dipole fields, magnetic dipole and electric quadrupole fields; centre fed linear antenna, scattering at long wavelengths – viz. by dipoles induced in a small scatterer, scattering by a small dielectric sphere.

Module III: Radiation by an accelerated Charge (18 hours)
Radiation from accelerated charge: Lienard-Wiechart potentials; radiated power from accelerated charge at low velocities. Larmor’s power formula. The fields of a point charge in arbitrary and uniform motion. Radiation from an ultra relativistic particle. Angular and frequency distribution of radiation from moving charges.

Module IV: Covariant Form of Maxwell’s Equations and Relativity (14 hours)
Special theory of relativity: Four dimensional Lorentz transformation, covariance of Maxwell’s equations, electromagnetic field tensor; matrix representation of Lorentz transformation; infinitesimal generators.

Suggested Readings
8. Introduction to Electrodynamics, D. J. Griffiths, Prentice Hall of India.

Mapping of COs to Syllabus

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PSSD312T: SEMICONDUCTOR DEVICES
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to provide basic analog electronic circuit design techniques and analytical skills using diodes, op-amps, FETs and BJTs. This course also introduces the concepts of digital and binary systems and how these concepts are connected to digital electronics. It also provides fundamental concepts used in the design of digital systems, the basic tools for the design and implementation of digital circuits, modules and subsystems.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Relate principles of operation of semiconductor devices. (Understanding)
CO 2: Design simple logic circuits using principles of logic design. (Applying)
CO 3: Analyze of semiconductor devices for different applications. (Analysis)

Module I: Semiconductor and diodes (20 hours)

a. Semiconductor concepts: Semiconductor material basics, intrinsic semiconductor, extrinsic semiconductor, energy levels, concept of hole and electron, mobility, conductivity, n-type and p-type, majority and minority carriers, mechanism of current flow.
b. Semiconductor diode: PN junction and various biasing conditions, V-I characteristics, diode equation, diode resistance, equivalent circuit, transition capacitance and diffusion capacitance; rectifier circuit with filter, clipper, clamper, voltage multiplier.
c. Special purpose diodes: Zener diodes, LED, Solar Cell, photo diode, Schottky diode, varactor diode, tunnel diode.

Module II: Transistors: (20 hours)
b. BJT biasing and stabilization: Load Line analysis of Transistors. DC Load line and Q-point and stability considerations, fixed bias, emitter feedback bias, collector feedback bias, voltage divider bias.

c. Field Effect Transistors: Introduction to FET- JFET, MOSFET and CMOS; structure, operation, characteristic curves and equations

Module III: Fundamentals of Digital Circuits (20 hours)

a. Number systems: Definition, type and inter-conversion, Signed and unsigned representation, binary arithmetic on signed and unsigned integers and detection of overflow and underflow, weighted binary Codes: BCD, 2421, non- weighted codes: excess-3 codes, gray codes, error detecting codes, error correcting codes, alphanumeric codes: ASCII code, EBCDIC codes.

b. Boolean algebra and Logic Gates: Logic gates (basic and universal), rules of Boolean algebra, sum of products and product of sums forms. Conversion between different forms, conversion between Boolean expression and truth table; implementing logic expressions with logic gates (logic circuits).

c. Combinational logic circuits: Simplification of Boolean expressions using algebraic method, Karnaugh map method and Don’t Care conditions. Designing Combinational logic circuits: half-adder, full-adder, encoder, decoder, Multiplexer, demultiplexer.

Suggested Readings

1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Lowis Nashelsky, Pearson Education.
5. Electronic Devices and Circuits, David A. Bell, Prentice Hall of India.
6. Op-amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI.
7. Digital Logic and computer Design, M. Mano, PHI.
8. Modern Digital Electronics, R. P. Jain, TMGH.

Mapping of COs to Syllabus:

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PSST313T: STATISTICAL MECHANICS

(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)

The objective of the course is to learn how to

Course / Learning Outcomes

At the end of this course students will be able to:

CO 1: Illustrate the connection between statistical mechanics and thermodynamics. (Analysing)
CO 2: Explain the concept of quantum statistical mechanics. (Understanding)
CO 3: Outline the physics of phase transition. (Understanding)
CO 4: Explain the importance of non-equilibrium physics. (Understanding)

Module I: Essentials (15 hours)

Probability theory: the random walk problem, binomial, Poisson and Gaussian distributions, central limit theorem; Classical equilibrium statistical mechanics: concept of equilibrium; Ergodic hypothesis; microcanonical, canonical and grand canonical Ensembles; partition functions and their relation to thermodynamics;

Module II: Quantum Statistics (15 hours)

Quantum statistical mechanics: Schrödinger and Heisenberg Picture; pure and mixed states, the density matrix, quantum mechanical Liouville’s theorem; the fundamental postulates; Quantum statistics: quantum gases of independent particles; partition functions; Bose Einstein and Fermi Dirac’s distributions; electrons in metals; black body radiation; Bose Einstein’s Condensation

Module III: Phase Transitions (15 hours)

Phenomenology: first and second order phase transitions; elementary ideas of critical phenomena; universality of critical exponents; scaling of thermodynamic functions; Theory: the Landau theory of phase transition with examples. Basic concepts of Ising model in one dimension.
Module IV: Non Equilibrium Phenomena (15 hours)
Non equilibrium phenomena: transport theory; Boltzmann equation; Maxwell-Boltzmann distribution; Irreversible processes: fluctuations; Brownian motion; Langevin’s equation.

Suggested Readings
1. Fundamental of Statistical and Thermal Physics, Federick Reif, McGraw Hill, Singapore.

Mapping of COs to Syllabus

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PSMP404T: MATERIALS PHYSICS
(4 Credits – 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to make students aware of the basic concepts of material science and nanotechnology. The students will develop an understanding of the material properties and how to manufacture, study, and control/manipulate them for specific applications.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explore the properties of materials at the micro and nano level. (Understanding)
CO 2: Explain different techniques used in the synthesis and characterization of materials. (Remembering)
CO 3: Illustrate a few applications of materials at the micro and nano level. (Applying)

Module I: Micro and Nanosystems (Properties) (15 hours)

Module II: Synthesis of Materials in micro and nano dimensions (10 hours)

Module III: Characterization (10 hours)

Module IV: Applications (10 hours)

Suggested Readings
1. Introduction to Nanotechnology, C. P. Poole, Jr. and Frank J. Owens, Wiley India Pvt. Ltd.

Mapping of COs to Syllabus

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PSSA406T: PHYSICS OF SENSORS AND ACTUATORS
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s)
The objective of this course is to give a fundamental idea about the mechanisms of sensing and actuation. The students will learn about cutting-edge technologies and recent developments in microelectronics and nanoelectronics.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate the key concept of sensors and actuators. (Analyzing)
CO 2: Explain different techniques and materials used in the fabrication of sensors and actuators. (Understanding)
CO 3: Apply the concepts for design and development of micro and nano-sensors. (Applying)

Module I: Basic Concepts (10 hours)

Module II: Mechanism of Sensing and Actuation (15 hours)
Electrostatic based Sensing and Actuation, Thermal Sensing and Actuation, Piezoelectric and Piezoresistive Sensing and Actuation, Magnetic and Optical Sensing and Actuation. Microfluidics.

Module III: Micro and Nano fabrication (10 hours)
Vacuum and Clean room, Thin film deposition methods. Nanowire/ Nanorod and Nanoparticles for sensors (Synthesis and Properties), Bulk and Surface Micromachining, Wet and Dry etching, DRIE, Optical and E-Beam lithography.

Module IV: Applications (10 hours)
Nanostructured and Nanomaterials-based sensor and Actuators (Strain gauge, Accelerometer, Resonators, RTD, FET, SED etc.). Flexible and Wearable Sensors. Sensors for Biomedical, Agricultural and Environmental Applications.

Suggested Readings
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SKILL ENHANCEMENT COURSES

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<tr>
<td>1</td>
<td>S E Course 1</td>
<td>PSTI104L</td>
<td>Basics of lab tools and Instrumentation (1-0-2)</td>
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<tr>
<td>2</td>
<td>S E Course 2</td>
<td>PSPC105T</td>
<td>Basics of Programming (C/C++/Fortran) (1-0-2)</td>
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<td>3</td>
<td>S E Course 3</td>
<td>PSPP210L</td>
<td>Computational Physics using Python (1-0-2)</td>
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PSTI104L: BASICS OF LAB TOOLS AND INSTRUMENTATION
(3 Credits – 75 hours) (L-T-P: 1-0-2)

Objective(s)
The objective of the course is to make students aware of the principle and working of basic lab tools and instruments. The students will develop the skills to use basic tools such as multimeters, slide calipers, and so on in day-to-day life.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Explain the concepts of various performance characteristics of measuring instruments. (Remembering)
CO 2: Demonstrate the basic concepts and working behind digital instruments. (Application)
CO 3: Illustrate the underlying principle of CRO and its uses. (Understanding)
CO 4: Demonstrate the underlying principle of the multimeter and its uses. (Application)

Module I: Basic of Measurement (15 hours)

Module II: Digital Instruments and Electronic Voltmeter (20 hours)

Module III: Digital Multimeter: (20 hours)

Module IV: Cathode Ray Oscilloscope (20 hours)
Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing, and acceleration (Explanation only— no mathematical treatment), a brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and the principle of working.

Suggested Readings
1. A textbook in Electrical Technology, B. L. Theraja, S Chand & Co.
2. Performance and design of AC machines, M. G. Say, ELBS Edn.
4. Logic circuit design, Shimon P. Vingron, Springer.
8. Electronic Devices, Thomas L. Floyd, Pearson India.

Mapping of COs to Syllabus

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Objective(s)
The objective of this course is to familiarize the students about the basic concepts of FORTRAN programming language, \LaTeX{} word processor and Gnuplot.

Course / Learning Outcomes
At the end of this course students will be able to:

CO 1: Make use of FORTRAN programming language for solving problems (Applying)
CO 2: Utilize Gnuplot for plotting graphs. (Applying)

Module I: Basics of FORTRAN Programming (20 hours)


Module II: Loops, Functions, Subroutines and their applications (35 hours)
Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DO- WHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open a file, writing in a file, reading from a file. Examples from physics problems.

Hands on exercises:
1. Exercises on syntax on usage of FORTRAN.
2. Usage of GUI Windows, Linux Commands, familiarity with DOS commands and working in an editor to write source codes in FORTRAN.
3. To print out all natural even/ odd numbers between given limits.
4. To find maximum, minimum and range of a given set of numbers.
5. Calculating Euler number using \( \exp(x) \) series evaluated at \( x=1 \).
6. To find the roots of a quadratic equation.
7. Motion of a projectile under gravity.
8. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs.
9. Motion of particles in a central force field and plot the output.

Module III: Gnuplot for some practical usage (20 hours)
Introduction to graphical analysis and its limitations. Introduction to Gnuplot. Importance of visualization of computational and computational data, basic Gnuplot commands: simple plots, plotting data from a file, saving and exporting, multiple data sets per file, physics with Gnuplot (equations, building functions, user defined variables and functions), Understanding data with Gnuplot.

Hands on exercises:
1. To compile a frequency distribution and evaluate mean, standard deviation etc.
2. To evaluate the sum of finite series and the area under a curve.
3. To find the product of two matrices.
4. To find a set of prime numbers and Fibonacci series.
5. To write a program to open a file and generate data for plotting using Gnuplot.
6. Plotting trajectory of a projectile projected horizontally.
7. Plotting trajectory of a projectile projected making an angle with the horizontally.
8. Creating an input Gnuplot file for plotting data and saving the output for seeing on the screen. Saving it as an eps file and as a pdf file.

Suggested Readings
1. Introduction to Numerical Analysis, S. S. Sastry, PHI Learning Pvt. Ltd.
2. Computer Programming in Fortran 77, V. Rajaraman, PHI.
3. LaTeX–A Document Preparation System, Leslie Lamport, Addison-Wesley.

Mapping of COs to Syllabus

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PSP210L: COMPUTATIONAL PHYSICS USING PYTHON
(3 Credits – 75 hours) (L-T-P: 1-0-2)

Objective(s)
The objective of the course is to familiarize the students about the basic concepts of Python programming language, its applications, and preliminaries of machine learning.

Course / Learning Outcomes
At the end of this course students will be able to:
CO 1: Outline the fundamental concepts of Python (Understanding)
CO 2: Apply Python code for solving numerical methods (Applying)
CO 3: Review the concepts of machine learning using Python(Understanding)

Module I: Elements of Python programming (25 hours)
Computer and Programming languages, types of languages, Operating system types, Python language; Data types, precision, numbers, castings strings, Booleans, Operators, variables; list: indexing, slicing, altering, appending and deleting elements, concatenation; tuples, sets and dictionaries; conditional statements; loops: if-else, while and for loops, nested-for loops; functions, arrays, lambda, classes, Inheritance, modules, Python libraries: installing packages, importing packages; NumPy arrays and matrices, example: eigenvalues and eigenvectors; basics of data handing using Pandas; introduction to SciPy; data visualization using Matplotlib and Seaborn

Module II: Numerical methods using Python I (20 hours)
Fundamental integral evaluation methods: trapezoidal rule, Simpson’s rule; error estimation of integrals; Romberg integration; Gaussian quadrature; Random numbers generators and seeds; non-uniform random numbers, Gaussian random numbers; Monte Carlo integration: mean value method, integrals in many dimensions, importance sampling; importance sampling; Markov chain methods numerical differentiation: forward and backward differences, central differences, second derivatives, partial derivatives, differentiation error estimation; Linear equations:

Module III: Numerical methods using Python II (15 hours)
Gaussian elimination, back-substitution, pivoting, LU decomposition, matrix inverse, tridiagonal and banded matrices; nonlinear equations; binary search, Newton’s method, secant method; First-order differential equations with one variable: Euler’s method, Heun’s method, 4th order Runge-Kutta method; differential equations with multiple variables; second-order differential equations; boundary value problems: shooting method, relaxation method; eigenvalue problems

Module IV: Elements of machine learning (15 hours)
Data distribution, Regression types, Scale, Train/Test, Decision Tree, Confusion Matrix, Hierarchical Clustering, Logistic Regression, K-means, Bootstrap aggregation, Cross validation, K-nearest neighbors, Artificial Neural Networks

Suggested Readings
### Mapping of COs to Syllabus

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DEPARTMENT OF PHYSICS

INTERNSHIPS

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**PSIN105I/PSIN211I: INTERNSHIP (Exit of 1st Year or 2nd Year)**
(4 Credits: 120 hours)

**PSIN314I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)**
(2 Credits-60 Hours)

**Internship Modalities for Physics Department**

**Objectives:**
1. To create students with real-world experience in working and addressing problems.
2. To make the transition for the students from the Institute to the real world as easy as possible.
3. To improve the students' employability.

**INTERNSHIP: GUIDELINES**
1. Request Letter/ Email from the Department via Registrar office should go to organization/ institutions/ industries to take interns for 4-6 weeks.
2. Organization/ institutions/ industries will confirm the training slots and the number of seats allocated for interns via Confirmation Letter/ Email.
3. In case the students arrange the training for themselves the confirmation letter has to be submitted by the students to the Department.
4. Students on joining Training at the concerned organization/ institutions/ industries, submit the Joining Report/Letters / Email.
5. Students will submit their progress report to the department in every week through Report/ Email. Students will submit Training Report and Completion Certificate obtained from the organization/ institutions/ industries.
6. Students will give a presentation on their learning outcome in presence of the faculty members and the students.
7. List of students who have completed their internship successfully will be notified by the Department.

**Requirement:**
Students willing to exit the course after completing the first/second year are required to go for 4-6 weeks compulsory internship programme to receive their Certificate/Diploma.
RESEARCH PROJECT / DISSERTATION

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BSC PHYSICS (Honours)

**PSDI407P: RESEARCH PROJECT PHASE I**
(6 credits – 180 hours) (L-T-P: 0-0-12)

**Objective:**
The aim of BSc Physics research project is to develop students’ analytical, problem-solving, and critical thinking abilities. Students have the opportunity to investigate certain areas of interest in the subject of physics under the direction of knowledgeable academics or researchers.

**Course Outcomes:** BSc Physics programs primarily focus on building a strong foundation in theoretical and experimental physics. During this phase the student will start a project applying the knowledge acquired during the previous semesters and also incorporating the recent trends in the chosen area. It should include phases of design, implementation and reporting. This project is to be executed individually within or outside the campus. The mode and components of evaluation and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

**PSDI408P: RESEARCH PROJECT PHASE II**
(6 credits – 180 hours) (L-T-P: 0-0-12)

**Objective:**
The activities involving research has the power to influence how students pursue their academic and professional goals. They might increase interest in a particular area of Physics. Additionally, exposure to research strengthens students’ resumes and increases their ability to compete for roles in research or future employment.

**Course Outcomes:**
During this phase the student will complete the project started in the previous semester. The final implementation of the project and report writing shall be done in this semester. The student shall be required to make a number of presentations to report on the progress of the project. There will be a viva voce examination which shall follow the final submission of the project report. The mode and components of evaluation and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

BSC PHYSICS (Honours) with Research

**PSDI409P: DISSERTATION I**
(18 Credits -540 Hours) (L-T-P: 0-0-36)

**Objective:** The objective of a dissertation is to conduct original research and contribute new knowledge or insights to a specific field of study. The primary objectives of a dissertation include to showcase original thinking and creativity in the approach to the research problem. To critically evaluate existing literature, theories, and research methodologies related to the topic would be the priority in this 1st phase of this course.

**Course Outcome:** The outcome of a dissertation is the culmination of the research and writing process. It typically takes the form of a written document that presents the research findings, analysis, conclusions, and contributions to the field of study.
The specific outcome of a dissertation can vary depending on the nature of the research. In this 1st phase, critically evaluate existing literature, theories, and research methodologies would be the priority of the students. The mode and components of evaluation and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

**PSDI410P: Dissertation II**  
(20 Credits -600 Hours) (L-T-P: 0-0-40)

**Objective:** The objective of this will be to contribute new knowledge, practical applications, or policy implications that can benefit the academic community, industry, or society as a whole. Additionally, it will strengthens students’ resumes and increases their ability to compete for roles in research or future employment.

**Course Outcome:** During this phase the student will complete the project started in the previous semester. The final implementation of the project and report writing shall be done in this semester. The student shall be required to make a number of presentations to report on the progress of the project. There will be a viva voce examination which shall follow the final submission of the project report. The mode and components of evaluation and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.
DEPARTMENT OF BOTANY

PROGRAMME: BACHELOR OF SCIENCE in BOTANY (BSC)
DEGREE: BSC BOTANY (HONOURS)/ BSC BOTANY (HONOURS) WITH RESEARCH

VISION:
To motivate and encourage the students in effective ways to utilize the knowledge of ‘Plant Sciences’ in order to solve the future needs of Food, Fuel, Energy and Environment for the betterment of mankind and society.

MISSION:
The department endeavours to make substantial contribution in the field of ‘Plant Sciences’ by new research innovations and producing competent students who are not only well versed with the subject but are also better adjusted socially, emotionally and intellectually.

PROGRAM OUTCOMES (PO)

PO 1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more other disciplines that form a part of an undergraduate programme of study.

PO 2: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO 3: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully; and present complex information in a clear and concise manner to different groups.

PO 4: Social Interaction: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO 5: Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 6: Moral and Ethical Awareness: Ability to embrace moral/ethical values in conducting one’s life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 7: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO 8: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes. Critical sensibility to lived experiences, with self-awareness and reflexivity of both and society.

PO 9: Information and Digital Literacy: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 10: Research related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause and affect relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Ability to apply one’s learning to real life situations.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Acquire the basic knowledge on classical as well as advanced plant science/botany to build up a strong foundation of concepts and basics for future.

PSO 2: Equip the students with the concepts and importance of interdisciplinary fields such as Molecular Biology and Biotechnology, Computational biology, Mathematics, etc and their applications in healthcare, agriculture, environment, and industry.

PSO 3: The students would acquire hands on experience of performing experiments on basic and advanced plant science thereby gaining the knowledge of some sophisticated scientific instruments.

PSO 4: The students would be moulded and well-prepared for national and international competitive examinations through this course.
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DEPARTMENT OF BOTANY

DETAILED SYLLABUS

MAJOR COURSES

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**BOPM100T: PHYCOLOGY AND MICROBIOLOGY**
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: Compare different microorganisms and their importance (Understanding)
CO 2: Able to identify and characterize different Algae (Applying)
CO 3: Able to explain the morphology and life cycle of various important Algal species (Remembering)
CO 4: To assess the importance of microbial activities in various fields (Analyzing)

Module I: Introduction to Microbial World (4 Hours)
Microbes in Our Lives; History of Microbiology; Modern Microbiology; Scope of Microbiology; Major Groups of the Microbial world. Microbial nutrition, growth and metabolism

Module II: Algae (8 Hours)
Algae General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; methods of reproduction; Classification; criteria, system of Fritsch, and evolutionary classification of Lee (only up to groups); Significant contributions of important
phycologists (F.E. Fritsch, G.M. Smith, R.N. Singh, T.V. Desikachary, H.D. Kumar, M.O.P. Iyengar). Role of algae in the environment, agriculture, biotechnology and industry

**Module III: Cyanophyta and Xanthophyta (5 Hours)**
Cyanophyta and Xanthophyta Ecology and occurrence; Range of thallus organization; Cell structure; Reproduction, Morphology and life-cycle of Nostoc and Vaucheria

**Module IV: Chlorophyta and Charophyta (6 Hours)**
Chlorophyta and Charophyta General Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction; Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium, Chara; Evolutionary significance of Prochloron

**Module V: Phaeophyta and Rhodophyta (6 Hours)**
Phaeophyta and Rhodophyta Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction; Morphology and life-cycles of Ectocarpus, Fucus and Polysiphonia.

**Module VI: Bacteria (8 Hours)**
Bacteria Discovery, general characteristics; Types- archaebacterial, eubacteria, wall-less forms (mycoplasma and spheroplasts); Cell structure; Nutritional types; Reproduction-vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine)

**Module VII: Viruses (8 Hours)**
Viruses Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV); Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases

**Suggested Readings**

**Mapping of COs to syllabus**

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**BOPM101L: PHYCOLOGY AND MICROBIOLOGY LAB**
(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

**Course outcomes**
At the end of this course, student will be able to:
CO 1: Differentiate between cell shapes and structures of microorganisms (Applying)
CO 2: Able to understand reproduction and multiplication processes in microbes (Understanding)
CO 3: Utilize and create basic identification techniques for microbes (Creating)

**Microbiology**
Expt. 1: Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle
Expt. 2: Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root nodule
Expt. 3: Gram staining
Expt. 4: Endospore staining with malachite green using the (endospores taken from soil bacteria) Phycology
Expt. 5: Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia, Prochloron through electron micrographs, temporary preparations and permanent slides
Mapping of COs to syllabus

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BOMY102T: MYCOLOGY
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Able to tell and name different fungi, allied fungi and lichens and their classification process/criteria (Remembering)
CO 2: Able to explain fungal cell organization; illustrate their reproduction mechanisms (Understanding)
CO 3: Able to explain the life cycle with reference to various important fungal species (Remembering)
CO 4: Determine the application of fungi in food industries, pharmaceutical preparations and agriculture (Evaluating)

Module I: Introduction to Fungi (4 Hours)
General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification

Module II: Chytridiomycota and Zygomycota (6 Hours)
Characteristics features; Ecology and significance; Thallus organization; Reproduction; Life cycle with reference to Synchytrium, Rhizopus

Module III: Ascomycota (10 Hours)
General characteristics (asexual and sexual fruiting bodies); Ecology; Heterokaryosis and Para sexuality; Life cycle and classification with reference to Saccharomyces, Aspergillus, Penicillium, Alternaria, Neurospora and Peziza

Module IV: Basidiomycota (10 Hours)
General characteristics; Ecology; Life cycle and Classification with reference to black stem rust on wheat Puccinia (Physiological Specialization), loose and covered smut (symptoms only), Agaricus; Bioluminescence, Fairy Rings and Mushroom Cultivation

Module V: Allied Fungi (4 Hours)
General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies

Module VI: Oomycota (4 Hours)
General characteristics; Ecology; Life cycle and classification with reference to Phytophthora, Albugo

Module VII: Symbiotic Associations (7 Hours)
Lichen – Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction; Mycorrhiza- Ectomycorrhiza, Endomycorrhiza and their significance

Suggested Readings:

Mapping of COs to syllabus

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BOMY103L: MYCOLOGY LAB
(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Able to recall the general structure of fungi, allied fungi and lichens and show their reproductive structures (Remembering)
CO 2: Able to demonstrate thallus structure of different classes of fungi (Understanding)
CO 3: Examine the methods of reproduction in fungi (Analyzing)
CO 4: Able to formulate control measures of deadly plant pathogens and also develop plans for preparation of herbarium (Creating)

Practical:
Expt.1. Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, ascocarps & basidiocarps)
Expt.2. Rhizopus: study of asexual stage from temporary mounts and sexual structures through permanent slides
Expt.3. Aspergillus and Penicillium: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs
Expt.4. Peziza: sectioning through ascocarp
Expt.5. Alternaria: Specimens/photographs and temporary mounts
Expt.6. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; sections/ mounts of spores on wheat and permanent slides of both the hosts
Expt.7. Agaricus: Specimens of button stage and full-grown mushroom; sectioning of gills of Agaricus, fairy rings and bioluminescent mushrooms to be shown
Expt.8. Study of phaneroplasmodium and aphanoplasmodium from actual specimens and /or photograph
Expt.9. Albigo: Study of symptoms of plants infected with Albigo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides
Expt.10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)

Mapping of COs to Syllabus

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BOBC200T: BIOMOLECULES AND CELL BIOLOGY
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: To recall the properties and economic importance of enzymes (Remembering)
CO 2: To memorize the general characteristics of carbohydrates, proteins, nucleic acids and lipids and how they are imported/exported to various organelles (Remembering)
CO 3: To acquire comprehensive knowledge on the general structure of proteins (Understanding)
CO 4: To interpret the basics of mode of actions of enzymes (Understanding)
CO 5: To understand the importance of cell cycle and its regulation in controlling diseases (Understanding)

Module I: Biomolecules (20 Hours)
Types and significance of chemical bonds; Structure and properties of water; pH and buffers; Carbohydrates: Nomenclature and classification; Lipids: Definition and major classes of storage and structural lipids; Fatty acids structure and functions; Essential fatty acids; Triacylglycerols structure, functions and properties; Phosphoglycerates. Proteins: Structure of amino acids; Levels of protein structure-primacy, secondary, tertiary and quaternary; Protein denaturation and biological roles of proteins. Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA

Module II: Bioenergetics (2 Hours)
Principles of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions. ATP: structure, its role as an energy currency molecule

Module III: Enzymes (4 Hours)
Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity

Module IV: The cell (2 Hours)
Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory)

Module V: Cell wall and Plasma Membrane (4 Hours)
Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis

Module VI: Cell Organelles (10 Hours)
Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export of proteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes

Module VII: Cell Division (3 Hours)
Importance of cell cycle, Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases

Suggested Readings

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BOBC201L: BIOMOLECULES AND CELL BIOLOGY LAB
(1 Credits-30 Hours) (L-T-P: 0-0-1)

Course outcomes
At the end of this course, student will be able to:
CO 1: To recall the properties of carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins (Remembering)
CO 2: To memorize the common tests of carbohydrates, proteins, nucleic acids and lipids and their classification (Remembering)
CO 3: To acquire comprehensive knowledge on the logic behind the cell structure and functions (Understanding)
CO 4: To comprehend the basics of cell structure (Understanding)

Practical:
Expt. 1: Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins
Expt. 2: Study of plant cell structure with the help of epidermal peel mount of Onion/Rhoeo/Crinum.
Expt. 3: Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf.
Expt. 4: Measurement of cell size by the technique of micrometry.
Expt. 5: Counting the cells per unit volume with the help of hemocytometer (Yeast/pollen grains)
Expt. 6: Study of cell and its organelles with the help of electron micrographs.
Expt. 7: Cytochemical staining of: DNA- Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff’s (PAS) staining technique.
Expt. 8: Study the phenomenon of plasmolysis and deplasmolysis.
Expt. 9: Study the effect of organic solvent and temperature on membrane permeability.
Expt. 10: Study different stages of mitosis and meiosis.
Mapping of COs to Syllabus

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**BOAR202T: ARCHEGONIATE**

(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes

At the end of this course, student will be able to:

CO 1: Recall the unique features of archegoniate (Remembering)

CO 2: Summarize the different land habits and alternation of generation in archegoniates (Understanding)

CO 3: Classify the different archegoniates and demonstrate their morphology, anatomy and reproduction (Understanding)

CO 4: Illustrate the economic importance of bryophytes, pteridophytes and Gymnosperms (Understanding)

**Module I: Introduction (2 Hours)**

Unifying features of archegoniate; Transition to land habit; Alternation of generations

**Module II: Bryophytes (12 Hours)**

General characteristics; Adaptations to land habit; Classification; Range of thallus organization Classification (up to family) *Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum and Funaria*; Reproduction and evolutionary trends in Riccia, Marchantia, Anthoceros and Funaria (developmental stages not included)

**Module III: Pteridophytes (13 Hours)**

General characteristics, classification, early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Psilotum, Selaginella, Equisetum* and *Pteris* (Developmental details not to be included) Apogamy, and apospory, heterospor and seed habit, telome theory, stellar evolution

**Module IV: Gymnosperms (15 Hours)**

General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas, Pinus* and *Gnetum* and *Ephedra*; (Developmental details not to be included)

**Module V: Economic Importance (3 Hours)**

Ecological and economic importance of bryophytes with special reference to *Sphagnum*; Ecological and economic importance of pteridophytes and gymnosperms

**Suggested Readings**

5. Vander-Poorten 2009 Introduction to Bryophytes. COP

Mapping of COs to syllabus

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**BOAR203L: ARCHEGONIATE LAB**

(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

Course outcomes

At the end of this course, student will be able to:

CO 1: Infer the various morphological, anatomical and reproductive features of important bryophytes (Understanding)

CO 2: Interpret the various morphological, anatomical and reproductive features of important pteridophytes (Understanding)

CO 3: Demonstrate the various morphological, anatomical and reproductive features of important gymnosperms (Understanding)
CO 4: Develop the art of preparing slides of various archegoniate specimens and identifying them under the microscope (Applying)

CO 5: Identify different bryophytes, pteridophytes and gymnosperms in their natural habitat (Applying)

**Practical:**

Expt. 1: Riccia- Study of morphology of thallus.

Expt. 2: Marchantia- Study of morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides)

Expt. 3: Anthoceros- Study of morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide)

Expt. 4: Pellia, Porella- Study of these specimens through permanent slides

Expt. 5: Sphagnum- Study of morphology of plant, whole mount of leaf (permanent slide only)

Expt. 6: Funaria- Study of morphology, whole mount of leaf, rhizoids, opeculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema

Expt. 7: Psilotum- Study of specimen, transverse section of synangium (permanent slide)

Expt. 8: Selaginella- Study of morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide)

Expt. 9: Equisetum- Study of morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide)

Expt. 10: Pteris- To study the morphology, transverse section of rachis, vertical section of sporophyll, wholomount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide)

Expt. 11: Cycas- To study the morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll, transverse section of coralloid root, transverse section of rachis, vertical section of leaflet, vertical section of microsporophyll, whole mount of spores (temporary slides), longitudinal section of ovule, transverse section of root (permanent slide)

Expt. 12: Pinus- To study the morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), transverse section of Needle, transverse section of stem, longitudinal section of /transverse section of male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), longitudinal section of female cone, tangential longitudinal section and radial longitudinal sections stem (permanent slide)

Expt. 13: Gnetum- Study of morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide)

Expt. 14: Botanical excursion

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**BOPG204T: PLANT GENETICS**

(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

**Course Outcomes**

At the end of this course, student will be able to:

CO 1: Summarize the concepts of Mendelian genetics (Understanding)

CO 2: Infer the ideas behind extrachromosomal inheritance, linkage and crossing over, numerical and structural chromosomal aberrations (Understanding)

CO 3: Compare the various genetic mutations and explain DNA repair (Understanding)

CO 4: Demonstrate the fine structure of the gene including complementation test (Understanding)

CO 5: Rephrase the Hardy Weinberg Law (Understanding)

**Module I: Mendelian Genetics and Its Extension (12 Hours)**

Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, lethal alleles, Epistasis,
Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance

Module II: Extrachromosomal Inheritance (6 Hours)
Chloroplast mutation: Variegation in Four o’clock plant; Mitochondrial mutations in yeast; Maternal effects - shell coiling in snail; Infective heredity - Kappa particles in Paramecium

Module III: Linkage, Crossing Over and Chromosome Mapping (10 Hours)
Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage

Module IV: Variation in Chromosome Number and Structure (5 Hours)
deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

Module V: Gene Mutations (5 Hours)
Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: Clib method. Role of transposons in mutation DNA repair mechanisms

Module VI: Fine Structure of Gene (3 Hours)
Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus

Module VII: Population and Evolutionary Genetics (4 Hours)
Allele frequencies, Genotype frequencies, Hardy – Weinberg Law, role of natural selection mutation, genetic drift Genetic variation and Speciation

Suggested Readings

Mapping of COs to Syllabus

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BOPG205L: PLANT GENETICS LAB
(2 CREDITS-60 HOURS) (L-T-P: 0-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Experiment with meiosis through slide preparation (Applying)
CO 2: Solve problems related to Mendel’s laws, probability and chi-square analysis (Applying)
CO 3: Examine test cross data for chromosome mapping and pedigree charts (Analyzing)
CO 4: Demonstrate incomplete dominance and gene interaction (Evaluating)
CO 5: Interpret blood typing, chromosomal aberrations and human genetic traits (Understanding)

Practical:
Expt. 1: Meiosis through temporary squash preparation
Expt. 2: Mendel’s laws through seed ratios. Laboratory exercises in probability and chi-square analysis
Expt. 3: Chromosome mapping using test cross data
Expt. 4: Pedigree analysis for dominant and recessive autosomal and sex-linked traits
Expt. 6: Blood Typing: ABO groups & Rh factor
Expt. 7: Study of aneuploidy: Down’s, Klinefelter’s and Turner’s syndromes
Expt. 8: Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge
Expt. 9: Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow’s peak, rolling of tongue, Hitchhiker’s thumb and Attached ear lobe
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**BOMA206T: MORPHOLOGY AND ANATOMY OF ANGIOSPERMS**

(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

**Course Outcomes**

At the end of this course, student will be able to:

CO 1: Compare the general morphology and distinguishing characteristics of angiospermic plants (Understanding)

CO 2: Examine the concepts and fundamentals of plant anatomy (Analyzing)

CO 3: Comprehend the concepts of organization and development of shoot and root apices (Understanding)

CO 4: Evaluate the secretory systems in plants (Evaluating)

**Module I: Plant morphology (3 hours)**

Introduction; Vegetative Characters: Modified Roots and Stems; Leaf (Phyllotaxy), Venation; Trichomes. Reproductive Characters: Floral parts, Arrangements of flowers on the floral axis, Unisexual and Bisexual Flowers, Variation in fruit surface, Placentation, Variation in seed coats

**Module II: Tissues (8 Hours)**

Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Wall ingrowths and transfer cells, encrustation and incrustation, Ergastic substances

**Module III: Stem, Leaves and Roots (13 Hours)**

Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cytohistological zonation); Types of vascular bundles; Structure of dicot and monocot stem; Structure of dicot and monocot leaf, Kranz anatomy, Organization of root apex (Apical cell theory, Histogen theory, Korper- Kappe theory); Quiescent centre; Root cap; Structure of dicot and monocot root; Endodermis, exodermis and origin of lateral root

**Module IV: Vascular Cambium, Periderm and Wood (13 Hours)**

Structure, function and seasonal activity of cambium; Secondary growth in root and stem, Development and composition of periderm, rhytidome and lenticels, Axially and radially oriented elements; Types of rays and axial parenchyma; Cyclic aspects and reaction wood; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood, tyloses; Dendrochronology

**Module V: Adaptive and Protective Systems (8 Hours)**

Epidermal tissue system, cuticle, epicuticular waxes, trichomes (uni and multicellular, glandular and non-glandular, two examples of each), stomata (classification); Adcrustation and incrustation; Anatomical adaptations of xerophytes and hydrophytes; Secretory system

**Suggested Readings**


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BOMA207L: MORPHOLOGY AND ANATOMY OF ANGIOSPERMS LAB
(2 CREDITS-60 HOURS) (L-T-P: 0-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Prepare permanent slides, temporary stain mounts, macerations and museum specimens (Creating)
CO 2: Gain the knowledge about apical meristem of root, shoot and vascular system (Understanding)
CO 3: Apprehend the ideas of the distribution and types of tissues (Understanding)
CO 4: Examine the different aspects of plant adaptations and plant secretory systems (Analyzing)

Practical:
Expt. 1: Study of anatomical details through permanent slides/temporary stain mounts/ macerations/ museum specimens with the help of suitable examples
Expt. 2: Apical meristem of root, shoot and vascular cambium
Expt. 3: Distribution and types of parenchyma, collenchyma and sclerenchyma
Expt. 4: Xylem: Tracheary elements- tracheids, vessel elements; thickenings; perforation plates; xylem fibres
Expt. 5: Wood: ring porous; diffuse porous; tyloses; heart-and sapwood
Expt. 6: Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres
Expt. 7: Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular
Expt. 8: Root: monocot, dicot, secondary growth
Expt. 9: Stem: monocot, dicot. - Primary and secondary growth; periderm; lenticels
Expt. 10: Leaf: isobilateral, dorsiventral, C4 leaves (Kranz anatomy)
Expt. 11: Adaptive Anatomy: xerophytes, hydrophyte
Expt. 12: Secretory tissues: cavities, lithocysts and laticifers

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BOPE208T: PLANT ECOLOGY
(3 Credits: 45Hours) (L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Illustrate the concepts of ecology of individual, population, community and ecosystem (Understanding)
CO 2: Extend the knowledge of various factors of environment, its interaction and the structural and functional aspects of ecosystem (Understanding)
CO 3: Apply the concepts of population dynamics and community succession in understanding the composition of a particular area (Applying)
CO 4: Illustrate the principle and concept of phytogeography (Understanding)

Module I: Introduction (4 Hours)
Basic concepts of ecology, Levels of organization, Inter-relationships between the living world and the environment, the components and dynamism, homeostasis

Module II: Abiotic and Biotic Components of Ecosystem (10 Hours)
Importance; Origin; Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development, Importance: States of water in the environment; Atmospheric moisture; Hydrological Cycle; Water in soil; Water table. Variations; adaptations of plants to their variation in Light, temperature, wind and fire, Host-Pathogen interaction

Module III: Ecosystem, Its Structural and Functional Aspects (8 Hours)
Structure; Processes; trophic organization, Food chains and Food webs; Ecological pyramids, Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus

Module IV: Population Ecology (8 Hours)
Characteristics and Dynamics of population ecology, ecological Speciation

Module V: Plant Communities (8 Hours)
Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts

Module VI: Phytogeography (7 Hours)
Principles; Continental drift; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra); Phytogeographical division of India; Local Vegetation

Suggested Readings

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BOPE209L: PLANT ECOLOGY LAB
(1 Credit: 30 Hours) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Recall their basic knowledge on ecology in order to use instruments to measure microclimatic variables (Remembering)
CO 2: Illustrate the various physico-chemical properties of soil and water (Understanding)
CO 3: Estimate the DO of water samples from polluted and unpolluted sources (Evaluating)
CO 4: Utilize their knowledge to demonstrate and calculate the plant communities (Applying)
CO 5: Adapt the concepts of ecology and inculcating these ideas in their young minds through field visits (Creating)

Practical
Expt. 1: Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, hygrometer, rain gauge and lux meter.
Expt. 2: Determination of pH of various soil and water samples
Expt. 3: Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
Expt. 4: Determination of organic matter of different soil samples by Walkley & Black rapid titration method.
Expt. 5: Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.
Expt. 6: Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
Expt. 7: Study of morphological adaptations of hydrophytes and xerophytes (four each).
Expt. 8: Determination of minimal quadrat size for the study of herbaceous vegetation by species area curve method.
Expt. 9: Quantitative analysis of herbaceous vegetation for frequency and comparison with Raunkiaer’s frequency distribution law.
Expt. 10: Quantitative analysis of herbaceous vegetation for density, abundance and IVI
Expt. 11: Field visit

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BOPP300T: PLANT PHYSIOLOGY
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: Explain the concepts of plant water relation, mineral nutrition, nutrient uptake and translocation (Understanding)
CO 2: Interpret the concepts of photoperiodism, phytochrome and vernalization (Understanding)
CO 3: Analyze the functions of growth regulators (Analyzing)
CO 4: Formulate methods to test actions of Plant Growth Regulators in vitro/in vivo (Creating)

Module I: Plant Water Relationship (10 Hours)
Water Potential and its components, water absorption by roots, aquaporins, and pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, and guttation. Ascent of sap–cohesion-tension theory, transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement

Module II: Mineral Nutrition (4 Hours)
Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents

Module III: Nutrient Uptake (4 Hours)
Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport

Module IV: Translocation in the Phloem (4 Hours)
Experimental evidence in support of phloem as the site of sugar translocation, Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship

Module V: Plant Growth Regulators (12 Hours)
Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid, biosynthesis

Module VI: Physiology of Flowering (6 Hours)
Photoperiodism, flowering stimulus, florigen concept, vernalization, dormancy and germination of seeds

Module VII: Phytochrome (5 Hours)
Discovery, chemical nature, role of phytochrome in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action

Suggested Readings

Mapping of COs to Syllabus

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BOPP301L: PLANT PHYSIOLOGY LAB
(2 CREDIT-60 HOURS) (L-T-P: 0-0-2)

Course outcomes
At the end of this course, student will be able to:
CO 1: Memorize the basic concept of transpiration and stomata (Remembering)
CO 2: Interpret the concepts of osmotic and water potential (Understanding)
CO 3: Infer the ideas behind seed germination, amylase activity and the effect of different concentrations of plant growth hormones like IAA (Understanding)
CO 4: Calculate stomatal index and frequency and also area and percentage of stoma using the basic knowledge on stomata (Applying)
CO 5: Examine suction pressure due to transpiration, fruit ripening or rooting from cuttings and bolting (Analyzing)

Practical:
Expt. 1: Determination of osmotic potential of plant cell sap by plasmolytic method
Expt. 2: Determination of water potential of given tissue (potato tuber) by weight method
Expt. 3: Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf
Expt. 4: Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte
Expt. 5: To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces)
Expt. 6: To study the phenomenon of seed germination (effect of light)
Expt. 7: To study the effect of different concentrations of IAA on Avena coleoptile elongation (IAA Bioassay)
Expt. 8: To study the induction of amylase activity in germinating barley grains

Demonstration experiments
Expt. 1: Demonstration of suction due to transpiration
Expt. 2: Expt. 2: Fruit ripening/Rooting from cuttings (Demonstration)
Expt. 3: Expt. 3: Bolting experiment/Avena coleoptile bioassay (demonstration)

Mapping of COs to Syllabus

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BOPS302T: PLANT SYSTEMATICS
(L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: Summarize the concepts of plant identification, classification, nomenclature and biosystematics (Understanding)
CO 2: Summarize botanical nomenclature and various systems of classification (Understanding)
CO 3: Explain biometrics, numerical taxonomy and cladistics (Understanding)
CO 4: Summarize the phylogeny in angiosperms (Understanding)

Module I: Introduction to Plant Systematics and Identification (10 Hours)
Plant identification, Classification, Nomenclature; Biosystematics; Evidence from palynology, cytology, phytochemistry and molecular data; Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium; Flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access

Module IV: Taxonomic Hierarchy (4 Hours)
Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary)

Module V: Botanical Nomenclature (6 Hours)
Principles and rules (ICN); Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations; Names of hybrids

Module VI: Systems of Classification (10 Hours)
Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (upto series) and Engler and Prantl (upto series); Brief reference of Angiosperm Phylogeny Group (APG III) classification

Module VII: Biometrics, Numerical Taxonomy and Cladistics (5 Hours)
Characters; Variations; OTUs, character weighting and coding; cluster analysis; Phenograms, cladograms (definitions and differences)

Module VIII: Phylogeny of Angiosperms (10 Hours)
Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades). Origin & evolution of angiosperms; co - evolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram)
Suggested Readings

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BOPS303L: PLANT SYSTEMATICS LAB
(2 CREDITS-60 HOURS) (L-T-P: 0-0-2)

Course outcomes
At the end of this course, student will be able to:
CO 1: Interpret the vegetative characters and systematic position of various angiospermic plants (Understanding)
CO 2: Utilize their knowledge on angiosperms to study the floral characters through slide preparation (Applying)
CO 3: Apply the ideas of plant taxonomy and systematics in identifying different plant specimens in their natural habitat (Applying)
CO 4: Develop the art of preparing herbarium of plant specimens (Creating)

Practical:
Expt. 1: Expt.1. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker’s system of classification): Ranunculaceae- Ranunculus, Delphinium, Brassicaceae- Brassica, Alyssum / Iberis, Myrtaceae- Eucalyptus, Callistemon, Umbelliferae- Coriandrum / Anethum / Foeniculum, Asteraceae- Sonchus / Launaea, Vernonia / Ageratum, Eclipta/ Tridax, Solanaceae- Solanum nigrum / Withania, Lamiaceae- Salvia / Ocimum, Euphorbiaceae- Euphorbia hirta/ E. milii, Jatropha, Liliaceae- Asphodelus / Lilium / Allium, Poaceae- Triticum / Hordeum / Avena
Expt. 2: Expt.2. Field visit (local) – Subject to grant of funds from the university.
Expt. 3: Expt.3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book)

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BORB304T: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS
(3 CREDITS - 45 HOURS) (L-T-P: 3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Categorize different reproductive mechanisms in Angiosperm (Analyzing)
CO 2: Explain the concepts of anther, pollen biology and ovule (Understanding)
CO 3: Evaluate the methods for studying pollination, fertilization and self-incompatibility (Evaluating)
CO 4: Infer the concepts of embryo development in monocot and dicot plants (Understanding)
CO 5: Design and improve protocols for transformation (Creating)

Module I: Introduction to Reproductive Biology in Angiosperms (2 Hours)
Module II: Anther and Pollen Biology (12 Hours)
Anther wall: Structure and functions, microsporogenesis, callose deposition and its significance, Microgametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination; abnormal features: Pseudomonads, polyads, massulae, pollinia

Module III: Ovule (8 Hours)
Structure; Types; Special structures—endothelium, obturator, aril, caruncle and hypostase; Female gametophyte—megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of Polygonum type); Organization and ultrastructure of mature embryo sac

Module IV: Pollination and Fertilization (6 Hours)
Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization

Module V: Self Incompatibility (8 Hours)
Basic concepts (interspecific, intraspecific, homomorphic, heteromorphic, GSI and SSI); Methods to overcome selfincompatibility: mixed pollination, bud pollination, stub pollination; Intraovarian and in vitro pollination; Modification of stigma surface, parasexual hybridization; Cybrids, in vitro fertilization

Module VI: Endosperm and Embryo (16 Hours)
Types, development, structure and functions, Six types of Embryogeny; General pattern of development of dicot and monocot embryo; Suspensor: structure and functions; Embryo-endosperm relationship; Nutrition of embryo; Unusual features; Embryo development in Paeonia, polyembryony and apomixes

Module VII: Seed and Germline Transformation (4 Hours)
Structure, importance and dispersal mechanisms, Pollen grain and ovules through pollen tube pathway method/Agrobacterium/electrofusion/floral dip/biolistic

Suggested Readings

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BORB305L: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS LAB
(1 CREDIT-30 HOURS) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: CO1: Identify parts of anther and develop pollen viability test and calculation of germination percentage (Applying)
CO 2: CO2: Examine various types of ovules, the female gametophyte and intra-ovarian pollination (Evaluating)
CO 3: CO3: Explain and infer endosperm and embryogenesis (Understanding)
CO 4: CO4: Dissect developing seeds to determine stages of growth (Analyzing)

Practical:
Expt. 1: Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehisced anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation
Expt. 2: Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, psuedomonads, polyads, pollinia (slides/photographs, fresh material), ultra-structure of pollen wall (micrograph); Pollen viability: Tetrazolium test germination: Calculation of percentage germination in different media using hanging drop method
Expt. 3: Ovule: Types-anatropous, orthotropous, amphitropous / campylotropous, circinotropous, unitegmic, bitegmic; tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril (permanent slides/specimens/photographs)

Expt. 4: Female gametophyte through permanent slides/photographs: Types, ultrastructure of mature egg apparatus

Expt. 5: Intra-ovarian pollination; Test tube pollination through photographs

Expt. 6: Endosperm: Dissections of developing seeds for endosperm with free-nuclear haustoria

Expt. 7: Embryogenesis: Study of development of dicot embryo through permanent slides; dissection of developing seeds for embryos at various developmental stages; Study of suspensor through electron micrographs

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BOPM306T: PLANT METABOLISM
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:

CO 1: Interpret the concepts of metabolism- carbohydrates, nitrogen and lipids (Understanding)
CO 2: Understand the process of photosynthesis and carbon assimilation (Understanding)
CO 3: Explain the pathways involved in respiration and ATP synthesis (Understanding)
CO 4: Rephrase the structure and properties of amino acids and proteins (Understanding)

Module I: Concept of Metabolism (6 Hours)
Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric, covalent modulation and Isozymes)

Module II: Carbon Assimilation (10 Hours)
Historical background, role of photosynthetic pigments (chlorophylls and accessory pigments), photosystems (PSI, PSII), antenna molecules and reaction centers, photochemical reactions, electron transport chain and photophosphorylation, mechanism of ATP synthesis
CO2 reduction: C3 and C4 pathways, Crassulacean acid metabolism, photorespiration, Factors affecting CO2 reduction

Module III: Carbohydrate Metabolism (4 Hours)
Structure, properties and importance of mono-, di- and polysaccharides, synthesis and catabolism of sucrose and starch

Module IV: Carbon Oxidation (8 Hours)
Glycolysis and its regulation, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, TCA cycle and its regulation, mitochondrial electron transport, oxidative phosphorylation, substrate level phosphorylation, mechanism of ATP synthesis, ATP synthase, cyanide-resistant respiration, anaerobic conversion of pyruvate into ethanol or lactate, factors affecting respiration

Module V: Lipid Metabolism (6 Hours)
Classification, structure and functions of fatty acids and triglycerides, synthesis and breakdown of triglycerides, α oxidation, β-oxidation, glyoxylate cycle, gluconeogenesis

Module VI: Nitrogen Metabolism (6 Hours)
Nitrogen cycle, nitrate assimilation, ammonium assimilation and transamination, biological nitrogen fixation (examples of legumes and non-legumes), physiology and biochemistry of nitrogen fixation

Module VII: Proteins and Amino acids (5 Hours)
Classification, structure and properties of amino acids and proteins

Suggested Readings
BOPM307L: PLANT METABOLISM LAB
(1 CREDIT-30 HOURS) (L-T-P: 0-0-1)

Course outcomes
At the end of this course, student will be able to:
CO 1: Utilize the knowledge to separate photosynthetic pigments (Applying)
CO 2: Demonstrate Hill’s reaction, fluorescence and absorption spectrum of photosynthetic pigments (Understanding).
CO 3: Interpret the effects of light and carbon dioxide on photosynthesis
CO 4: Compare the rate of respiration in various plant materials (Understanding)
CO 5: Infer the activity of nitrate reductase and lipases (Understanding)

Practical:
Expt. 1: Expt.1. Chemical separation of photosynthetic pigments
Expt. 2: Expt.2. Experimental demonstration of Hill’s reaction
Expt. 3: Expt.3. Study of the effect of light intensity on the rate of photosynthesis
Expt. 4: Expt.4. Effect of carbon dioxide on the rate of photosynthesis
Expt. 5: Expt.5. Comparison of the rate of respiration in different parts of a plant
Expt. 6: Expt.6. Demonstration of activity of Nitrate Reductase in germinating leaves of different plant sources
Expt. 7: Expt.7. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids during germination
Expt. 8: Expt.8. Demonstration of fluorescence by isolated chlorophyll pigments
Expt. 9: Expt.9. Demonstration of absorption spectrum of photosynthetic pigments

BOMO308T: MOLECULAR BIOLOGY
(3 Credit-45 Hours)(L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Define the molecular structure of DNA and RNA. (Remembering)
CO 2: Explain the mechanism of DNA replication of both linear and circular DNA as well as protein synthesis including transcription and translation in both prokaryotes and eukaryotes. (Understanding)
CO 3: Illustrate the post-translational modifications and processing of eukaryotic mRNA and prokaryotic and eukaryotic gene regulation. (Understanding)
CO 4: Distinguish the different DNA repair mechanisms with their significance. (Analyzing)
CO 5: Summarize the interdependence of these molecular mechanisms in providing a holistic environment for the smooth functioning of a cell/organism. (Understanding)

Module I: Nucleic Acids (3 Hours)
Historical perspective; DNA as the carrier of genetic information (Griffith’s, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel-Conrat’s experiment RNA and its significance in evolution.

Module II: The Structures of DNA and RNA (7 Hours)
DNA Structure: Miescher to Watson and Crick-historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Org-anization of DNA-Prokaryotes, Viruses,

Module III: DNA Replication (6 Hours)
DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres, Enzymes for replication, process of prokaryotic and eukaryotic replication

Module IV: Central Dogma and Genetic Code (4 Hours)
Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features).

Module V: Transcription (6 Hours)
RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors.

Module VI: Translation (Prokaryotes and eukaryotes) (6 Hours)
Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

Module VII: Post Transcriptional Modifications and Processing of Eukaryotic RNA (4 Hours)
Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Module VIII: Regulation of Transcription in prokaryotes and Eukaryotes (5 Hours)
Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements; Gene silencing, Genetic imprint

Module IX: DNA Repair Mechanisms (4 Hours)
Pyrimidine dimerization and mismatch repair, Regulatory RNAs 3 Ribo-switches, RNA interference, miRNA, siRNA

Suggested Readings

Mapping of COs to syllabus

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BOMO309L: MOLECULAR BIOLOGY LAB
(2 Credit-60 Hours) (L-T-P:0-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Explain the structure of chromosome. (Understanding)
CO 2: Design the growth medium and estimate growth kinetics. (Creating)
CO 3: Estimation of DNA and RNA using different analytical tools. (Evaluating)
CO 4: Interpret the micrographs of DNA replication and split genes. (Understanding)
CO 5: Prepare LB medium for growing bacterial cultures (Creating)

Practical:
Expt. 1: Preparation of LB medium and raising E.Coli and Isolation of genomic DNA from E.Coli
Expt. 2: DNA estimation by diphenylamine reagent/UV Spectrophotometry
Expt. 3: Estimation of the growth kinetics of E. coli by turbidity method
Expt. 4: Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking
Expt. 5: Quantitative estimation of RNA using Orcinol reaction.
Expt. 6: Study and interpretation of electron micrographs/ photograph showing (a) DNA replication (b) Transcription (c) Split genes
Expt. 7: Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi discontinuous replication)
Expt. 8: Photographs establishing nucleic acid as genetic material (Meselson and Stahl’s, Avery et al, Griffith’s, Hershey & Chase’s and Fraenkel &Conrat’s experiments)
Expt. 9: Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing
Expt. 10: Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs

Mapping of CoS to Syllabus

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BOEC310T: ECONOMIC BOTANY

(3 Credit-45 Hours) (L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:

CO 6: Understanding different dimensions of plant identification as a resource for self-sustenance, their domestication, commercialization etc. (Understanding)
CO 7: Understand the cultivation, extraction processes of different economically useful plants. (Understanding)
CO 8: Execute the concepts developed in the class in their daily activities (Applying)
CO 9: Survey the uses of economically important plants. (Analyzing)
CO 10: Induction of modern techniques and processing methods for useful crops (Creating)

Module I: Origin of Cultivated Plants (5 Hours)
Concept of Centres of Origin; their importance with reference to Vavilov’s work examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity and commercialization

Module II: Nature of Plant Products (7 Hours)
Importance and Nature of Plant Products: Protoplasm and its Activities; Photosynthesis; Plant skeleton; Reserved food (Carbohydrates, Fats and Proteins); Secretions and Excretions (Essential Oils, Pigments, Tannins, Latex, Waxes, Alkaloids, Glycosides, Organic Acids, Enzymes, Vitamins, Hormones). Different Aspects of Economic Botany; Classification of Economically Important Plants

Module III Cereals, legumes and Pulses (5 Hours)
Wheat and Rice (origin, morphology, processing & uses), brief account of millets, General account of legumes, importance to man and ecosystem

Module IV: Oil, Essential oil and Fats (4 Hours)
General account with special reference to Drying oils, semi drying oils; Non-drying oils, essential oil and Vegetables Fats, extraction methods and uses.

Module V: Fibre and rubber yielding Plants (4 Hours)
Classification based on the origin of fibres, Cotton and Jute (morphology, extraction and uses). Para-rubber: tapping, processing and uses
Module VI: Sugars and starches yielding Plants (5 Hours)
Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses

Module VII: Spices (4 Hours)
Listing of important spices, their family and part used, economic importance with Special reference to fennel, saffron, clove and black pepper

Module VIII: Beverages (4 Hours)
Tea, Coffee (morphology, processing & uses)

Module IX: Forest Products and Resources (4 Hours)
Importance and Structures of Wood; Mechanical Properties and Factors of Wood; General account with special reference to Teak, Sal, Pine and Bamboos.

Module X: Other economically Important Plants (3 Hours)
A general accounts on Poisonous Plants, Ceremonial Plants, Herbal Plants, medicinal Plants.

Suggested Readings

Mapping of COs to syllabus

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BOEC311L: ECONOMIC BOTANY LAB
(1 Credit-30 Hours) (L-T-P:0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Recollect the morphology and anatomy of various economically important plants. (Remembering)
CO 2: Explain the economic importance of crop plants. (Understanding)
CO 3: Execute various micro-chemical tests of cereals, legumes, sugars and starches. (Applying)
CO 4: Able to carry out qualitative and quantitative checking of crop plant products. (Evaluating)

Practical:
Expt. 1: Cereals: Wheat (habit sketch, L. S/T.S. grain, starch grains, micro-chemical tests) Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests)
Expt. 2: Legumes: Soya bean, Groundnut, (habit, fruit, seed structure, micro-chemical tests)
Expt. 3: Sugars & Starches: Sugarcane (habit sketch; cane juice-micro-chemical tests), Potato (habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w. m. starch grains, micro-chemical tests)
Expt. 4: Spices: Black pepper, Fennel and Clove (habit and sections)
Expt. 5: Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans)
Expt. 6: Oils & Fats: Coconut-T.S. Nut, Mustard–plant specimen, seeds; tests for fats in crushed seeds
Expt. 7: Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).
Expt. 8: Rubber: specimen, photograph/model of tapping, samples of rubber products
Expt. 9: Drug-yielding plants: Specimens of Digitalis, Papaver and Cannabis
Expt. 10: Tobacco: specimen and products of Tobacco
Expt. 11: Woods: Tectona, Pinus: Specimen, Section of young stem.
Expt. 12: Fibre-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fibre and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fibre)
BOAT400L: ANALYTICAL TECHNIQUES IN PLANT SCIENCES
(3 Credit-45 Hours) (L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Interpret various microscopic techniques (Understanding)
CO 2: Compare the different centrifugation techniques (Understanding)
CO 3: Apply radioisotopes and spectrophotometry in biological research (Applying)
CO 4: Illustrate the various chromatographic and molecular techniques (Understanding)
CO 5: Application of digitization technologies in plant Science

Module I: Imaging and Related Techniques (12 Hours)
Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS): Genome estimation (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching, Digital image processing.

Module II: Radioisotopes and Spectrophotometry (7 Hours)
Use in biological research, auto-radiography, pulse chase experiment, Principle and its application in biological research.

Module III: Chromatography (8 Hours)
Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography

Module IV: Characterization of Proteins and Nucleic Acids (6 Hours)
Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE, native PAGE

Module V: Implication of digitization in Plant Science (12 Hours)
Use of Internet of things, Big Data in Plant study and conservations, Application of spectral signatures in plant distribution, taxonomy, biochemical estimation, vegetation index (NDVI, PVI, SVI), characterize by its size, shape, boundaries and internal structure ETC

Suggested Readings
6. IoT in Agriculture Investigation on Plant Diseases and Nutrient Level Using Image Analysis Techniques

Mapping of COs to Syllabus

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BOAT401L: ANALYTICAL TECHNIQUES IN PLANT SCIENCES LAB
(1 Credit-30 Hours)(L-T-P:0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Infer the various blotting techniques as well as PCR (Understanding)
CO 2: Utilize paper chromatography and TLC to separate sugars and nitrogenous bases (Applying)
CO 3: Apply radioisotopes and spectrophotometry in biological research (Applying)
CO 4: Illustrate the various microscopic, biochemical and molecular techniques (Understanding)
CO 5: Application of digitization technologies in plant Sciences (Evaluating)

Practical
Expt. 1: Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs
Expt. 2: Separation of sugars, chloroplast by thin layer/paper chromatography
Expt. 3: Isolation of chloroplast by differential centrifugation
Expt. 4: Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH)
Expt. 5: Study of DNA/protein separation by using AGE/PAGE
Expt. 6: Preparation of permanent slides (double staining)
Expt. 7: Estimation of protein concentration through Lowry’s methods
Expt. 8: Study of different spatial imagery, vegetation index and digital image processing through photograph
Expt. 9: Study of different parts and functions of Sensors used in GIS ang IOTs

Suggested Readings
7. IoT in Agriculture Investigation on Plant Diseases and Nutrient Level Using Image Analysis Techniques

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BOBS402T: BIOSTATISTICS
(3 Credit-45 Hours) (L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Define basic terminologies in Biostatistics. (Remembering)
CO 2: Explain the concepts of biostatistics and its use in biology. (Understanding)
CO 3: Apply the statistics tools for data analysis. (Applying)
CO 4: Design sampling methods to generate significant data. (Creating)

Module I: Introduction (8 Hours)
Biostatistics - definition - statistical methods - basic principles Variables - measurements, functions, limitations and uses of statistics
Module II: Collection of Data (8 Hours)
Collection of data primary and secondary - types and methods of data collection procedures - merits and demerits Classification - tabulation and presentation of data - sampling methods

Module III: Measures of Central Tendency (10 Hours)
Measures of central tendency - mean, median, mode, geometric mean - merits & demerits. Measures of dispersion - range, standard deviation, mean deviation, quartile deviation - merits and demerits; Co-efficient of variations

Module IV: Correlation & Regression (10 Hours)
Correlation - types and methods of correlation, regression, simple regression equation, fitting prediction, similarities and dissimilarities of correlation and regression

Module V: Statistical Inference and Experimental design (9 Hours)
Statistical inference - hypothesis - simple hypothesis - student’s t’ test - chi square test, Experimental design softwares.

Suggested Readings
4. Bishop, O. N. Houghton, Mifflin Statistics for Biology, Boston

Mapping of Cos to Syllabus

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BOBS403L: BIOSTATISTICS LAB
(2 CREDITS-60 HOURS) (L-T-P: 0-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Tell the definitions and formula of various statistical terms (Remembering)
CO 2: Make use of statistical calculations for data interpretation (Applying)
CO 3: Analyse any given biological data to see their accuracy and importance (Analyzing)

Practical
Expt. 1: Calculation of mean, standard deviation and standard error
Expt. 2: Calculation of correlation coefficient values and finding out the probability
Expt. 3: Calculation of ‘F’ value and finding out the probability value for the F value
Expt. 4: Demonstration of an experimental trial and statistical optimization using MINITAB/Design Expert.

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BOPL404T: PLANT BIOTECHNOLOGY
(3 Credits-45 HOURS) (3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Define the terms and concepts of plant tissue culture (Remembering)
CO 2: Explain Plant tissue culture & recombinant DNA Technology (Understanding)
CO 3: Utilize the knowledge of plant tissue culture techniques in their future research works (Applying)
CO 4: Develop/improve protocols for better transgenic products (Creating)
Module I: Plant Tissue Culture (10 Hours)
Historical perspective; Composition of media; Nutrient and hormone requirements (role of vitamins and hormones); Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation)

Module II: Recombinant DNA Technology (20 Hours)
Restriction Endonucleases (History, Types, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC).Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning); Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, PCR; Methods of gene transfer- Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics— selectable marker and reporter genes (Luciferase, GUS, GFP)

Module III: Applications of Biotechnology (15 Hours)
GMOs, Pest resistant (Bt-cotton); herbicide resistant plants (Roundup Ready soybean); Transgenic crops with improved quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Genetically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.

Suggested Readings

Mapping of Cos to Syllabus

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BOPL405L: PLANT BIOTECHNOLOGY LAB
(2 Credits-60 HOURS) (0-0-2)

Course outcomes
At the end of this course, student will be able to:
CO 1: Study various media used in Plant tissue culture Laboratory (Remembering)
CO 2: Explain/demonstrate different molecular biology techniques in tissue culture (Understanding).
CO 3: Analyze modern DNA techniques used in plant improvement (Analyzing)
CO 4: Evaluate and compare techniques in plant tissue culture (Evaluating)

Practical
Expt. 1: **a)** Preparation of MS medium **b)** Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc
Expt. 2: Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs
Expt. 3: Isolation of protoplasts
Expt. 4: Construction of restriction map of circular and linear DNA from the data provided
Expt. 5: Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.
Expt. 6: Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs
Expt. 7: Isolation of plasmid DNA
Expt. 8: Restriction digestion and gel electrophoresis of plasmid DNA

Mapping of Cos to syllabus

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BOPA406T: PLANT PATHOLOGY
(3 Credits-45 HOURS) (3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Classify various microorganisms and explain their properties (Understanding)
CO 2: Identify and detect microbial plant diseases and plan control strategies (Applying)
CO 3: Assess and recommend post-harvest controls measures and techniques (Evaluating)

Module I: Plant Microbial diversity (8 Hours)
Bacteria & Archeabacteria: general properties, classification, economic importance; Viruses- general properties, classification and economic importance, nematodes and Mycoplasma-general properties and importance

Module II: An insight into Plant Pathology (10 Hours)
Historical and developmental aspects of plant pathology, mode of infection and role of enzymes and toxins in plant disease, defense mechanisms of plants against infection

Module III: Plant diseases and effects on physiological functions (15 Hours)
Study of plant diseases caused by fungi, bacteria, viruses, nematodes and mycoplasma; identifications and characterizations. Environmental factors on disease development and epidemiology. Effects of diseases on physiological functions of plants.

Module IV: Plant diseases control measures (12 Hours)
Plant disease control measures: cultural, chemical, biological, bio pesticides, breeding for resistant varieties, plant quarantine, integrated pest management; molecular and transgenic approach for crop protection

Suggested readings:
7. Gour HN. Physiological and Molecular Plant Pathology, Scientific Publishers India.

Mapping of Cos to Syllabus

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BOPA407L: PLANT PATHOLOGY LAB
(2 Credits-60 HOURS) (0-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Prepare different media used in microorganism isolation (Applying)
CO 2: Identify various plant pathogens and symptoms in plants (Applying)
CO 3: Formulate control strategies of plant diseases (Creating)

Syllabus
Expt. 1: Preparation of nutrient media (solid/liquid) for microorganisms’ isolation
Expt. 2: Staining techniques (Gram's staining, Fungal staining)
Expt. 3: Detailed study of symptoms of representative diseases of plantation crops, Collection and dry preservation of diseased specimens of important crops
Expt. 4: Isolation and characterization of pathogens from diseased plants
Expt. 5: Test of plant disease control using chemicals agent, biological and mechanical means

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MINOR COURSES

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BONV104T: INTRODUCTION TO NON-VASCULAR PLANTS
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: Recall the unique features of non-vascular plants (Remembering)
CO 2: Classify and demonstrate the morphology and reproduction of algae (Understanding)
CO 3: Classify and demonstrate their morphology, anatomy and reproduction of bryophytes (Understanding)
CO 4: Illustrate the economic importance of algae and bryophytes (Understanding)

Module I: Introduction (2 Hours)
Introduction to non-vascular plants; Transition to land habit, Classification of algae and bryophytes.

Module II: Chlorophyta and Charophyta (8 Hours)
General Characteristics of Chlorophyta and Charophyta; Occurrence; Range of thallus organization; Cell structure; Reproduction; Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium, Chara.

Module III: Phaeophyta and Rhodophyta (10 Hours)
Phaeophyta and Rhodophyta Characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction; Morphology and life-cycles of Ectocarpus, Fucus and Polysiphonia

Module IV: Bryophytes (20 Hours)
General characteristics; Adaptations to land habit; Classification; Range of thallus organization; Classification (up to family) reproduction of Riccia, Marchantia, Anthoceros and Sphagnum

Module V: Economic importance of algae and bryophytes (5 Hours)
Role of algae in the environment, agriculture, biotechnology and industry.
Ecological and economic importance of bryophytes with special reference to Sphagnum

Suggested Readings.
4. Vander-Poorter 2009 Introduction to Bryophytes. COP

Mapping of COs to syllabus

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BONV10Sl: INTRODUCTION TO NON-VASCULAR PLANTS LAB
(1 CREDIT-30 HOURS) (L-T-P: 0-0-1)

Course outcomes
At the end of this course, student will be able to:
CO 1: Differentiate the vegetative and reproduction structures in algae (Applying)
CO 2: Able to understand reproduction and multiplication processes in bryophytes (Understanding)
CO 3: Utilize and create basic identification techniques for non-vascular plants (Creating)

Practical:
Expt. 1: Study of vegetative and reproductive structures of *Chlamydomonas* (electron micrographs)
Expt. 2: Study the reproduction of *Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus* and *Polysiphonia, Prochloron* through electron micrographs, temporary preparations and permanent slides
Expt. 3: *Riccia*—Study of morphology of thallus (temporary/permanent slides)
Expt. 4: *Anthoceros*—Study of morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slide), vertical section of thallus (permanent slide).
Expt. 5: *Sphagnum*—Study of morphology of plant, whole mount of leaf (permanent slide only)

Mapping of COs to syllabus

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BOVP106T: INTRODUCTION TO VASCULAR PLANTS (PTERIDOPHYTES, GYMNOSPERMS, ANGIOSPERMS)
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)

Course Outcomes:
At the end of this course, students will be able to:
CO 1: Classify Pteridophytes based on their morphology, anatomy, reproduction and life cycles.
CO 2: Classify Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
CO 3: Understand various taxonomical aids for identification of Angiosperms.
CO 4: Analyze the systematic description and economic value of common Angiosperms

Module I: Pteridophytes (12 Hours)
General characteristics of Pteridophytes, classification of Smith (1955) upto division; Occurrence, morphology, anatomy, reproduction (developmental details not to be included); life history of (a) Lycopodium (Lycopsida) and (b) Marsilea (Filicopsida); Stelar evolution, heterospory and seed habit; Ecological and economic importance of Pteridophytes

Module II: Gymnosperms (14 Hours)
General characteristics of Gymnosperms; classification upto class; Occurrence, morphology, anatomy, reproduction (developmental details not to be included) and life history of (a) Cycas, (Cycadopsida), (b) Pinus (Coniferopsida) and (c) Gnetum (Gnetopsida); Ecological and economic importance of Gymnosperms

Module III: Basic aspects of Angiosperm Taxonomy (8 Hours)
Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family; Plant nomenclature: Binomial system, ICBN-rules for nomenclature; Bentham and Hooker system of classification

Module IV: Systematic Taxonomy (11 hours)
Systematic description and economic importance of the following families: (a) Brassicaceae (b) Curcurbitaceae (c) Rutaceae (d) Fabaceae (e) Asteraceae (f) Solanaceae (g) Lamiaceae (h) Euphorbiaceae (i) Orchidaceae and (j) Poaceae

Suggested readings:

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**BOVP107L: INTRODUCTION TO VASCULAR PLANTS LAB**

(1 CREDIT: 30 HOURS) (L-T-P: 0-0-1)

**Course Outcomes**

At the end of this course, student will be able to:

- **CO 1:** Infer the concepts of classification system and identification of few important pteridophytes (Understanding)
- **CO 2:** Summarize the concepts of classification system and identification of few important gymnosperms (Understanding)
- **CO 3:** Differentiate between monocots and dicots (Understanding)
- **CO 4:** Collect, prepare and document herbarium specimens through non-destructive field collection method so as to get acquainted with herbarium technique (Applying)

**Practical**

- *Expt. 1:* Study of morphology and reproductive structures of the following pteridophytes: *Lycopodium, Selaginella, Equisetum, Adiantum* and *Marsilea*.
- *Expt. 2:* To study the morphology and reproductive features of the following gymnosperms: *Cycas* and *Pinus*.
- *Expt. 3:* Taxonomic study of selected families of dicots and monocots of angiospermic plants (three of each).
- *Expt. 4:* Collection, preparation and documentation of herbarium specimens through non-destructive field collection method so as to get acquainted with herbarium technique.

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**BOFP210T: MORPHOLOGY AND ANATOMY OF FLOWERING PLANTS**

(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

**Course Outcomes**

At the end of this course, student will be able to:

- **CO 1:** Develop an understanding of concepts and fundamentals of plant morphology and anatomy (Understanding)
- **CO 2:** Examine the morphology and internal anatomy of plant systems and organs (Remembering)
- **CO 3:** Comprehend the concepts of organization and development of shoot and root apices (Understanding)
- **CO 4:** Examine the structure and role of cambium (Analyzing)
- **CO 5:** Evaluate the adaptive, protective and secretory systems of plants (Evaluating)

**Module I: Plant morphology (4 hours)**

Introduction; Vegetative Characters: Modified Roots and Stems; Leaf (Phyllotaxy), Venation; Trichomes.

**Module II: Reproductive Characters (7 hours)**

Floral parts, Arrangements of flowers on the floral axis, Unisexual and Bisexual Flowers, Variation in fruit surface, Placentation, Variation in seed coats.
Module III: Tissues (14 Hours)
Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Wall ingrowths and transfer cells, encrustation and incrustation, Ergastic substances

Module IV: Stem, Leaves and Roots (20 Hours)
Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cytohistological zonation); Types of vascular bundles; Structure, function and seasonal activity of cambium; Structure of dicot and monocot stem; Structure of dicot and monocot leaf, Kranz anatomy, Development and composition of periderm, rhytidome and lenticels; Organization of root apex (Apical cell theory, Histogen theory, Korper- Kappe theory); Secondary growth in root and stem; Quiescent centre; Root cap; Structure of dicot and monocot root; Endodermis, exodermis and origin of lateral root

Suggested Readings

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BOFP211L: MORPHOLOGY AND ANATOMY OF FLOWERING PLANTS LAB
(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Prepare permanent slides, temporary stain mounts, macerations and museum specimens (Creating)
CO 2: Gain the knowledge about apical meristem of root, shoot and vascular system (Understanding)
CO 3: Apprehend the ideas of the distribution and types of tissues (Understanding)
CO 4: Gain an understanding on secondary growth and wood anatomy in plants (Applying)
CO 5: Scrutinize the different aspects of plant adaptations (Analyzing)

Practical:
Expt. 1: Study of anatomical details through permanent slides/temporary stain mounts/ macerations/ museum specimens with the help of suitable examples
Expt. 2: Apical meristem of root, shoot and vascular cambium
Expt. 3: Distribution and types of parenchyma, collenchyma and sclerenchyma
Expt. 4: Xylem: Tracheary elements- tracheids, vessel elements; thickenings; perforation plates; xylem fibres
Expt. 5: Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres
Expt. 6: Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular
Expt. 7: Root: monocot, dicot, secondary growth
Expt. 8: Stem: monocot, dicot. - Primary and secondary growth; periderm; lenticels
Expt. 9: Leaf: isobilateral, dorsiventral, C4 leaves (Kranz anatomy)
Expt. 10: Adaptive Anatomy: xerophytes, hydrophyte

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BQEB212T: INTRODUCTION TO ECONOMIC BOTANY
(3 Credit-45 Hours)(L-T-P:3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Understanding different dimensions of plant identification as a resource for self-sustenance, their domestication, commercialization etc. (Understanding)
CO 2: Understand the cultivation, extraction processes of different economically useful plants. (Understanding)
CO 3: Execute the concepts developed in the class in their daily activities. (Applying)
CO 4: Survey the uses of economically important plants. (Analyzing)
CO 5: Induction of modern techniques and processing methods for useful crops. (Creating)

Module I: Origin of Cultivated Plants (5 Hours)
Concept of Centres of Origin; their importance with reference to Vavilov’s work examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity and commercialization

Module II: Introduction to Nature of Plant Products (7 Hours)
Importance and Nature of Plant Products: Protoplasm and its Activities; Photosynthesis; Plant skeleton; Reserved food (Carbohydrates, Fats and Proteins); Secretions and Excretions (Essential Oils, Pigments, Tannins, Latex, Waxes, Alkaloids, Glycosides, Organic Acids, Enzymes, Vitamins, Hormones). Different Aspects of Economic Botany; Classification of Economically Important Plants

Module III Cereals, legumes and Pulses (5 Hours)
Wheat and Rice (origin, morphology, processing & uses), brief account of millets, General account of legumes, importance to man and ecosystem

Module IV: Oil, Essential oil and Fats (4 Hours)
General account with special reference to Drying oils, semi drying oils; Non-drying oils, essential oil and Vegetables Fats, extraction methods and uses.

Module V: Fibre and rubber yielding Plants (4 Hours)
Classification based on the origin of fibres, Cotton and Jute (morphology, extraction and uses). Para-rubber: tapping, processing and uses

Module VI: Sugars and starches yielding Plants (5 Hours)
Morphology and processing of sugarcane, products and by- products of sugarcane industry. Potato – morphology, propagation & uses

Module VII: Spices (4 Hours)
Listing of important spices, their family and part used, economic importance with Special reference to fennel, saffron, clove and black pepper

Module VIII: Beverages (4 Hours)
Tea, Coffee (morphology, processing & uses)

Module IX: Forest Products and Resources (4 Hours)
Importance and Structures of Wood; Mechanical Properties and Factors of Wood; General account with special reference to Teak, Sal, Pine and Bamboos.

Module X: Other economically Important Plants (3 Hours)
A general accounts on Poisonous Plants, Ceremonial Plants, Herbal Plants, medicinal Plants.

Suggested Readings

Mapping of COs to syllabus

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BOEB213L: INTRODUCTION TO ECONOMIC BOTANY LAB  
(1 Credit-30 Hours) (L-T-P:0-0-1) 

Course Outcomes  
At the end of this course, student will be able to:  
CO 1: Recollect the morphology and anatomy of various economically important plants. (Remembering)  
CO 2: Explain the economic importance of crop plants. (Understanding)  
CO 3: Execute various micro-chemical tests of cereals, legumes, sugars and starches. (Applying)  
CO 4: Able to carry out qualitative and quantitative checking of crop plant products. (Evaluating)  

Practical:  
Expt. 1: Cereals: Wheat (habit sketch, L. S/T.S. grain, starch grains, micro-chemical tests) Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests)  
Expt. 2: Legumes: Soya bean, Groundnut, (habit, fruit, seed structure, micro-chemical tests)  
Expt. 3: Sugars & Starches: Sugarcane (habit sketch; cane juice-micro-chemical tests), Potato (habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w. m. starch grains, micro-chemical tests)  
Expt. 4: Spices: Black pepper, Fennel and Clove (habit and sections)  
Expt. 5: Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans)  
Expt. 6: Oils & Fats: Coconut-T.S. Nut, Mustard–plant specimen, seeds; tests for fats in crushed seeds  
Expt. 7: Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Eucalyptus (specimens/photographs).  
Expt. 8: Rubber: specimen, photograph/model of tapping, samples of rubber products  
Expt. 9: Drug-yielding plants: Specimens of Digitalis, Papaver and Cannabis  
Expt. 10: Tobacco: specimen and products of Tobacco  
Expt. 11: Woods: Tectona, Pinus: Specimen, Section of young stem.  
Expt. 12: Fibre-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fibre and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fibre)  

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BOET313T: ETHNOBOTANY  
(3 CREDITS-45 HOURS) (L-T-P: 3-0-0)  

Course Outcomes  
At the end of this course, student will be able to:  
CO 1: Demonstrate the concept, scope and objectives of ethnobotany with reference to tribal lifestyle (Understanding)  
CO 2: Interpret different ethnobotanical methodologies (Understanding)  
CO 3: Examine the role of various plants in traditional and modern medicine (Analyzing)  
CO 4: Infer the legal aspects of ethnobotany (Understanding)  
CO 5: Evaluate the different conservational strategies of medicinal plants (Evaluating)  

Module I: Ethnobotany (7 Hours)  
Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science; the relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses  

Module II: Methodology of Ethnobotanical Studies (4 Hours)  
a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places  

Module III: Role of Ethnobotany in Modern Medicine (14 Hours)  
Medico-ethno botanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctum c) Vitex negundo. d) Gloriosa superba e) Tribulusterrestrisf) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria. Role of ethnobotany in modern medicine with special example
Rauvolfiasepentina, Trichopuszeylanicus, Artemisia, Withania; Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management)

Module IV: Ethnobotany and Legal Aspects (8 Hours)
Ethnobotany as a tool to protect interests of ethnic groups; Sharing of wealth concept with few examples from India; Biopiracy, Intellectual Property Rights and Traditional Knowledge

Module V: Conservation Strategies (12 Hours)
Conservation of endangered and endemic medicinal plants Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding

Suggested Readings

Mapping of COs to Syllabus

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BOET314L: ETHNOBOTANY LAB
(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

Course Outcome
At the end of this course, student will be able to:
CO 1: Execute various collection methods for specimen collection (Applying)
CO 2: Knowledge on preparing and labelling herbarium specimen (Understanding)
CO 3: Able to extract crude extracts from important plants (Applying)
CO 4: Collect information of Ethnobotanically important plants (Evaluating)

Practical
Expt. 1: Collection method of plants from the field
Expt. 2: Preparation and labelling of herbarium specimens (minimum 10 plants)
Expt. 3: Extraction of crude extracts from various ethnobotanically important plant material (minimum 3 plants)
Expt. 4: Field survey and collection of information on ethnobotanical uses from traditional healers
Expt. 5: Knowledge of some plants used in various ceremonies and rituals

Mapping of COs to syllabus

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BOMD315T: MICROBIAL DIVERSITY
(3 Credits-45 HOURS) (3-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Tell the differences between microbes (Remembering)
CO 2: Classify various microorganisms and explain their properties (Understanding)
CO 3: Evaluate the importance of microbes in environment and agriculture (Evaluating)

Module I: Introduction to Microorganisms (10 Hours)
Historical developments: Discovery of microorganisms, Spontaneous Generation Controversy, Germ theory of fermentation, Germ theory of disease. Classification of microorganisms

Module II: Prokaryotic Microbes (10 Hours)
Eubacteria, Archaeobacteria, Cyanobacteria—General comparison, Morphology and structures; cell wall chemistry and internal organelles, role in environment

Module III: Eukaryotic Microbes (15 Hours)
Algae and Fungi—General characteristics and classification, cellular structures, modes of reproductions, economic importance and role in environment and agriculture.

Module IV: Viruses (10 Hours)
Origin, classification and nomenclature of viruses, general structures of viruses, bacteriophages—types and uses; prions and viroids—nature and importance

Suggested reading:

Mapping of COs to Syllabus

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BOMD316L: MICROBIAL DIVERSITY LAB
(1 Credit-30 Hours) (0-0-1)

Course outcomes
At the end of this course, student will be able to:
CO 1: Differentiate between cell shapes and structures of microorganisms (Applying)
CO 2: Able to understand reproduction and multiplication processes in microbes (Understanding)
CO 3: Utilize and create basic identification techniques for microbes (Creating)

Practical
  Expt. 1: Types of Bacteria to be observed from temporary/permanent slides/photographs.
  Expt. 2: Electron micrographs/Models of viruses and bacteriophages
  Expt. 3: Staining of prokaryotic and eukaryotic microbes
  Expt. 4: Study of vegetative and reproductive structures of Algae and Fungi through electron micrographs, temporary preparations and permanent slides

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BOIM408T: INDUSTRIAL MICROBIOLOGY
(2 CREDITS-30 HOURS) (L-T-P:2-0-0)

Course outcomes
At the end of this course, student will be able to:
CO 1: Tell the basics of bioreactors and fermentation process (Remembering)
CO 2: Explain the role of microbes in industry, agriculture and environment (Understanding)
CO 3: Compare various techniques used in waste water treatment (Analyzing)
CO 4: Assess and evaluate pollutants in environment (Evaluating)

Module I: Bioreactors/Fermenters and Fermentation Processes (8 Hours)
Types of Fermentation: Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations, components of a typical bioreactor, Types of bioreactors-laboratories, pilot scale and production fermenters; constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter

Module II: Microbial Production of Industrial Products (8 Hours)
Scope of microorganisms in Industries; Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Industrial process of fermentations for the production Enzyme: amylase, Organic acid (citric acid), alcohol (Ethanol) and antibiotic (Penicillin)

Module III: Microbial Enzymes of Industrial Interest and Enzyme Immobilization (5 Hours)
Microorganisms for industrial applications and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase)

Module IV: Microbial Flora of Water (4 Hours)
Water pollution, role of microbes in sewage and domestic waste water treatment systems; Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and faecal coli form in water samples

Module V: Microbes in Agriculture and Environment and Remediation of Contaminated Soils (5 Hours)
Distribution of microbes in air; Isolation of microorganisms from soil, air and water; Biological fixation; Mycorrhizae; Bioremediation of contaminated soils, isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots

Suggested Readings

Mapping of COs to Syllabus:

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BOIM409L: INDUSTRIAL MICROBIOLOGY LAB
(1 CREDIT-30 HOURS) (L-T-P:0-0-1)

Course outcomes
At the end of this course, student will be able to:
CO 1: Tell the principles of laboratory instruments (Remembering)
CO 2: Explain different sterilization techniques and culture media preparation (Understanding)
CO 3: Compare and select best sterilization methods (Evaluating)

Practical:
Expt. 1: Principles and functioning of instruments in microbiology laboratory
Expt. 2: Hands on sterilization techniques and preparation of culture media

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BOFM411T: FUNDAMENTALS OF MOLECULAR BIOLOGY
(3 Credit-45 Hours) [L-T-P:3-0-0]

Course Outcomes
At the end of this course, student will be able to:
CO 1: Define the molecular structure of DNA and RNA. (Remembering)
CO 2: Explain the mechanism of DNA replication of both linear and circular DNA as well as protein synthesis including transcription and translation in both prokaryotes and eukaryotes. (Understanding)
CO 3: Illustrate the post-translational modifications and processing of eukaryotic mRNA and prokaryotic and eukaryotic gene regulation. (Understanding)
CO 4: Distinguish the different DNA repair mechanisms with their significance. (Analyzing)
CO 5: Summarize the interdependence of these molecular mechanisms in providing a holistic environment for the smooth functioning of a cell/organism. (Understanding)

Module I: Nucleic Acids (3 Hours)
Historical perspective; DNA as the carrier of genetic information (Griffith’s, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel-Conrat’s experiment RNA and its significance in evolution.

Module II: The Structures of DNA and RNA (7 Hours)
DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Org- anization of DNA-Prokaryotes, Viruses, Eukaryotes. RNA: Types and Structure, Organelle DNA—mitochondria and chloroplast DNA. The nucleosome, chromatin structure—Euchromatin, Heterochromatin—Constitutive and facultative heterochromatin.

Module III : DNA Replication (6 Hours)
DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres, Enzymes for replication, process of prokaryotic and eukaryotic replication

Module IV: Central Dogma and Genetic Code (4 Hours)
Key experiments establishing: The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features).

Module V: Transcription (6 Hours)
RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors.

Module VI: Translation (Prokaryotes and eukaryotes) (6 Hours)
Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

Module VII: Post Transcriptional Modifications and Processing of Eukaryotic RNA (4 Hours)
Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Module VIII: Regulation of Transcription in prokaryotes and Eukaryotes (5 Hours)
Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements; Gene silencing, Genetic imprinting.

Module IX: DNA Repair Mechanisms (4 Hours)
Pyrimidine dimerization and mismatch repair, Regulatory RNAs 3 Ribo-switches, RNA interference, miRNA, siRNA

Suggested Readings

Mapping of COs to syllabus

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BOFM412L: FUNDAMENTALS OF MOLECULAR BIOLOGY LAB
(1 Credit-30 Hours) [L-T-P:0-0-1]

Course Outcomes
CO 1: At the end of this course, student will be able to:
CO 2: Explain the structure of chromosome. (Understanding)
CO 3: Design the growth medium and estimate growth kinetics. (Creating)
CO 4: Estimation of DNA and RNA using different analytical tools. (Evaluating)
CO 5: Interpret the micrographs of DNA replication and spilt genes. (Understanding)
CO 6: Prepare LB medium for growing bacterial cultures (Creating)

Practical:
Expt. 1: Preparation of LB medium and raising E.Coli and Isolation of genomic DNA from E.Coli
Expt. 2: DNA estimation by diphenylamine reagent/UV Spectrophotometry
Expt. 3: Estimation of the growth kinetics of E. coli by turbidity method
Expt. 4: Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking
Expt. 5: Quantitative estimation of RNA using Orcinol reaction.
Expt. 6: Study and interpretation of electron micrographs/ photograph showing (a) DNA replication (b) Transcription (c) Split genes
Expt. 7: Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi discontinuous replication)
Expt. 8: Photographs establishing nucleic acid as genetic material (Messelson and Stahl’s, Avery et al, Griffith’s, Hershey & Chase’s and Fraenkel &Conrat’s experiments)
Expt. 9: Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing.
Expt. 10: Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs

Mapping of COs to syllabus

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SKILL ENHANCEMENT COURSES

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<td>BOBI214L</td>
<td>Biosafety, IPR and Bio-entrepreneurship</td>
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BOBT108L: BIOFERTILIZER TECHNOLOGY
(1 CREDITS-15 HOURS) (L-T-P: 1-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Explain different microorganisms used as biofertilizers (Understanding)
CO 2: Select microorganisms for making biofertilizers (Applying)
CO 3: Develop strategies for organic farming (Applying)

Module I: Introduction of microbes as fertilizers (10 Hours)
General account about the microbes used as biofertilizer – Rhizobium, Azotobacter, Azospirillum, Azolla and Anabaena, VAM fungi – isolation, identification, mass multiplication, and carrier-based inoculants, influence on growth and yield of crop plants

Module II: Organic Farming (5 Hours)
Organic farming – Green manuring and organic fertilizers, recycling of biodegradable municipal, agricultural and Industrial wastes – bio compost making methods, types and method of vermi-composting – field Applications

Suggested Readings

Mapping of COs to Syllabus

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<th>Module I</th>
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BOBT108L: BIOFERTILIZER TECHNOLOGY LAB
(2 CREDITS-60 HOURS) (L-T-P: 1-0-2)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Develop microbes based biofertilizers (Applying)
CO 2: Formulate bio compost for organic farming (Creating)

Syllabus
Expt. 1: Isolation/selection of microorganisms (Rhizobium, Azotobacter, Azospirillum, BGA, VAM fungi)
Expt. 2: Multiplication/scale up of microorganisms to be used as biofertilizer
Expt. 3: Processing and packing of microorganisms
Expt. 4: Field trials/applications of biofertilizers
Expt. 5: Preparation of bio-compot using microbes and other sources and packaging

Mapping of COs to syllabus

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BOEB109L: ESSENTIALS OF BIOINFORMATICS
(2 CREDITS-30 HOURS) (L-T-P: 2-0-0)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Interpret the basic terminology of bioinformatics (Understanding)
CO 2: Illustrate the significance of the biological databases in managing biological data. (Understanding)
CO 3: Apply different bioinformatics tools and software in decoding sequences, their structure and interactions and to correlate these data amongst different species. (Applying)

CO 4: Evaluate various statistical methods in data analysis and interpretation. (Evaluating)

Module I: Introduction to Bioinformatics (7 Hours)
Importance, Goal, Scope; Genomics, Transcriptomics, Functional Genomics, Metabolomics, Systems Biology, Molecular Phylogeny; Applications and Limitations of Bioinformatics.

Module II: Biological Databases (8 Hours)
Introduction to biological databases; Primary, secondary and composite databases; Nucleic acid databases (GenBank, DDBJ, EMBL and NDB); Protein databases (PIR, SWISS-PROT, TrEMBL, PDB); Metabolic pathway database (KEGG, EcoCyc, and MetaCyc); Small molecule databases (PubChem, Drug Bank, ZINC, CSD)

Module III: Data Generation and Data Retrieval (8 Hours)
Generation of data (Gene sequencing, Protein sequencing, Mass spectrometry, Microarray), Sequence submission tools (BankIt, Sequin, Webin); Sequence file format (flat file, FASTA, GCG, EMBL, Clustal, Phylip, Swiss-Prot); Sequence annotation; Data retrieval systems (SRS, Entrez)

Module IV: Applications of Bioinformatics software (7 Hours)
Structural Bioinformatics (3-D protein, PDB), CN3D, BLAST, Functional genomics (genome wide and high throughput approaches to gene and protein function), Drug discovery method (Basic concepts)

Suggested Readings

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BOEB109L: ESSENTIALS OF BIOINFORMATICS LAB
(1 CREDITS-30 HOURS) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: To developed the understanding of using different software’s and database. (Understanding)
CO 2: To execute sequence alignment, primer designing, gene prediction phylogenetic tree construction by utilizing the various biological database and tools (Evaluating)
CO 3: To study 3D Structure of Protein using available softwares. (Applying)
CO 4: Apply bioinformatics tools to archive, retrieve, and analyze biological data. (Analyzing)

Practical
Expt. 1: Introduction to various databases available, their usage in sequence searching, retrieval available in databases and Sequence alignment
Expt. 2: Introduction to Gene prediction tools
Expt. 3: Primer designing and analysis
Expt. 4: Phylogenetic Analysis based on sequence alignment data and RAPD/protein profile data
Expt. 5: Study 3D Structure using available software’s.

Suggested Readings

Mapping COs to Syllabus

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BOBI214L: BIOSAFETY, IPR AND BIO-ENTREPRENEURSHIP
(2 CREDITS-30 HOURS) (L-T-P: 2-0-0)
Course Outcomes
At the end of this course, student will be able to:

CO 1: Interpret IPR, patent law and its philosophy (Understanding)

CO 2: Summarize copyrights and related rights and industrial property rights like designs, trademarks, patents, geographical indications and the importance of protecting traditional knowledge (Understanding)

CO 3: Explain the necessity to protect plant varieties and summarize the roles of information technology and biotechnology in the field of IPR (Understanding)

CO 4: Utilize the concepts of intellectual property rights in safeguarding innovations, products etc. in future and possible bioentrepreneurship (Applying)

CO 5: Utilize biosafety measures in handling GMOs and transgenic in laboratories (Utilizing)

Module I: Introduction to Intellectual Property Right (IPR) (2 Hours)
Overview, Concept, Novelty, Utility, Inventiveness/Non-obviousness and kinds Economic importance IPR in India and world: Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO).

Module II: Patents, its Law and Copyrights (10 Hours)

Module III: Trademarks and Industrial Designs (3 Hours)
Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defences, Domain name, Objectives, Rights, Assignments, Infringements, Defences of Design Infringement

Module IV: Protection of Traditional Knowledge and Geographical Indication (7 Hours)

Module V: Protection of Plant Varieties (2 Hours)

Module VI: Intellectual Property Rights: Information Technology & Biotechnology (4 Hours)

Module VII: Biosafety and Entrepreneurship
History of biosafety microbiology and molecular biology, risk assessment, biosafety levels, personal protective equipment, laboratory facilities and safety equipment, disinfection, decontamination, sterilization, regulatory compliance, laboratory security and emergency response, administrative controls, Current trends in biosafety. Entrepreneurship essentials: opportunities, ideas and Innovation; feasibility and market research; business plan; Building a business: business models, teams, pitching and investment, finance; Start-up ecosystem; Technology and bio-entrepreneurship – case studies.

Suggested Readings:
8. Ipr Biosafety And Bioethics 2013 Edition by GOEL, PEARSON
BOBI214L: BIOSAFETY, IPR AND ENTREPRENUERSHIP LAB
(1 CREDIT-30 HOURS) (L-T-P: 0-0-1)

Course Outcomes
At the end of this course, student will be able to:
CO 1: Interpret different IPR, laws governing IPR and their management in biosciences (Understanding)
CO 2: Analyse different steps involve in filing patent applications (Analysing)
CO 3: Relate the fundamentals of business and entrepreneurship to biosciences (Understanding)
CO 4: How to document a detailed project report (Applying)
CO 5: Relate various safety concern related to biosafety (Remembering)

Practical
Expt. 2: Study of different forms of IPR
Expt. 3: Study of how to write Broad Claim and Narrow Claim
Expt. 4: Study the process of how to file a patent application
Expt. 5: Designing of a detailed project report for a product/service
Expt. 6: Study of biosafety levels, personal protective equipment, laboratory facilities and safety equipment through photography.

Mapping COs to Syllabus

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INTERNERSHIP/APPRENTICESHIP/MINOR PROJECT

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BOIN110I/ BOIN215I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 CREDITS: 120 HOURS)

BOIN317I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 CREDITS-60 HOURS)

BOMP312P: MINOR PROJECT
(4 CREDITS-120 HOURS)

GUIDELINES FOR INTERNSHIP/APPRENTICESHIP/MINOR PROJECT
Internship/Apprenticeship/Minor project may be carried out in any reputed and recognized Institutions/Laboratories/Industries/Companies recommended/recognized by Assam Don Bosco University. A written permission for Internship/Apprenticeship/Minor project must be obtained from the Head of the Department/Registrar of the University. All interns will be under the mentorship of the department faculty members and co-mentored by any regular employee (Assistant Professor and above) of the Institutes where the student(s) is/are undergoing internship. All interns must abide by the rules and regulations of the host Institutions/Laboratories/Industries/Companies. After the completion of the Internship/Apprenticeship/Minor project, students must obtain a certificate from the Head of the Institutions/Laboratories/Industries/Companies in Letterhead clearing mentioning the starting and completion dates of Internship/Apprenticeship/Minor project. A report about the Internship/Apprenticeship/Minor project undertaken by the student will have to be submitted to the concerned department at the end of the Internship/Apprenticeship/Minor project.

Duration: Internship/Apprenticeship/Minor project will be of 8 weeks duration (during summer breaks).

Attendance: Co-mentors of the Institutions/Laboratories/Industries/Companies where the student is undergoing Internship/Apprenticeship/Minor project will have to maintain regular attendance records of the intern.

Assessment: Assessment would be carried out by the mentor and co-mentors based on the regularity of the student; submission of progress report followed by seminar presentation of the report.

RESEARCH PROJECT/DISSertation

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BSC BOTANY (Honours)

BODI413P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)

BODI414P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)

BSC BOTANY (Honours) with Research
GUIDELINES FOR RESEARCH PROJECT/DISSertation (7th and 8th semesters)

Research Project/Dissertation must be carried out in the department under the supervision of faculty members. In case of inter-disciplinary Research Project/Dissertation, a co-supervisor may be opted from within the school or from any other departments within the University for better quality data generation and results. If a student wants to carry out a portion of the Research Project/Dissertation in any Institutions/Laboratories/Industries/Companies outside the University, a written permission has to be obtained by the student from the appropriate authorities of the University. The student involved in the Research Project/Dissertation and Assam Don Bosco University would be the sole proprietor of any publications/patents/commercialization generated out of the Research Project/Dissertation works but due acknowledgement must be given to other faculties involved in the project from partner Departments/Institutions/Laboratories. All Research Project/Dissertation students must abide by the rules and regulations of the host Institutions/Laboratories/Industries/Companies. After the completion of the Research Project/Dissertation, students must obtain a certificate from the Head of the Institutions/Laboratories/Industries/Companies in letterhead clearing mentioning the starting and completion dates of Research Project/Dissertation. A detail report of the project/works carried out by the student will have to be submitted to the concerned department at the end of the project period.

Duration: Research Project/Dissertation will be carried out for 2 semesters (7th and 8th semester). Written permission from the University authorities must be obtained for extension of the Research Project/Dissertation if need arises.

Attendance: Faculty supervisor/Co-supervisor of the Institutions where the student is carrying out the Research Project/Dissertation will have to maintain regular attendance records of the student.

Assessment: Assessment: The B. Sc student undergoing research project/dissertation would be assessed by the Departmental Research Committee by conducting a progress report seminar. A final report will have to be submitted to the department/University.

Final assessment would be carried out at the end of 8th semester by the supervisor/Co-supervisor based on the regularity of the student and submission of regular progress reports. The student will have to submit a final Research Project/Dissertation thesis in proper formats to the Department, followed by seminar presentation of the project report. The final assessment may be conducted in the presence of an External examiner.
DEPARTMENT OF ZOOLOGY

PROGRAMME: BACHELOR OF SCIENCE in ZOOLOGY (BSC)

DEGREE: BSC ZOOLOGY (HONOURS)/ BSC ZOOLOGY (HONOURS) WITH RESEARCH

VISION:
- To develop the Department as an interdisciplinary centre for learning, research, and innovation
- To develop the Department into a hub of biodiversity research while making the surrounding a natural laboratory

MISSION:
- To provide a better understanding of Zoological Sciences through interaction with the natural environment and sensitizing the students about their social responsibilities
- To expose the learners to recent advances in Zoology and to provide high quality education with an emphasis on learning and research.

PROGRAM OUTCOMES (POs)
- **PO 1:** Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more other disciplines that form a part of an undergraduate programme of study.
- **PO 2:** Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Critically evaluate practices, policies and theories by following a scientific approach to knowledge development.
- **PO 3:** Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully; and present complex information in a clear and concise manner to different groups.
- **PO 4:** Social Interaction: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- **PO 5:** Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- **PO 6:** Moral and Ethical Awareness: Ability to embrace moral/ethical values in conducting one’s life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
- **PO 7:** Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- **PO 8:** Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes. Critical sensibility to lived experiences, with self-awareness and reflexivity of both and society.
- **PO 9:** Information and Digital Literacy: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.
- **PO 10:** Research related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause and affect relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Ability to apply one’s learning to real life situations.

PROGRAMME SPECIFIC OUTCOMES (PSOs)
- **PSO 1:** Knowledge and Concept: Acquire detailed knowledge on the extensive diversity of organisms inhabiting varied ecological niches of the earth as well as understand the complexity of the various life-systems operating in these organisms.
- **PSO 2:** Applying knowledge for self-sustenance: Build foundations for novel thinking through application-based studies such as sericulture and aquarium fish keeping, thus ensuring better opportunities for self-sustenance in future.
- **PSO 3:** Skills in handling scientific instruments: Develop interest as well as proficiency in handling scientific instruments introduced as part of practical courses, thereby warranting all-around growth.
- **PSO 4:** Conservation strategies: Recognize the importance of conservation and encourage designing effective strategies to address present conservation issues with preference to sustainable development.
# DEPARTMENT OF ZOOLOGY

## MAPPING OF COURSES TO PO and PSO

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**ZGDN100T: DIVERSITY OF NON-CHORDATES**  
(3 Credits: 45 Hours) (L-T-P: 3-0-0)  

**Objective(s)**  
To know the general characters and classification of Non-chordates and understand the increasing complexity of body forms.

**Course/ Learning Outcomes:**  
CO 1: Interpret the evolution of body cavity in non-Chordates. (Understanding)  
CO 2: Illustrate the morphological structure different larval forms of important representative organisms belonging to these phyla. (Understanding)  
CO 3: Identify the distinguishing characters of the pseudocoelomates and coelomates. (Applying)  
CO 4: Distinguish the unique physiology of selected representative non-chordates. (Analyzing)  

**Module I: Protista, Parazoa and Metazoa (4 Hours)**  
General characteristics and Classification up to classes Study of Euglena, Amoeba and Paramecium Life cycle and pathogenicity of Plasmodium vivax and EntamoebaHistolytica.
Module II: Porifera (3 Hours)
General characteristics and Classification up to classes; Canal system and spicules in sponges

Module III: Cnidaria (4 Hours)
General characteristics and Classification up to classes, Metagenesis in Obelia, Polymorphism in Cnidaria, Corals and coral reefs.

Module IV: Ctenophora (2 Hours)
General characteristics and Classification up to Classes.

Module V: Platyhelminthes (4 Hours)
General characteristics and Classification up to classes. Life cycle and pathogenicity of Fasciola hepatica and Taeniasolium

Module VI: Nemathelminthes (4 Hours)
General characteristics and Classification up to classes. Life cycle, and pathogenicity of Ascarislumbricoides and Wuchereriabancrofti.

Module VII: Annelida (4 Hours)
General characteristics and Classification up to classes. Reproduction, Regeneration and Locomotion of Annelida.

Module VIII: Arthropoda (4 Hours)
General characteristics and Classification up to classes. Metamorphosis in Insects; Social life in bees and termites.

Module IX: Onychophora (4 Hours)
General characteristics and Classification up to classes.

Module X: Mollusca (4 Hours)
General characteristics and Classification up to classes, Pearl formation in bivalves; Trochophore larva.

Module XI: Echinodermata (4 Hours)
General characteristics and Classification up to classes, Water-vascular system in Asteroidea, Larval forms in Echinodermata

Module XII: Hemichordata (4 Hours)
General characteristics and classification of Hemichordata up to classes; Study of Balanoglossus.


Suggested Readings

Mapping of COs to Syllabus

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ZGDN101L: DIVERSITY OF NON-CHORDATES LAB
(1 Credits: 30 Hours) (L-T-P: 0-0-0-1)

Objectives
To know the general characters and classification of Non-chordates and understand the increasing complexity of body forms by doing practical and at field level.

Course/ Learning Outcomes:
CO 1: Examine and investigate different species of non-chordate (Analyzing).
CO 2: Examine various systems of non-chordate species (Analyzing).
CO 3: Differentiate different parts of body thorough prepared slides (Analyzing).
CO 4: Design a project for any related topic (Creating).
Syllabus:
1. Study of whole mount of Euglena, Amoeba and Paramecium
2. Study of the following Specimens - Porifera: Sycon (T.S. and L.S.), Hyalonema, Euplectella, Spongia; Cnidaria: Obelia, Physalia, Millepora, Aurelia, Tubipora, Gorgonia, Metridium, Pennatula, Fungia; Ctenophora: Pleurobrachia, Ctenoplana; Platyhelminthes: Fasciola hepatica, Taeniasolium; Nemathelminthes: Ascaris lumbricoides; Annelids- Aphrodite, Nereis, Heteronereis, Phereetima, Hirudinaria; Arthropoda: Limulus, Palamnaeus, Palaemon, Daphnia, Philosamia, Periplaneta, Termites and honey bees; Onychophora-Peripatus, Molluscs - Chiton, Dentalium, Pila, Unio, Sepia, Octopus, Nautilus; Echinodermates-Asterias, Ophiura, Echinus, Cucumaria; Hemichordata- Balanoglossus
3. Examination of pond water collected from different places for diversity in protists
4. Dissection of the mouth parts of Cockroach
5. Dissection of digestive system of Cockroach

Suggested Readings

Mapping of COs to Syllabus

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ZGDC102T: DIVERSITY OF CHORDATES
(3 Credits: 45 Hours)(L-T-P:3-0-0)

Objective(s)
To know the Diversity of Chordata from lower to higher Chordates and their geographical distribution

Course/ Learning Outcomes

CO 1: Understand the origin and evolution of the phylum Chordata. (Understanding)
CO 2: Distinguish the unique characteristics as well as life functions of different chordate subphylum. (Analyzing)
CO 3: Evaluate the varied morphological, anatomical and physiological complexity in selected chordate organisms. (Evaluating)
CO 4: Analyze the various theories of animal distribution and their geographical realms. (Analyzing)

Module I: Introduction to Chordates (8 Hours)
General characteristics and outline classification

Module II: Protochordata (8 Hours)
General characteristics of Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata

Module III: Origin of Chordata (3 Hours)
Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata

Module IV: Agnatha (2 Hours)
General characteristics and classification of cyclostomes up to class

Module V: Pisces (8 Hours)
General characteristics of Chondrichthyes and Osteichthyes, classification up to order Migration, Osmoregulation and Parental care in fishes

Module VI: Amphibia (8 Hours)
Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification up to order; Parental care in Amphibians

Module VII: Reptilia (7 Hours)
General characteristics and classification up to order; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes
Module VIII: Aves (8 Hours)
General characteristics and classification up to order Archaeopteryx- a connecting link; Principles and aerodynamics of flight, Flight adaptions and Migration in birds

Module IX: Mammals (8 Hours)
General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages

Suggested readings
5. T.C. Majupuria. Introduction to Chordates, Pradeep Publicartions.

Mapping of Cos to syllabus

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ZGDC103L: DIVERSITY OF CHORDATES LAB
(1 Credits: 30 hours) (L-T-P: 0-0-1)

Objective(s)
To demonstrate the different Chordates from lower to higher Chordates with help of the laboratory specimen.

Course/ Learning Outcomes:
CO 1: Identify distinguishing characteristics of representative museum specimens belonging to different phyla. (Applying)
CO 2: Determine their affinities and evolutionary relationships. (Evaluating)
CO 3: Examine specific organ structures through dissections. (Analyzing)
CO 4: To compare the anatomical structure of different vertebrates. (Applying)

Syllabus
1. Protochordata: Herdmania, Branchiostoma, Colonial UrochordataSections of Balanoglossus through proboscis and branchiogenital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slide of Herdmania spicules
2. Agnatha: Petromyzon, Myxine
3. Pieces: Sciolodon, Sphyrrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas, Flat fish
5. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastyx, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodilus Key for Identification of poisonous and non-poisonous snakes
6. Aves: Study of six common birds from different orders. Types of beaks and claws
7. Mammalia: Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes, Erinaceous. Mount of weberian ossicles of Mystus, pecten from Fowl head Dissection of Fowl head (Dissections and mounts subject to permission) Powerpoint presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

Suggested readings
5. T.C. Majupuria. Introduction to Chordates, Pradeep Publicartions.
ZGC-200T: CELL BIOLOGY
(3 credits: 45 Hours)(L-T-P: 3-0-0)

Objective(s)
To appreciate how cell the structural & functional unit of life works.

Course/ Learning Outcomes:
CO 1: Define the composition and function of membrane structure; cytoskeleton and their role in affecting cell shape, function and movement (Remembering).
CO 2: Distinguish the different cell types viz prokaryotes, eukaryotes and infectious agents viz. virus, viroids, prions & mycoplasma. (Understanding)
CO 3: Evaluate the complexity and interaction of the varied organelles, including endoplasmic reticulum, golgi apparatus, mitochondria, nucleus and peroxisomes (Evaluating).
CO 4: Analyze the importance of nucleus in cell division and signaling (Analyzing).

Module I: Overview of Cells (4 Hours)
Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions

Module II: Plasma Membrane (6 Hours)
Models of plasma membrane structure; Transport across membranes: Active and Passive transport, Facilitated transport; Cell junctions: Tight junctions, Desmosomes, Gap junctions

Module III: Endomembrane System (6 Hours)
Structure and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes

Module IV: Mitochondria and Peroxisomes (7 Hours)
Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis, Mitochondrial Respiratory Chain, Chemosmatic hypothesis Peroxisomes

Module V: Cytoskeleton (5 Hours)
Structure and Functions: Microtubules, Microfilaments and Intermediate filaments

Module VI: Nucleus (7 Hours)
Structure of Nucleus: Nuclear envelope, nuclear pore complex, Nucleolus Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome)

Module VII: Cell Division (7 Hours)
Mitosis, Meiosis, Cell cycle and its regulation

Module VIII: Cell Signaling (3 Hours)
GPCR and Role of second messenger (cAMP)

Suggested Readings
5. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson
Mapping of COs to Syllabus

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ZGCB201L: CELL BIOLOGY LAB
(2 Credits: 60 Hours) (L-T-P:0-0-2)

Objective(s)
To visualise and learn the dynamics of intracellular components of cell while undergoing several vital functions including cell division.

Course/ Learning Outcomes:
CO 1: Create the temporary stained slides of different stages of cell division. (Creating)
CO 2: Investigate various stages of meiotic cell division. (Analyzing)
CO 3: Create the permanent slides to investigate various structural components inside the cell. (Analyzing)
CO 4: Create temporary slides to demonstrate Barr body. (Evaluating)

Syllabus
1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis
2. Study of various stages of meiosis.
3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
4. Preparation of permanent slide to demonstrate:
   I. DNA by Feulgen reaction
   II. DNA and RNA by MGP
   III. Mucopolysaccharides by PAS reaction
   IV. Proteins by Mercurobromophenol blue/Fast Green

Suggested Readings

Mapping of COs to Syllabus

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ZGBS202T: BIOSYSTEMATICS
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s):  
- To acquaint the student with different taxonomic procedures and its application in faunal identification.
- To enable the students to identify, classify and name the organisms according to international code of zoological nomenclature.

Course/ Learning Outcomes:
CO 1: Explain the concept of Biosystematics, Taxonomy and Species. (Understanding)
CO 2: Apply Taxonomy to solve the species problem and construction of a phylogenetic tree. (Applying and Creating)
CO 3: Identify species on the basis of taxonomic keys and utilize the nomenclature codes. (Applying)
CO 4: Apply the techniques of specimen collection and preservation. (Applying)

Module I: Science of Biosystematics (8 hours)
Concept of Biosystematics, Terms used in systematic biology, Historical review of taxonomic philosophies, Future of taxonomic studies, Stages of taxonomy, Tasks of taxonomist, Systematics as a profession, Significance of taxonomy.

Module II: Concept of Species (8 hours)
Historical perspective of species concept (Typological, Biological, Nominalistic, Evolutionary & recognition), Difficulties in the application of different species concepts; Kinds of species – sibling, sympatric, allopatric, syntopic, ring species, polytypic and monotypic species; Intraspecific groups (variety, morphs, subspecies, temporal subspecies, race and clines).

Module III: Classification and Phylogenetic analysis (8 hours)
Taxonomic Classification; components, procedure (phenetic & cladistic), and presentation of classification (Linnaean/Taxonomic hierarchy); Ways of constructing a phylogenetic tree. Phylogenetic analysis – Purpose, terminology, methods of phylogenetic analysis (phenetic method, dendogram method, pairwise distance; Cladistic method, parsimony, maximum likelihood); phylogenetic lineage

Module IV: Taxonomical publications & Techniques (8 hours)
Taxonomic collection – Purpose, value, scope of collection, content of collection, significance of museum collection, legal aspects of collecting animals, post collection processes.
Techniques of preservation – Methods, taxidermy, plastination, factors responsible for the deterioration of museum specimens.
Curating of collection – museum collection policy, preparation of material of study, housing and cataloging, exchangeable and expendable materials and loans.
Identification – Systematic process of sorting and labeling, procedure of identification of species.

Module V: Recent trends in modern taxonomy (7 hours)
Different approaches of taxonomy viz. Morphotaxonomy, Cytotaxonomy, Chemotaxonomy, Numerical taxonomy, Molecular taxonomy etc.

Module VI: Application of Zoological Nomenclature (6 hours)
Taxonomic keys – types and their significance; taxonomic publication – types and procedures; Nomenclature (Bionomial and Trinomial Nomenclature); International code of Zoological Nomenclature (ICZN) and its recent amendments; Process of typification and Zoological types.

Suggested Readings

Online Tools and Web Resources:
2. ePG Pathshala (MHRD) Module 184 of the paper on taxonomy (https://epgp.inflibnet.ac.in/ahl.php?csrno=35)

Mapping of COs to Syllabus

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ZGBS203L: BIOSYSTEMATICS LAB
(1 Credits -30 Hours) (L-T-P: 0-0-1)

Objective(s):
- To develop the student on skill of taxonomic identification, classification and nomenclature of fauna.
- To acquaint the student on skill of taxonomic sampling and preservation, and analysis through construction of taxonomic keys and phylogenetic tree.

Course/ Learning Outcomes:
CO 1: Apply the morphometric study and identify different animals. (Applying)
CO 2: Develop the systematic position of different animals. (Applying)
CO 3: Compare various techniques of taxonomic sampling and preservation techniques. (Understanding)
CO 4: Construct taxonomic keys and phylogenetic trees of known species. (Applying)

Syllabus:
1. Recent classification of animals with the help of museum specimens.
2. Identification of animal species with the help of taxonomic keys (identification up to order).
3. Demonstrate the methods of Taxonomic collection and preservations in various taxa.
4. Construction of different types of Taxonomic keys for the identification of animals.
6. Morphometric measurements of some locally available fish/ frog.
7. Construction of phylogenetic trees of groups of known species from the museum specimens.

Mapping of COs to Syllabus:

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ZGCC204T: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS
(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

Objective(s)
To understand the high degree of control and coordination in complex multicellular organism through nervous, endocrine regulation which in turn also help to achieved vital functions like reproduction.

Course/ Learning Outcomes:
CO 1: Define the structure and function of different animal tissues, and the endocrine glands. (Understanding)
CO 2: Distinguish the unique physiological aspects at both the cellular and system levels. (Analyzing)
CO 3: Assess the complexity and co-ordination exhibited by the nervous, muscle and reproductive system. (Evaluating)
CO 4: Compare the histological intricacy of the endocrine glands, their mechanism of action and the coordination demonstrated by the neuroendocrine system. (Analysing)

Module I: Tissues (4 Hours)
Structure, location, classification and functions of epithelial tissue, connective tissue, muscular Tissue and nervous tissue

Module II: Bone and Cartilage (4 Hours)
Structure and types of bones and cartilages, Ossification, bone growth and resorption

Module III: Nervous System (7 Hours)
Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision.

Module IV: Muscle (8 Hours)
Histology of different types of muscles; Ultrastructure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and muscle tetany.
Module V: Reproductive System (9 Hours)
Histology of testis and ovary; Physiology of male and female reproduction; Puberty, Methods of contraception in male and female

Module VI: Endocrine System (13 Hours)
Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones; Regulation of their secretion; Mode of hormone action, Signal transduction pathways for steroidal and non-steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system; Placental hormones.

Suggested Readings:

Mapping of COs to Syllabus

ZGCC205L: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS LAB
(2 Credits: 60 Hours) (L-T-P: 0-0-2)

Objective(s)
To visualize the structural architecture of cells, tissues that forms various vital organs, glands etc. which in turn will help understanding their functions.

Course/ Learning Outcomes:
CO 1: Estimate specific physiological functions of muscle tissues (Applying)
CO 2: Compare structural organization of various tissue through temporary and permanent slides. (Evaluating)
CO 3: Utilize the process of microtomy to visualize histological structures in different mammalian tissues. (Applying)
CO 4: Elaborate how neural activity responsible for condition and unconditioned reflex works (Understanding)

Syllabus:
1. Recording of simple muscle twitch with electrical stimulation (or Virtual)
2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)
3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells
4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell,
5. Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid
6. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues (*Subject to UGC guidelines)

Mapping of Cos to Syllabus

ZGPE206T: PERSPECTIVES IN ECOLOGY
(3 Credits: 45 Hours; L-T-P: 3-0-0)

Objective(s)
To understand concepts and the Principles in ecology and wildlife management

Course Outcomes:
CO 1: Distinguish the mechanism of various biological interactions (Understanding).
CO 2: Analyze different population dynamics and interactions (Analysing).
CO 3: Evaluate ecosystem energetics with reference to food chain, food web (Evaluating).
CO 4: Apply conservation and management strategies for local endangered species (Applying).

Module I: Introduction to Ecology (3 Hours)
History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of physical factors

Module II: Population (20 Hours)
Unitary and Modular populations Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors Population interactions, Gause’s Principle with laboratory and field examples, Lotka-Volterra equation for competition and Predation, functional and numerical responses

Module III: Community (10 Hours)
Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological succession with one example Theories pertaining to climax community

Module IV: Ecosystem (10 Hours)
Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with one example of Nitrogen cycle Human modified ecosystem

Module V: Applied Ecology (2 Hours)
Ecology in Wildlife Conservation and Management

Suggested Readings:
4. Robert Leo Smith Ecology and field biology Harper and Row publisher

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ZGPE207L: PERSPECTIVES IN ECOLOGY LAB
(2 Credit: 60 Hours) (L-T-P: 0-0-2)

Objective(s)
To gain knowledge and understand about the status and the diversity of the different ecosystem

Course Outcomes:
CO 1: Investigate life tables and survivorship curves of different types (Analyzing).
CO 2: Estimate and analyze different population dynamics and interactions (Analyzing).
CO 3: Evaluate the aquatic ecosystem (Evaluating).
CO 4: Design a project for any related topic (Creating).

Syllabus
1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler’s method), Chemical Oxygen Demand and free CO2, alkalinity and hardness of water
4. Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary

SUGGESTED READINGS
4. Robert Leo Smith Ecology and field biology Harper and Row publisher

Mapping of COs to Syllabus

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ZGP208T: PRINCIPLES OF GENETICS
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
To understand how characters or traits are being inherited in a wide range of organisms & to appreciate how even the minute changes in hereditary material can bring about variation, thereby enriching diversity.

Course outcomes:
CO 1: Define the concept of genes, genomics and inheritance with special reference to Mendelian heredity and inheritance. (Remembering)
CO 2: Describe the mechanism of linkage and crossing-over with models of recombination in prokaryotes, eukaryotes and viruses. (Understanding)
CO 3: Illustrate the different types of mutations and their molecular mechanisms. (Understanding)
CO 4: Analyze and interpret the diverse inheritance patterns. Compare the methods of generation of transposons in bacteria, drosophila, maize and humans. (Understanding, Analyzing)

Module I: Mendelian Genetics and its Extension (6 Hours)
Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex-influenced and sex-limited characters inheritance.

Module II: Linkage, Crossing Over and Chromosomal Mapping (8 Hours)
Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.

Module III: Mutations (8 Hours)
Types of gene mutations (Classification), Types of chromosomal aberrations (Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB methods, attached X method.

Module IV: Sex Determination (4 Hours)
Chromosomal mechanisms of sex determination in Drosophila and Man

Module V: Extra-chromosomal Inheritance (4 Hours)
Criteria for extra-chromosomal inheritance, Mitochondrial mutations in Saccharomyces, Infective heredity in Paramecium and Maternal effects

Module VI: Polygenic Inheritance (3 Hours)
Polygenic inheritance with suitable examples; simple numerical based on it.

Module VII: Recombination in Bacteria and Viruses (7 Hours)
Conjugation, Transformation, Transduction, Complementation test in Bacteriophage

Module VIII: Transposable Genetic Elements (5 Hours)
Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, Transposons in humans

Suggested Readings:

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ZPGPG209L: PRINCIPLES OF GENETICS LAB
(1 Credits: 30 Hours) (L-T-P: 0-0-1)

Objective(s)
To appreciate the use of genetic experimental data in explaining some of the key concepts of genetics viz. linkage map construction, gene interactions as well as analysis of inheritance pattern of certain human trait.

Course Outcomes:
CO 1: Explain the laws of Inheritance. (Evaluating)
CO 2: Analyze organisms trait using Chi Square test. (Analyzing)
CO 3: Construct linkage maps and human karyotype (Applying)
CO 4: Constructing and analyzing pedigree for inherited traits. (Applying)

Syllabus:
1. To study the Mendelian laws and gene interactions.
2. To study the traits using Chi-square analyses [seeds/beads/Drosophila].
3. Linkage maps based on data from conjugation, transformation and transduction.
4. Linkage maps based on data from Drosophila crosses.
5. Study of human karyotype (normal and abnormal).
6. Pedigree analysis of some human inherited traits.

Suggested Readings:

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ZGFB300T: FUNDAMENTALS OF BIOCHEMISTRY
(3 CREDITS; 45 HRS) (L-T-P: 3-0-0)

Objective(s)
To acquire knowledge on the building blocks of life and their significance

Course Outcomes:
CO 1: Define the structural and functional aspects of different biomolecules.(understanding)
CO 2: Describe and draw the chemical structures of different biomolecules. (understanding)
CO 3: Evaluate their inter-relationship as evident in the living system.(evaluating)
CO 4: Analyze the mechanism and regulation of enzyme action and their kinetics with reference to bi-substrate, multi-substrate and allosteric enzymatic reactions. (analysing)

Module I: Carbohydrates (5 Hours)
Structure and Biological importance: Monosaccharides, Disaccharides,

Module II: Lipids (6 Hours)
Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids

Module III: Proteins (10 Hours)
Amino acids: Structure, Classification and General properties of α-amino acids; Physiological importance of essential and non-essential α-amino acids Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Denaturation of protein

Module IV: Nucleic Acids (12 Hours)
Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic Denaturation and Renaturation of DNA Types of DNA and RNA

Module V: Enzymes (12 Hours)
Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax

SUGGESTED READING

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ZGF301L: FUNDAMENTALS OF BIOCHEMISTRY LAB
(2 CREDIT: 60 HOURS) (L-T-P: 0:0-2)

Objective(s)
To learn different estimation techniques of biological molecules

Course Outcomes
CO 1: Estimate biochemical functional groups of different macromolecules. (Evaluating)
CO 2: Develop chromatography skills for separation of amino acids (Evaluating)
CO 3: Determine the enzyme kinetics of given enzyme: salivary amylase. (Evaluating)
CO 4: Learn basic laboratory techniques like buffer preparation, solutions and working of instruments (learning)

Syllabus:
1. Study of working principles of different laboratory instruments
2. Preparation of Buffers: phosphate and citrate
3. Preparation of normal and molar solutions
4. Qualitative tests of functional groups in carbohydrates, proteins and lipids.
5. Paper chromatography of amino acids.

Suggested readings:

Mapping of CO’s to syllabus

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ZGLS302T: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS
(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

Objectives
To understand how vital metabolic activities like digestion, respiration, excretion, circulation of blood which responsible for life sustenance works.

Course Outcomes:
CO 1: Define the organ systems responsible for maintaining a balanced physiological functioning of the mammalian body (Remembering)
CO 2: Summarize the structure and function of the gastrointestinal tract, the lungs, the kidneys, the heart and other related organs (Understanding)
CO 3: Determine basic blood parameters as a measure of a vigorous physiological system; evaluate the effects of organ systems compromised due to infection, disease or injury (Evaluating)
CO 4: Correlate the inter-relationship of these organ systems to maintain a stable homeostasis in the body (Understanding)

Module I: Physiology of Digestion (9 Hours)
Structural organization and functions of gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in Gastrointestinal tract.

Module II: Physiology of Respiration (9 Hours)
Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Respiratory pigments, Dissociation curves and the factors influencing it; Carbon monoxide poisoning; Control of respiration

Module III: Renal Physiology (9 Hours)
Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance

Module IV: Blood (9 Hours)
Components of blood and their functions; Structure and functions of haemoglobin, Haemostasis: Blood clotting system, Kallikrein- Kininogen system, Complement system Fibrinolytic system, Haematopoiesis Blood groups: Rh factor, ABO and MN

Module V: Physiology of Heart (9 Hours)
Structure of mammalian heart; Coronary circulation; Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses Cardiac cycle; Cardiac output and its regulation, Frank-Starling Law of the heart, nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation

Suggested Readings:
5. https://onlinecourses.nptel.ac.in/noc20_bt42/preview
ZGLS303L: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS LAB
(2 CREDITS: 60 Hours) (L-T-P: 0-0-2)

Objective(s)
To appreciate the concept and skill set required for measurement or analysis of certain physiological parameters viz. RBC count, WBC count, haemoglobin % etc. which can reflect health status of the individual.

Course Outcomes:
CO 1: Develop skills to determine basic blood parameters as a measure of a vigorous physiological system (Applying)
CO 2: Examine the anatomy of various internal organs. (Analyzing)
CO 3: Determine the percentage of haemoglobin in blood. (Applying)
CO 4: Illustrate the presence of haemoglobin in RBC through preparation of haemoglobin crystal. (Analyzing)

Syllabus
1. Determination of ABO Blood group
2. Enumeration of red blood cells and white blood cells using haemocytometer
3. Estimation of haemoglobin using Sahli’s haemoglobinometer
4. Preparation of haemoglobin and haemochromogen crystals
5. Recording of frog’s heart beat under in situ and perfused conditions*
6. Recording of blood pressure using a sphygmomanometer
7. Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney
(*)Subject to UGC guidelines

Suggested Readings:

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ZGDB304T: DEVELOPMENTAL BIOLOGY
(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

Objective(s)
To understand the developmental process of different organism and their gradual evolution

Course Outcomes:
CO 1: Understand the mechanisms underlying the process of development (Understanding)
CO 2: To determine the evolutionary history of living species inferred through the phylogenetic molecular and morphological information using models. (Evaluating)
CO 3: Correlate the effects of different natural and artificial factors leading to developmental anomalies or congenital defects in humans. (Analyzing)
CO 4: Interpret the different stages of development of frog, chick and culture preparation of Drosophila. (Analyzing)
Module 1: Introduction (4 Hours)
Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation,

Module 2: Early Embryonic Development (20 Hours)
Gametogenesis: Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps

Module 3: Late Embryonic Development (6 Hours)
Early development of frog and chick up to gastrulation; Embryonic induction and organizers
Fate of Germ Layers; Extra-embryonic membranes in birds; Placenta (Structure, types and functions of placenta)

Module 4: Post Embryonic Development (10 Hours)
Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, Role of maternal genes in development

Module 5: Implications of Developmental Biology (5 Hours)
Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis

Suggested Readings:
3. Carlson, R. F. Patten's Foundations of Embryology

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ZGDB305L: DEVELOPMENTAL BIOLOGY LAB
(1 CREDIT: 30 HOURS) (L-T-P: 0-0-1)

Objective(s)
To gather hands on knowledge on different developmental process

Course outcomes:
CO 1: To demonstrate the mechanisms underlying the process of development. (Understanding).
CO 2: To explain different histological structure of placenta. (Understanding)
CO 3: To prepare drosophila culture media or make a proper environment to study the chick embryo development. (Creating)
CO 4: To apply the knowledge of developmental biology in different fields (Applying)

Syllabus:
1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
3. Study of the developmental stages and life cycle of Drosophila from stock culture
4. Study of different histological structures of placenta (photomicropgraph/ slides)
5. Study of different types of eggs : chicken, lizard, insect, frog
6. Study of chick embryo by vital staining method
7. Phylogenetic tree construction to study the development of animal germinal layers

Suggested Readings:
DEPARTMENT OF ZOOLOGY

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ZGMB306T: MOLECULAR BIOLOGY
(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

Objective(s)
To understand the biology of organisms at molecular, nucleic acid level and acquire knowledge on their modification and mechanism of action

Course Outcomes:
CO 1: Define the molecular structure of DNA and RNA (Understanding)
CO 2: Describe the mechanism of DNA replication of both linear and circular DNA as well as protein synthesis including transcription and translation in both prokaryotes and eukaryotes. (Understanding)
CO 3: Illustrate the post-translational modifications and processing of eukaryotic mRNA and prokaryotic and eukaryotic gene regulation. (Analyzing)
CO 4: Distinguish the different DNA repair mechanisms with their significance. (Analyzing)

Module I: Nucleic Acids (4 Hours)
Salient features of DNA and RNA Watson and Crick model of DNA and molecular structure of DNA

Module II: DNA Replication (8 Hours)
DNA Replication in prokaryotes and eukaryotes, Semi-conservative, bidirectional and semi-discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres

Module III: Transcription and Translation (12 Hours)
RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes, Difference between prokaryotic and eukaryotic translation

Module 4: Post Transcriptional Modifications and Processing of Eukaryotic RNA (8 Hours)
Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Module 5: Gene Regulation (8 Hours)
Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements

Module 6: DNA Repair Mechanisms (5 Hours)
Pyrimidine dimerization and mismatch repair Regulatory RNAs 3 Ribo-switches, RNA interference, miRNA, siRNA

Suggested Readings:

Mapping of CO’s to syllabus

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ZGMB307L: MOLECULAR BIOLOGY LAB  
(1 CREDIT; 30 HOURS) (L-T-P: 0-0-1)

Objective(s)  
To learn the usage of different analytical tools and techniques

Course Outcome:
CO 1:  Explain the structure of chromosome. (Understanding)
CO 2:  Preparation and analysis of different growth medium. (Creating)
CO 3:  Estimation of DNA and RNA using different analytical tools. (Evaluating)
CO 4:  Interpret the micrographs of DNA replication and spilt genes. (Understanding)

Syllabus:
1. Study of Polytene chromosomes from Chironomous / Drosophila larvae
2. Preparation of liquid culture medium (LB) and raise culture of E. coli
3. Estimation of the growth kinetics of E. coli by turbidity method
4. Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking
5. Demonstration of antibiotic sensitivity/resistance of E. coli to antibiotic pressure and interpretation of results
6. Quantitative estimation of DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A260 measurement)
7. Quantitative estimation of RNA using Orcinol reaction | Isolation of gDNA
8. Agarose gel electrophoresis of sample DNA
9. RNA purification from blood using TriZol
10. Study and interpretation of electron micrographs/ photograph showing (a) DNA replication (b) Transcription (c) Split genes

Suggested readings:

Mapping of CO’s to syllabus

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ZGIM308T: IMMUNOLOGY  
(3 CREDITS; 45 HRS) (L-T-P: 3-0-0)

Objective(s)  
To understand and appreciate the intricate and robust mechanism by which components of innate and adaptive immunity works to neutralized, killed or eliminate the pathogens or their products.

Course Outcomes:
CO 1:  Define the basic concepts of immunology and distinguish the two important facets of immunity, innate and adaptive; how different components of innate and adaptive collaborate to neutralize or eliminate pathogen. (Understanding)
CO 2:  Develop critical definition of the antigen and the self, Immunoglobulin, antigen-antibody interactions, complement, hypersensitivity, cytokines; (Understanding)
CO 3:  Apply the concepts of immunology through various laboratory techniques and vaccine development; (Applying)
CO 4:  Analyze the importance of the Major Histocompatibility Complex proteins and their role in transplantation immunology. (Analyzing)

Module I: Overview of Immune System (5 Hours)
Historical perspective of Immunology, Early theories of Immunology, Cells and organs of the Immune system
Module II: Innate and Adaptive Immunity (10 Hours)

Module III: Antigens (5 Hours)
Antigenicity and immunogenicity, Immunogens, Adjuvants and hapten, Factors influencing immunogenicity, B and T-Cell epitopes

Module IV: Immunoglobulins (6 Hours)
Structure and functions of different classes of immunoglobulins, Antigenantibody interactions, Immunoassays (ELISA and RIA), Polyclonal sera, Hybridoma technology: Monoclonal antibodies in therapeutics and diagnosis

Module V: Major Histocompatibility Complex (5 Hours)
Structure and functions of MHC molecules. Endogenous and exogenous pathways of antigen processing and presentation

Module VI: Cytokines (4 Hours)
Properties and functions of cytokines, Therapeutics Cytokines

Module VI: Complement System (4 Hours)
Components and pathways of complement activation.

Module VIII: Hypersensitivity (3 Hours)
Gell and Coombs’ classification and brief description of various types of hypersensitivities

Module IX: Vaccines (3 Hours)
Vaccine preparations and types of vaccines.

Suggested Readings

Mapping of Cos to Syllabus:

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ZGIM309L: IMMUNOLOGY LAB
(1 CREDITS: 30 HRS) (L-T-P: 0-0-1)

Objective(s)
To learn and develop skill to carried out some of the key immunotechniques having wide clinical applications.

Course Outcomes:
CO 1: To describe the structure and function of the lymphoid organ, spleen, thymus, lymph node. (Understanding)
CO 2: To prepare blood smear for various blood cell studies and develop methods for blood group determination. (Creating)
CO 3: Demonstration of cell viability test. (Creating)
CO 4: Demonstration of various immunological techniques. (Creating)

Syllabus
1. *Demonstration of lymphoid organs.
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
5. ABO blood group determination.
6. *Cell counting and viability test from splenocytes of farm bred animals/cell lines.
7. Demonstration of:
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ZGBT3110T: BIOTECHNOLOGY
(3 CREDITS: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
To gather knowledge on the concept, techniques and applications of Biotechnology

Course Outcomes:
CO 1: Define the concept and scope of biotechnology. (Understanding)
CO 2: Understand the basic molecular technique for gene manipulation. (Understanding)
CO 3: Analyze animal cell culture and gene therapy procedure in molecular diagnosis of various genetic diseases. (Analysing)
CO 4: Apply the practical concepts of basic techniques in biotechnology. (Applying)

Module I: Introduction (8 Hours)
Concept and scope of biotechnology

Module II: Molecular Techniques in Gene manipulation (18 Hours)
Outline of Recombinant DNA technology, Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage
Restriction enzymes: Nomenclature, types of restriction enzymes
Transformation techniques: Calcium chloride method and electroporation, Construction of genomic and cDNA libraries, screening by colony and plaque hybridization Southern, Northern and Western blotting
DNA sequencing: Sanger method, Pyro-sequencing
Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Module III: Genetically Modified Organisms (12 Hours)
Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection
Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice.

Module IV: Applications of Biotechnology (7 Hours)
Animal cell culture, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)
Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy.

Suggested Readings:

Mapping of CO’s to syllabus

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ZGBT311L: BIOTECHNOLOGY LAB
(1 CREDIT: 30 HOURS) (L-T-P: 0-0-1)

Objective(s)
To learn different tools and techniques of basic research in Biotechnology

Course Outcomes:
CO 1: Explain and perform the process of DNA isolation (Understanding, Applying)
CO 2: Experiment with DNA with different enzymes (Applying)
CO 3: Construct restriction maps and analyse transformation efficiency (Creating)
CO 4: Explain and interpret different biological techniques (Understanding)

Syllabus:
1. Genomic DNA isolation from sample
2. Plasmid DNA isolation from E. coli
3. Restriction digestion of plasmid DNA.
4. Polymerase chain reaction (demonstration)
5. SDS PAGE for protein
6. Construction of circular and linear restriction map from data provided.

Suggested Readings

Mapping of CO’s to syllabus

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ZGMP312P: MINOR PROJECT: 4 Credit

ZGEB400T: EVOLUTIONARY BIOLOGY
(3 CREDITS: 45 HOURS) (L-T-P: 3-0-0)

Objective(s)
To provide adequate knowledge about Micro-evolutionary changes, Speciation and Adaptive Radiation, and Origin and Evolution of Man.

Course Outcomes:
CO 1: Explain the basic evolutionary processes and concept of extinction. (Understanding)
CO 2: Interpret the evolutionary history of living species through the phylogenetic analysis of molecular and morphological information. (Understanding)
CO 3: Explain the basics of evolution of population in the light of population genetics. (Understanding)
CO 4: Apply evolutionary principles in their research. (Applying)

Module I: Life’s Beginnings (6 Hours)
Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes

Module II: Historical review of evolutionary concept (3 Hours)
Lamarckism, Darwinism, Neo-Darwinism

Module III: Evidences of Evolution (8 Hours)
Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, Molecular (universality of genetic code and protein synthesizing machinery, neutral theory of molecular evolution, molecular clock.)
Module IV: Source of Variations (2 Hours)
Heritable variations in evolution

Module V: Population genetics (12 Hours)
Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, adaptive resemblances, sexual selection. Genetic Drift (mechanism, founder’s effect, bottleneck phenomenon; Role of Migration and Mutation in changing allele frequencies.

Module Vi: Product of evolution (7 Hours)
Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Adaptive radiation / macroevolution (exemplified by Galapagos finches

Module VII: Extinctions (2 Hours)
Back ground and mass extinctions (causes and effects), detailed example of K-T extinction

Module VIII: Origin and evolution of man (3 Hours)
Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from Dryopithecus leading to Homo sapiens.

Module IX: Phylogenetic trees (2 Hours)
Multiple sequence alignment, construction of phylogenetic trees, interpretation of trees

Suggested Readings:

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ZGEB401L: EVOLUTIONARY BIOLOGY LAB
(2 CREDITS: 60 HOURS) (L-T-P: 0-0-2)

Objective(s)
To demonstrate understanding of ecological and evolutionary processes including the role of genetic variation, heredity, and natural selection.

Course/ Learning Outcomes:
CO 1: Explain in details about fossils from models/pictures and fossil age determination techniques. (Understanding)
CO 2: Demonstrate the concept of homology and analogy and Hardy Weinberg Law. (Understanding)
CO 3: Explain various phenomenon of evolution. (Understanding)
CO 4: Construct and interpret phylogenetic trees. (Creating and understanding)

Syllabus:
1. Study of fossils from models/ pictures.
2. Study of radiometric dating techniques used in determination of fossil age.
3. Study of homology and analogy from suitable specimens.
4. Study and verification of Hardy-Weinberg Law by chi square analysis.
6. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.
7. Construction of phylogenetic trees with the help of bioinformatics tools (Clustal X, Phylip, NJ) and its interpretation.

**Suggested Readings:**

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**ZGEZ402T: ECONOMIC ZOOLOGY**

(3 credits – 45 Hours) (L-T-P: 3-0-0)

**Objective(s):**
- To develop the students for understanding on various culture system for the uplift of rural economy.
- To acquaint the students about the skill of various farming systems and management for future entrepreneurship.

**Course/ Learning Outcomes:**

CO 1: Understand the experiential and significance of learning on lac culture, aquaculture, poultry and animal husbandry for the uplift of rural economy. (Understanding)

CO 2: Develop the skill to identify the agricultural pests and insect vectors, their role and control measures to extension services to the common people. (Evaluating)

CO 3: Create the self-employment opportunities to students through poultry, animal husbandry, aquaculture and Vermiculture. (Creating)

CO 4: Develop an overall idea of fish farming, the scientific management of different species in aquaculture and fish diseases. (Applying)

CO 5: Identify the different types of parasites, their role in human health and prophylactic measures to curve them. (Applying)

**Module I: Beneficial and harmful insects (12 Hours)**

**Agricultural pest:** Types of agricultural; Common pest’s of paddy, grams and stored grains (Damage and control); Common pest’s of Tea, Coconut, Cashew, sugarcane, Banana (Damage and control); Biological and integrated pest control methods.

**Insect vectors:** Anopheles, Culex, Aedes and Xenopsylla as vectors for yellow fever, chikungunya, malaria, filariasis, pasteurella and rickettsia; their life cycle, pathogenicity and control.

**Lac Culture:** Types of Lac; Life cycle of Lac insect; Harvesting and Extraction of Lac; Uses and Enemies of Lac; Economic importance.

**Module II: Poultry & Animal Husbandry (8 Hours)**

**Poultry:** Types of birds for poultry (indigenous and exotic breeds); Quail and duck farming- advantages, housing and management, economic importance– egg and meat production; Bio-security measures followed in Poultry farms, Diseases and pests.

**Animal husbandry:** Types of breeds rearing in animal husbandry (Cow, Sheep and Goats, Pigs); Disease and parasites of animal husbandry; Economic importance.

**Module III: Aquaculture (12 Hours)**

**Aquaculture:** Diversity of aquaculture and significance; Pisciculture- importance, construction and management of pond; Common culturable fish, seed collection, breeding and types of culture; Modern fish farming techniques- Aquaponics, RAS, Biofloc, Aquascaping; Integrated fish farming; Fish utilization- Nutritive value and fish byproduct; Ornamental fish farming and potentials, diseases.

**Prawn culture:** Importance, culturable species, methods of prawn farming and marketing potential.

**Pearl culture & mollusk culture:** Importance, culturable species, farming techniques and marketing potential.

**Module IV: Vermiculture (5 Hours)**
**Vermiculture**: Species of earthworm used in vermiculture; Raw materials for vermiculture; Composting production. Natural enemies and their control measures; Harvesting of vermicompost and worms; Role of vermicompost in agriculture.

**Module V: Parasitology (8 Hours)**

Parasitism in relation to human health: Classification of parasites & hosts and mode of infection; Morphology, life cycle, pathogenicity & control of *Entamoeba histolytica*, *Taenia solium*, *Schistosoma haematobium*, *Ancylostoma duodenale*, *Wuchereria bancrofti*, *Enterobius vermicularis*.

**Suggested Reading:**
8. NPCS Board of Consultants & Engineers. *The Complete Technology Book on Vermiculture and Vermicompost*.

**Mapping COs to syllabus:**

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**ZGEZ403L: ECONOMIC ZOOLOGY lab**

(2 credits: 60 Hours) (L-T-P: 0-0-2)

**Objective(s):**
- To acquaint the students for identification of various insect pests.
- To develop the skill of field survey on various farming systems and management for future entrepreneurship

**Course/ Learning Outcome:**

CO 1: Identify the insect vectors and the agricultural pest of tea, coconut, cashew and cotton through survey and field observation. (Applying)

CO 2: Identify the structure and biological functioning of insect vectors with preparation of permanent slides. (Applying & creating)

CO 3: Develop the skill of dissection and study the anatomy of earthworm. (Applying)

CO 4: Develop the skill of field survey to different farming systems to provide a way to entrepreneurship. (Understanding)

**Syllabus**

2. Identification of insect vectors through whole mount – *Anopheles, Culex, Aedes* and *Xenopsylla*
3. Dissection of earthworm and study of its digestive and nervous system.
5. Identification of food and ornamental fishes of Northeastern India.
6. Study on prepared slides/ specimens of *Anopheles, Culex, Aedes*.
7. Field visit to a modern fish farming/ poultry/ cattle farming centre and write a report on it.

**Suggested Reading:**
8. NPCS Board of Consultants & Engineers. *The Complete Technology Book on Vermiculture and Vermicompost.*

**Mapping of COs to syllabus**

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**ZGCA404T: COMPARATIVE ANATOMY OF VERTEBRATES**

(3 Credits: 45 Hours)( L-T-P:3-0-0)

**Objective(s)**

To know the differences and similarities between the different organ structure of different vertebrate to predict whether they are related to a common ancestor or not.

**Course/ Learning Outcomes:**

At the end of the course, students will be able to:

- **CO 1:** Identify the distinct anatomical structures that comprise the vertebrate body. (Understanding)
- **CO 2:** Demonstrate the structural and functional similarities and differences of these organ systems amongst different vertebrate groups. (Applying)
- **CO 3:** Evaluate the pattern of organ development in various vertebrate groups. (Evaluating)
- **CO 4:** Compare the functioning of these organ systems from lower to higher vertebrates. (Analyzing)

**Module I: Integumentary System (8 Hours)**

Structure, functions and derivatives of integument

**Module II: Skeletal System (8 Hours)**

Overview of axial and appendicular skeleton, Jaw suspensorium, Visceral arches

**Module III: Digestive System (8 Hours)**

Alimentary canal and associated glands, dentition

**Module IV: Respiratory System (8 Hours)**

Skin, gills, lungs and air sacs; Accessory respiratory organs

**Module V: Circulatory System (8 Hours)**

General plan of circulation, evolution of heart and aortic arches

**Module VI: Urinogenital System (6 Hours)**

Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri

**Module VII: Nervous System (8 Hours)**

Comparative account of brain Autonomic nervous system, Spinal cord, Cranial nerves in mammals

**Module VIII: Sense Organs (6 Hours)**

Classification of receptors Brief account of visual and auditory receptors in man

**Suggested readings**


Mapping of Cos to Syllabus:

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ZGCA405L: COMPARATIVE ANATOMY OF VERTEBRATES LAB
(2 Credits: 60 Hours) (L-T-P: 0-0-2)

Objective(s)
To demonstrate the differences and similarities between the different organ structure of different vertebrate at laboratory.

Course Outcomes:
CO 1: Compare the different types of scales. (Analyzing)
CO 2: Demonstrate the structural and functional similarities and differences of the organ systems amongst different vertebrate groups (Applying)
CO 3: Compare the functioning of these organ systems from lower to higher vertebrates (Applying)
CO 4: Explain the arterial and urogenital system. (Understanding)

Syllabus:
1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
2. Disarticulated skeleton of Frog, Varanus, Fowl, Rabbit
3. Carapace and plastron of turtle/tortoise
4. Mammalian skulls: One herbivorous and one carnivorous animal
5. Dissection of rat to study arterial and urogenital system (subject to permission)
6. Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted)
7. Project on skeletal modifications in vertebrates (may be included if dissection not permitted)

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ZGMP406T: BIOCHEMISTRY OF METABOLIC PROCESSES
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
To understand how macromolecules like carbohydrate, protein, lipids metabolized for providing energy and structural component of the cells.

Course/ Learning Outcomes:
CO 1: Define characteristic features of catabolic and anabolic pathways of metabolism (Remembering)
CO 2: Demonstrate the differences of carbohydrate, lipid and protein metabolism and their inter-relationships (Understanding)
CO 3: Infer the significance of the electron transport system in metabolic pathways (Analyzing)
CO 4: Interpret the biochemistry of metabolic disorders (Evaluating)

Module I: Overview of Metabolism (9 Hours)
Catabolism vs Anabolism, Stages of catabolism, Compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as &quot;Energy Currency of cell;&quot;; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms

Module II: Carbohydrate Metabolism (12 Hours)
Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis
**Module III: Lipid Metabolism (8 Hours)**

β-oxidation and omega-oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis

**Module IV: Protein Metabolism (8 Hours)**

Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids

**Module V: Oxidative Phosphorylation (8 Hours)**

Redox systems; Review of mitochondrial respiratory chain, Inhibitors and uncouplers of Electron Transport System

**Suggested Readings:**

5. https://onlinecourses.swayam2.ac.in/cec20_bt19/preview

**Mapping of COS to Syllabus:**

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**ZGMP407L: BIOCHEMISTRY OF METABOLIC PROCESSES LAB**

(2 Credits: 60 Hours) (L-T-P: 0-0-2)

**Objective(s)**

*Develop skill to measure and trace biochemical pathways as well as enzyme activities etc. and to interpret its results.*

**Course Outcomes:**

1. Estimation of protein content (Evaluating)
2. Interpretation of enzyme activity (Evaluating)
3. Determination of metabolic pathways (Evaluating)
4. Tracing metabolic pathway using bioinformatics (Applying)

**Syllabus:**

1. Estimation of total protein in given solutions by Lowry’s method.
2. Detection of SGOT and SGPT or GST and GSH in serum/tissue
3. To study the enzymatic activity of Trypsin and Lipase.
4. Study of biological oxidation (SDH) [goat liver]
5. To perform the Acid and Alkaline phosphatase assay from serum/tissue.
6. Dry Lab: To trace the I 13 abeled C atoms of Acetyl-CoA till they evolve as CO2 in the TCA Cycle Mapping of Cos to Syllabus

**Suggested Readings:**

5. https://onlinecourses.swayam2.ac.in/cec20_bt19/preview

**Mapping of COS to Syllabus**

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## Minor Courses

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### ZGAN104T: ANIMAL DIVERSITY-I

(3 Credits: 45 Hours) (L-T-P: 3-0-0)

**Objective(s)**

To know the general characters and classification of Non-chordates and understand the increasing complexity of body forms.

**Course/ Learning Outcomes:**

- CO 1: Interpret the evolution of body cavity in non-chordates. (Understanding)
- CO 2: Illustrate the morphological structure different larval forms of important representative organisms belonging to these phyla. (Understanding)
- CO 3: Identify the distinguishing characters of the pseudocoelomates and coelomates. (Applying)
- CO 4: Distinguish the unique physiology of selected representative non-chordates. (Analyzing)

**Module I: Protista, Parazoa and Metazoa (4 Hours)**

General characteristics and classification up to classes Study of Euglena, Amoeba and Paramecium Life cycle and pathogenicity of Plasmodium vivax and Entamoeba Histolytica.

**Module II: Porifera (3 Hours)**

General characteristics and classification up to classes; Canal system and spicules in sponges

**Module III: Cnidaria (4 Hours)**

General characteristics and classification up to classes, Metagenesis in Obelia, Polymorphism in Cnidaria, Corals and coral reefs.

**Module IV: Ctenophora (2 Hours)**

General characteristics and classification up to classes.

**Module V: Platyhelminthes (4 Hours)**

General characteristics and classification up to classes. Life cycle and pathogenicity of Fasciola hepatica and Taeniasolium

**Module VI: Nemathelminthes (4 Hours)**

General characteristics and classification up to classes. Life cycle, and pathogenicity of Ascarislumbricoides and Wuchereriabancrofti.

**Module VII: Annelida (4 Hours)**

General characteristics and classification up to classes. Reproduction, Regeneration and Locomotion of Annelida.

**Module VIII: Arthropoda (4 Hours)**

General characteristics and classification up to classes. Metamorphosis in Insects; Social life in bees and termites.

**Module IX: Onychophora (4 Hours)**

General characteristics and classification up to classes.
Module X: Mollusca (4 Hours)
General characteristics and Classification up to classes, Pearl formation in bivalves; Trochophore larva.

Module XI: Echinodermata (4 Hours)
General characteristics and Classification up to classes, Water-vascular system in Asteroidea, Larval forms in Echinodermata

Module XII: Hemichordata (4 Hours)
General characteristics and classification of Hemichordata up to classes; Study of Balanoglossus.


Suggested Readings

Mapping of COs to Syllabus

ZGAN105L: ANIMAL DIVERSITY-I LAB
(1 Credits: 30 Hours)(L-T-P: 0-0-1)

Objective(s)
To know the general characters and classification of Non-chordates and understand the increasing complexity of body forms by doing practical and at field level.

Course/ Learning Outcomes:
CO 1: Examine and investigate different species of non-chordate (Analyzing).
CO 2: Examine various systems of non-chordate species (Analyzing).
CO 3: Differentiate different parts of body thorough prepared slides (Analyzing).
CO 4: Design a project for any related topic (Creating).

Syllabus:
1. Study of whole mount of Euglena, Amoeba and Paramecium
3. Examination of pond water collected from different places for diversity in protists
4. Dissection of the mouth parts of Cockroach
5. Dissection of digestive system of Cockroach

Suggested Readings
ZGAD106T: ANIMAL DIVERSITY II
(3 Credits: 45 Hours)(L-T-P: 3-0-0)

Objective(s)
To know the Diversity of Chordata from lower to higher Chordates and their geographical distribution

Course/ Learning Outcomes:
CO 1: Understand the origin and evolution of the phylum Chordata. (Analyzing)
CO 2: Distinguish the unique characteristics as well as life functions of different chordate subphylum. (Applying)
CO 3: Evaluate the varied morphological, anatomical and physiological complexity in selected chordate organisms. (Understanding)
CO 4: Analyze the various theories of animal distribution and their geographical realms. (Analyzing)

Module I: Introduction to Chordates (8 Hours)
General characteristics and outline classification

Module II: Protochordata (8 Hours)
General characteristics of Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata

Module III: Origin of Chordata (3 Hours)
Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata

Module IV: Agnatha (2 Hours)
General characteristics and classification of cyclostomes up to class

Module V: Pisces (8 Hours)
General characteristics of Chondrichthyes and Osteichthyes, classification up to order Migration, Osmoregulation and Parental care in fishes

Module VI: Amphibia (8 Hours)
Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification up to order; Parental care in Amphibians

Module VII: Reptilia (7 Hours)
General characteristics and classification up to order; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes

Module VIII: Aves (8 Hours)
General characteristics and classification up to order Archaeopteryx- a connecting link; Principles and aerodynamics of flight, Flight adaptations and Migration in birds

Module IX: Mammals (8 Hours)
General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages

Suggested readings
5. T.C. Majupuria. Introduction to Chordates, Pradeep Publicartions.

Mapping of Cos to syllabus

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ZGAD107L: ANIMAL DIVERSITY II LAB
(1 credits: 30 Hours)(L-T-P: 0-0-1)

Objective(s)
To demonstrate the different Chordates from lower to higher Chordates with help of the laboratory specimen.

Course/ Learning Outcomes
CO 1: Identify distinguishing characteristics of representative museum specimens belonging to different phyla. (Applying)
CO 2: Determine their affinities and evolutionary relationships. (Evaluating)
CO 3: Examine specific organ structures through dissections. (Analyzing)

Syllabus
1. Protochordata: Herdmania, Branchiostoma, Colonial Urochordata Sections of Balanoglossus through proboscis and branchiogenital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slide of Herdmania spicules
2. Agnatha: Petromyzon, Myxine
5. Reptilia: Chelone, Triomyx, Hemidactylus, Varanus, Uromastyx, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus Key for Identification of poisonous and non-poisonous snakes
6. Aves: Study of six common birds from different orders. Types of beaks and claws
7. Mammalia: Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes, Erinaceous. Mount of weberian ossicles of Mystus, pecten from Fowl head Dissection of Fowl head (Dissections and mounts subject to permission) Powerpoint presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

Suggested readings
5. T.C. Majupuria. Introduction to Chordates, Pradeep Publications.

Suggested Readings

Mapping of COs to syllabus

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ZGPH210T: ENVIRONMENT AND PUBLIC HEALTH
(3 Credits: 45 Hours)(L-T-P:3-0-0)

Objective(s)
After completion of the course, students will be able to explain the critical importance of evidence in advancing public health knowledge, effects of environmental factors on a population’s health, and global burdens of disease.

Course/ Learning Outcomes:
CO 1: Illustrate the effects of air, water and noise pollution with regards to human health. (Understanding)
CO 2: Identify different types and sources of environmental hazards, their persistence, dose and exposure. (Applying)
CO 3: Distinguish the different factors contributing to climate change and their effect in human health. (Analyzing)
CO 4: Compile the various types of waste generated, their disposal and management. (Creating)
Module I: Introduction (5 Hours)
Definition of Environmental Health and Environmental Hazards; Categories of Environmental Hazard; Principles of hazard management; Inharaent Capacity of Environment; Categories of Pollution.

Module II: Pollution: (20 hours)
Air Pollution: Types, Sources, Effects and Control. Greenhouse effects, Global warming, Acid rain and Ozone layer depletion.
Water Pollution: Types, Sources, Effects and Control; Minamata diseases.
Noise pollution: Types, Sources, Effects and Control of Noise Pollution.

Module III: Case histories: (5 hours)
Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.

Module IV: Solid Waste Management: (10 hours)
Definition of Solid Waste, Types of Solid Waste, Sources of waste, Management of Solid waste. Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.

Module V: Diseases (5 Hours)
Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid

Suggested Readings:

Mapping of COs to Syllabus

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ZGPH211L: ENVIRONMENT AND PUBLIC HEALTH LAB
(1 Credits: 30 Hours) (L-T-P: 0-0-1)

Objective(s):
*To demonstrate the physical and chemical properties of water and soil.*

Course/ Learning Outcomes:
- CO1. To learn the procedure to find out the pH, Cl, SO4 and NO3 of soil of different location. (Applying)
- CO2. To learn the procedure of determination of pH, DO and CO2 in pond water. (Applying)

Syllabus
1. To determine pH, Cl, SO4, NO3 in soil samples from different locations.
2. To determine pH, CO2, DO, Transparency and NO3 in water samples from different locations.

Mapping of COs to Syllabus

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ZGAZ212T: APPLIED ZOOLOGY I
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
*To gain knowledge and get acquainted with major aspects of Sericulture, Apiculture, Vermiculture and Aquaculture.*

Course/ Learning Outcomes:
CO 1: Gain a thorough knowledge about different kinds of silkmoths, study of different host plants of the silkworms, cultivation of silkworm, seed technology, treatment of silk cocoons and silk reeling. (Applying)

CO 2: Learn about the various skills that are necessary for self-employment in the muga and eri silk cultivation, seed production and vermiculture. (Applying)

CO 3: Understand the basic life cycle of the honeybee. Learn about beekeeping tools and equipment; manage beehives for honey production and pollination. (Evaluating)

CO 4: Gain an overview of fish farming, the scientific management of different species in aquaculture, aquarium keeping and fish diseases. (Applying)

Module I: Sericulture (15 hours)

Module II: Apiculture (8 hours)
Different species of honey bees, bee plants, pollen calendar, bee keeping and management practices, bee products, Bee enemies and diseases.

Module III: Vermiculture (7 Hours)
Species of worms, condition for efficient vermiculture (domestic and commercial level), Economics of Vermiculture

Module IV: Aquaculture (15 hours)
Aquarium fish keeping: Ornamental Fishes of India special reference to North East India, common aquarium fishes; Aquarium Maintenance, Fisheries management: Composite fish culture, induced breeding and hybridization; Prawn and Pearl Culture, Exotic and Indigenous food Fishes of NE India, Fish and shellfish diseases and their control measures. Fish genetic resource conservation; Aquaphonics–prospect and future

Suggested Readings
1. Venkitaraman: Economic Zoology, Sudarsana Publishers
9. Chandra Girish. Apiculture &amp; the Honey Bee (Know about the species of honey bees, beekeeping, pollination, beehives, entomology, beekeepers, honey making

Mapping of COs to Syllabus
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ZGAZ213L: APPLIED ZOOLOGY I LAB:
(1 CREDITS: 30 HOURS) (L-T-P: 0-0-1)

Objective(s)
To be acquainted with hands on training on the biology of silkmoths, worms used in Vermiculture, the different life cycles of honey bees and to be able to identify economically important fishes
Course Outcomes:
CO 1: Develop knowledge regarding cultivation of silkworm, maintenance of the farm, selection of disease free eggs, silkworm rearing and silk reeling. (Applying)
CO 2: Learn about the various skills that are necessary for self-employment in the cultivation of muga and eri silkworms and vermiculture. (Applying)
CO 3: Understand the basic life cycle of the honeybee. Learn about beekeeping tools and equipment; manage beehives for honey production and pollination. (Evaluating)
CO 4: Identification of different types of fishes and their economic importance. (Identifying)

Syllabus:
1. Field Visit to any Sericulture Department to study about silkworm rearing
2. To study the life cycle of Antheraea assama and Samia ricini
3. Identification of different types of worms used for Vermiculture
4. To study the different types of caste of honeybees
5. Maintenance of freshwater aquarium
6. Identification of economically important fishes

Suggested Readings
1. Venkitaraman: Economic Zoology, Sudarsana Publishers

Mapping of COs to Syllabus

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ZGAY313T: APPLIED ZOOLOGY II
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s):
- To impart knowledge regarding management of poultry and economically important pest.
- To understand the importance of biodiversity and their conservation.

Course Outcomes:
CO 1: Learn basic concepts of poultry farming, housing, biosecurity measures, prevention of outbreaks and economics of poultry sciences. (Applying)
CO 2: Identify and understand the different types of parasites, their life cycles and the diseases caused by them. Identifying viruses carrying vectors, like Aedes, Culex and Anopheles; Learn about the economic importance and biodiversity of different insects. (Evaluating)
CO 3: Learn about the different types of pests and their hosts; and apply the latest knowledge in management of pest population. (Applying)
CO 4: Analyze the importance of biodiversity and threats to biodiversity and design steps to protect and conserve biodiversity. (Analyzing and Creating)

Module I: Poultry management (6 hours)
Poultry rearing / farming: housing and equipments, breeds of fowls, nutritional requirements, poultry diseases, poultry products: Broilers, meat processing and meat products, poultry by-products.

Module II: Parasitology (18 hours)
Introduction to Parasitology: Types of parasites, Types of Host, Zoonosis, Host-parasite Relationship, Sources of Infection, Mode of infection, Pathogenesis.
**Module I: Applied Zoology (8 hours)**

- **Vibrio cholera and Clostridium tetani**: Life Cycle, mode of transmission, infection and treatment.
- Dengue and Bird flu - Life cycle, mode of transmission, infection and treatment.
- Life history and mode of transmission of Entamoeba histolytica, Plasmodium vivax, Trypanosoma gambiense, Ancylostoma duodenale and Wuchereria bancrofti and the diseases caused by them.

**Module III: Insect pest management, Public Health and Forensic Entomology (8 hours)**

- Concept of Pest, different kinds of pest, concept of integrated pest management (IPM)

**Module IV: Biodiversity (7 hours)**

- Components of Biodiversity, Threats to biodiversity, biodiversity conservation, hot spots and heritage sites, IUCN Red List Categories, keystone species, habitat diversity of Indian wildlife, endemic and threatened species of North East India, National parks and wildlife sanctuaries present in North East India, Ethnozoology with special reference to North East India

**Module V: Insects of Economic Importance (6 hours)**

- Biology, Control and damage caused by Helicoverpa armigera, Pyrilla perpusilla and Papilio demoleus, Callosobruchus chinensis, Stiphilus oryzae and Tribolium castaneum

**Suggested Readings**

1. Venkitaraman: Economic Zoology, Sudarsana Publishers
7. Eldridge B Medical entomology (Springer)

**Mapping of COs to Syllabus**

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**ZGAY314L: APPLIED ZOOLOGY II Lab**

(1 Credit: 30 Hours) (L-T-P: 0-0-1)

**Objective(s)**

To impart latest knowledge in pest management techniques, management of disease carrying vectors and poultry farming

**Course Outcomes:**

- CO 1: Learn about the different types of pests and apply the latest knowledge of pest management techniques. (Applying)
- CO 2: Creating awareness regarding virus carrying vectors, like Aedes, Culex and Anopheles etc. (Understanding)
- CO 3: Learn about the insects of economic importance and biodiversity. (Applying)
- CO 4: Learn about basics of poultry farming and advances in housing and equipments. (Applying)

**Syllabus**

1. Visit to poultry farm or animal breeding centre. Submission of visit report
2. Study of Life Cycle of Aedes, Culex and Anopheles through Photographs
3. Study of Plasmodium vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale and Wuchereria bancrofti and their life stages through photographs
5. Study of insect damage to different plant parts/stored grains through damaged products/photographs; Identifying feature and economic importance of pest of stored grains and tea pest

**Suggested Readings**

1. Venkitaraman: Economic Zoology, Sudarsana Publishers

Mapping of COs to Syllabus

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ZGPE315T: PRINCIPLES OF ECOLOGY
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
To understand concepts and the Principles in ecology and wildlife management

Course Outcomes:
CO 1: Distinguish the mechanism of various biological interactions (Understanding).
CO 2: Analyse different population dynamics and interactions (Analysing).
CO 3: Evaluate ecosystem energetics with reference to food chain, food web (Evaluating).
CO 4: Apply conservation and management strategies for local endangered species (Applying)

Module I: Introduction to Ecology (3 Hours)
History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of physical factors

Module II: Population (20 Hours)
Unitary and Modular populations Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors Population interactions, Gause’s Principle with laboratory and field examples

Module III: Community (10 Hours)
Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological succession with one example Theories pertaining to climax community

Module IV: Ecosystem (10 Hours)
Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with one example of Nitrogen cycle Human modified ecosystem

Module V: Applied Ecology (2 Hours)
Ecology in Wildlife Conservation and Management

SUGGESTED READINGS
4. Robert Leo Smith Ecology and field biology Harper and Row publisher

Mapping of COs to Syllabus

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ZGPE316L: PRINCIPLES OF ECOLOGY LAB
(1 Credit: 30 Hours) (L-T-P: 0-0-1)

Objective(s)
To gain the knowledge and understand about the status and the diversity of the different ecosystems

Course Outcomes
CO 1: Investigate life tables and survivorship curves of different types (Analyzing).
CO 2: Estimate and analyze different population dynamics and interactions (Analyzing).
CO 3: Evaluate the aquatic ecosystem (Evaluating).
CO 4: Design a project for any related topic (Creating).

Syllabus
1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler’s method), Chemical Oxygen Demand and free CO2, alkalinity and hardness of water
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary

SUGGESTED READINGS
4. Robert Leo Smith Ecology and field biology Harper and Row publisher

Mapping of COs to Syllabus

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ZGMP312P: MINOR PROJECT: 4 Credit

ZGAB408T: ANIMAL BIOTECHNOLOGY
(2 Credits: 30 Hours) (L-T-P: 3-0-0)

Objective(s)
To study the techniques and application of animal biotechnology and their relevance in today’s world

Course Outcomes:
CO 1: Define the concept and scope of animal biotechnology.(Understanding)
CO 2: Understand the basic molecular technique for gene manipulation.(Understanding)
CO 3: Analyze animal cell culture and gene therapy procedure in molecular diagnosis of various genetic diseases. (Analyzing)
CO 4: Apply the practical concepts of basic techniques in animal biotechnology.(Applying)

Module 1. Introduction (2 Hours)
Concept and scope of animal biotechnology

Module 2. Molecular Techniques in Gene manipulation (12 Hours)
Outline of Recombinant DNA technology, introduction to Cloning vectors and Restriction enzymes. Techniques used in animal biotechnology: DNA isolation, PCR, Sanger Sequencing, DNA microarray.

Module 3. Genetically Modified Organisms (10 Hours)
Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals

Module 4. Applications of Biotechnology (6 Hours)
Animal cell culture, application of animal biotechnology in healthcare and medicine.
Suggested Readings:

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ZGAB409L: ANIMAL BIOTECHNOLOGY LAB
(1 Credit: 30 Hours) (L-T-P: 0-0-1)

Objective(s)
To acquaint oneself with basic biotechnology experiments

Course Outcomes:
CO 1: Explain and perform the process of DNA isolation (Understanding, Applying)
CO 2: Experiment with DNA with different enzymes (Applying)
CO 3: Learn PCR technique and analysis (Analysing)
CO 4: Explain and interpret different biological techniques (Understanding)

Syllabus:
1. Genomic DNA isolation from sample
2. Restriction digestion of plasmid DNA.
3. Polymerase chain reaction (demonstration)
4. To study following techniques through photographs: Southern Blotting, Northern Blotting Western Blotting, DNA fingerprinting

Suggested Readings:

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ZGRM410T: RESEARCH METHODOLOGY
(2 Credits: 30 Hours)(L-T-P: 2-0-0)

Objective(s):
- To develop the students to understand about various aspect of research and its significance.
- To create the analytical thinking and judicious solving on any activities in their future.

Course outcomes:
CO 1: Define various kinds of research, objectives of doing research, research process, research designs and sampling. (Remembering)

CO 2: Demonstrate basic knowledge on research techniques. (Understanding)

CO 3: Analyze the data collected in research through the use of analytical research tools. (Analyzing)

CO 4: Design solutions to varied biological problems. (Creating)

Module I: Foundations of Research (5 Hours)
Meaning, Objectives, Motivation: Research Methods vs Methodology, Types of Research: Analytical vs Descriptive, Quantitative vs Qualitative, Basic vs Applied

Module II: Research Design (8 Hours)
Need for research design: Features of good design, Important concepts related to good design- Observation and Facts, Prediction and Explanation, Development of Models. Developing a research plan: Problem identification, Experimentation, Determining experimental and sample designs

Module III: Data Collection, Analysis and Report Writing (12 Hours)
Observation and Collection of Data- Methods of data collection- Sampling Methods, Data Processing and Analysis Strategies, Technical Reports and Thesis writing, Preparation of Tables and Bibliography. Data Presentation using digital technology

Module IV: Ethical Issues (5 Hours)
Intellectual property Rights, Commercialization, Copyright, Royalty, Patent law, Plagiarism, Citation, Acknowledgement

Suggested readings

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ZGWC411T: WILDLIFE CONSERVATION AND MANAGEMENT
(2 Credits: 30 Hours) (L-T-P: 2-0-0)

Objective(s)
To impart the knowledge on modern concepts of management and conservation of Wildlife and the related Government Act.

Course Outcome:
CO 1: Explain the importance of evaluation and management of wildlife and their habitat. (Understanding)
CO 2: Analyze various characteristics of population. (Analyzing)
CO 3: Explain the management strategies to protect/unprotected areas. (Understanding)
CO 4: Apply conservation and management strategies for local endangered species. (Applying)

Module I: Introduction (7 Hours)
Introduction to Wild Life, evaluation of wild life Habitat, remote sensing and GIS in evaluation of wildlife habitat; Depletion of Wildlife; Importance of conservation; Conservation ethics, World conservation strategies.

Module II: Management of habitats (6 Hours)
Setting back succession; Grazing logging; Mechanical treatment; Advancing the succession process; Cover construction; Preservation of general genetic diversity; Restoration of degraded habitats

Module III: Population estimation (6 Hours)
Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method.

Module IV: Management and planning (9 Hours)
Protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Management planning of wild life in protected areas; Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbance.

Module V: Management of excess population (2 Hours)
Bio- telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animal

Suggested Readings:

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ZGWC412L: WILDLIFE CONSERVATION AND MANAGEMENT LAB
(1 Credits: 30 Hours) (L-T-P: 0-0-1)

Objective(s)
To identify the different wildlife species and demonstration of wildlife census.

Course Outcomes:
CO 1: Identify different fauna species. (Applying)
CO 2: Apply the equipment used for wildlife studies. (Understanding, applying)
CO 3: Analyze animal signs (Analyzing)
CO 4: Apply different field and survey techniques (Applying)

Syllabus:
1. Identification of mammalian fauna, avian fauna, herpeto-fauna.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, Ten tree method, Circular, Square & rectangular plots, Parker’s 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

Suggested Readings:
## Mapping of COs to Syllabus

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SKILL ENHANCEMENT COURSES

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ZGAC108L: APICULTURE
(3 credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
The students will be able to understand the basics knowledge of beekeeping, beekeeping tools, equipment, and managing beehives.

Course Outcomes:
CO 1: The learner will be able to manage beehives for honey production and pollination. (Applying)
CO 2: The course will be useful for providing self-employment to the learner. (Understanding)
CO 3: The learner will be able to understand the marketing of various bee products. (Understanding)
CO 4: The learner will be able to apply the basics knowledge of beekeeping tools, equipment, and managing beehives. (Applying)

Module I: (3 Hours)
Introduction to Apiculture: Importance and History

Module II: (6 Hours)
Different Species of Honey bee. Species and Sub-Species of Hive Bees, General morphology and anatomical features.

Module III: ( Hours)
Colony Organization and Life cycle of honey bee. Dances of honey bees

Module IV: (7 Hours)
Bee Hive and other Equipment, Selection of Apiary site and bee Species, Examination of bee colony, Maintenance of Apiary records

Module V: (10 Hours)
Principles of Bee Management, Spring management, Swarming and control, Summer management, Monsoon and Autumn management, Winter management, Swarming and control, Migratory bee keeping

Module VI: (5 Hours)
Dividing, Uniting and Shifting of bee colonies, Robbing and Absconding, Supplementary feeding, Economics of Bee Keeping

Module VII: (3 Hours)
Queen Management, Queen rearing, Mass Queen rearing

Module VIII: (5 Hours)
Bee enemies and diseases: Predatory wasps, Wax moths, Ectoparasite mites and other bee enemies. Different diseases of honey bees.

Mapping of COs to Syllabus

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ZGSC109L: SERICULTURE
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Objective(s)
To inculcate the skills in Sericulture with special emphasis on the rearing of silkworms, diseases and pest and entrepreneurship in Sericulture
Course Outcomes:
CO 1: Outline various kinds of silkworms, their life cycles, the silk they produce and the present status of silk production in India as well as abroad (Understanding)
CO 2: Examine silkworm rearing techniques, with special importance given to those extensively reared in North East India (Analyzing)
CO 3: Inspect the loss in silk production due to increased silkworm mortality as a result of pests and diseases (Analyzing)
CO 4: Design start-ups or entrepreneur proposals to enhance the economy of the Sericulture industry thereby boosting the younger generation to develop skill in uplifting this indigenous industry (Creating)

Module I: Introduction (4 Hours)
Sericulture: Definition, history and present status; Silk route Types of silkworms, Distribution and Races Exotic and indigenous races Mulberry and non-mulberry Sericulture

Module II: Biology of Silkworm (6 Hours)
Life cycle of *Philosamia ricini*, *Antheraea assama* and *Bombyxmori*, Structure of silk gland and secretion of silk

Module III: Rearing of Silkworms (15 Hours)
Selection of a non-mulberry variety and establishment of garden, Rearing of Eri, Muga and Bombyxmori silkworm, Rearing house and rearing appliances Disinfectants: Formalin, bleaching powder, RKO Silkworm rearing technology: Early age and Late age rearing Types ofmountages Spinning, harvesting and storage of cocoons.

Module IV: Pests and Diseases (5 Hours)
Pests of silkworm: Uzi fly, dermestid beetles and vertebrates Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial Control and prevention of pests and diseases

Module V: Entrepreneurship in Sericulture (15 Hours)
Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture. Visit to various sericulture centres.

Suggested Readings:
1. Manual on Sericulture; Food and Agriculture Organisation, Rome 1976
4. Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI, Mysore.

Mapping of COs to Syllabus

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ZGAK214L: AQUARIUM FISH KEEPING
(2 Credits: 30 Hours) (L-T-P:2-0-0)

Objective(s):
- To understand the scope of aquarium fish industry.
- To develop entrepreneurship skills on aquarium fish keeping as a future career.

Course/ Learning Outcomes:
CO 1: Explain the scope of aquarium fish industry and the biology of aquarium fishes, both freshwater and marine. (Understanding)
CO 2: Compare food formulation and feeding techniques of aquarium fish. (Analyzing)
CO 3: Analyze the scope of the aquarium fish Industry as a means of livelihood (Analyzing)
CO 4: Identify techniques and skills in fish transportation (Applying)

Module I: Introduction to Aquarium Fish (2 Hours)
Introduction to aquarium fish, the scope of aquarium fish industry based on endemic and exotic species.

**Module II: Biology of Aquarium Fishes (10 Hours)**
Common characters and sexual dimorphism of Freshwater and Marine fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

**Module III: Food and feeding of Aquarium fishes (8 Hours)**
Use of live fish feed organisms. Preparation and composition of formulated fish feeds.

**Module IV: Fish Transportation (4 Hours)**
Live fish transport - Fish handling, packing and forwarding techniques.

**Module V: Maintenance of Aquarium (6 Hours)**
General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry.

**Suggested Readings**

**Mapping of COs to Syllabus:**

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INTERNSHIP/APPRENTICESHIP/MINOR PROJECT

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ZGIN109I/ ZGIN215I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 Credits: 120 Hours)

BOIN317I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits-60 Hours)

ZGMP312P: MINOR PROJECT
(4 CREDITS-120 HOURS)

GUIDELINES FOR INTERNSHIP AND MINOR PROJECT:
Any kind of Internship or Minor project may be carried out by the students of the Department of Zoology in any reputed and recognized Institutions/Laboratories/Industries/Companies which is recognized by Assam Don Bosco University. A written permission for Internship/Apprenticeship/Minor project must be obtained from the Head of the Department/Registrar of the University. All interns must be under the supervision of the faculty members of the Department of Zoology and may be Co-supervised by other of that institution who is a regular employee at the level of Assistant Professor and above. All interns must abide by the rules and regulations of the host Institutions. After the completion of the Internship/Apprenticeship/Minor project, students must obtain a certificate from the Head of the Institutions/Laboratories/Industries/Companies in Letterhead clearing mentioning the starting and completion dates of Internship/Apprenticeship/Minor project. A report about the Internship/Apprenticeship/Minor project undertaken by the student will have to be submitted to the concerned department at the end of the Internship/Apprenticeship/Minor project.

Duration: Internship/Apprenticeship/Minor project may be of 2 months duration (full time) and 6 months duration (part time).

Attendance: Co-Supervisor of the Institutions/Laboratories/Industries/Companies where the student is undergoing Internship/Apprenticeship/Minor project will have to maintain regular attendance records of the intern.

Assessment: Assessment would be carried out by the Supervisor and Co-supervisor based on the regularity of the student; submission of progress report followed by seminar presentation of the report.

RESEARCH PROJECT /DISSERTATION

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BSC ZOOLOGY (Honours)

ZGDI413P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)

ZGDI414P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)
ZGDI415P: DISSERTATION I  
(18 Credits -540 Hours) (L-T-P: 0-0-36)

ZGDI416P: DISSERTATION II  
(20 Credits -600 Hours) (L-T-P: 0-0-40)

GUIDELINES FOR RESEARCH PROJECT/DISSERTATION:
Research Project/Dissertation must be carried out in the department under the supervision of faculty members. In case of inter-disciplinary Research Project/Dissertation, a co-supervisor may be opted from within the school or from any other departments within the University for better quality data generation and results. If a student wants to carry out a portion of the Research Project/Dissertation in any Institutions/Laboratories/Industries/Companies outside the University, a written permission has to be obtained by the student from the Head of the Department or Registrar of the University. The student involved in the Research Project/Dissertation, Assam Don Bosco University will be the sole proprietor of any publications/patents/commercialization generated out of the Research Project/Dissertation works but due acknowledgement must be given to other faculties involved in the project from partner Departments/Institutions/Laboratories. All Research Project/Dissertation students must abide by the rules and regulations of the host Institutions/Laboratories/Industries/Companies. After the completion of the Research Project/Dissertation, students must obtain a certificate from the Head of the Institutions/Laboratories/Industries/Companies in letterhead clearing mentioning the starting and completion dates of Research Project/Dissertation. A detail report of the project/works carried out by the student will have to be submitted to the concerned Department and Library of Assam Don Bosco University at the end of the project period.

Duration: Research Project/Dissertation will be carried out for 2 semesters (7th and 8th semester). Written permission from the University authorities must be obtained for extension of the Research Project/Dissertation if need arises.

Attendance: Faculty Supervisor/Co-supervisor of the Institutions where the student is carrying out the Research Project/Dissertation will have to maintain regular attendance records of the student.

Assessment: The B. Sc student undergoing research project/dissertation would be assessed by the Departmental Research Committee by conducting a progress report seminar. 
A final report will have to be submitted to the department/University. Final assessment would be carried out at the end of 8th semester by the supervisor/Co-supervisor based on the regularity of the student and submission of regular progress reports. The student will have to submit a final Research Project/Dissertation thesis in proper formats to the Department, followed by seminar presentation of the project report. The final assessment maybe conducted in the presence of an External examiner.
DEPARTMENT OF ECONOMICS

PROGRAMME: BACHELOR OF ARTS in ECONOMICS (BA)

DEGREE: BA ECONOMICS (HONOURS)/BA ECONOMICS (HONOURS) WITH RESEARCH

VISION

● To envision excellence in quality education and molding intellectually competent persons in economics for creating novel ideas through innovative teaching and research contributing to the modern society.

MISSION

● Empower the students with critical understanding of economic theory, analytical treatment and empirical interpretations of economic issues.
● Make the students aware of recent and ongoing developments in the field of economics.
● Enhance the skill and efficiency of the students for better employability in competitive job markets.

POs – BA Economics

PO 1: **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO 2: **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO 3: **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO 4: **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 5: **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO 6: **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO 7: **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

PSOs – BA Economics

PSO 1: **Knowledge of Economic System**: An ability to understand economic theories and functioning of basic microeconomic and macroeconomic systems.

PSO 2: **Statistical and Mathematical Skills**: Acquaint with collection, organization, tabulation and analysis of empirical data. Ability to use basic mathematical and statistical tools to solve real economic problems.

PSO 3: **Econometric Applications**: Acquaint with basic and applied econometric tools and methods used in economics. The aim of this course is to provide a foundation in applied econometric analysis and develop skills required for empirical research in economics. It also covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models.

PSO 4: **Understanding Development Perspectives**: Delineate the developmental policies designed for developed and developing economics. The course is also acquainted with the measurement of development with the help of theories along with the conceptual issues of poverty and inequalities.

PSO 5: **Environmental Strategy and Management**: This course emphasizes on environmental problems emerging from economic development. Economic principles are applied to valuation of environmental quality, quantification of environmental damages, tools for evaluation of environmental projects such as cost-benefit analysis and environmental impact assessments.

PSO 6: **Perspectives on Indian Economy**: Acquaint with basic issues of Indian economy and learn the basic concept of monetary analysis and financial marketing in Indian financial markets. This course reviews major trends in economic indicators and policy debates in India in the post-Independence period.

PSO 7: **Research and Internship**: The course gives impetus to develop the analytical skill of research among the students through dissertation and project works. The internship programme provides the students with the exposure to explore various institutions where they can earn the experience of working in the field of their interest.

Mapping of POs & PSOs

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## DETAILED SYLLABUS
### MAJOR COURSES

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### ENMI100T: INTRODUCTORY MICROECONOMICS

(4 credit- 60 hours) (L-T-P: 4-0-0)

**Objective(s)**

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis of the course will illustrate how microeconomic concepts can be applied to analyze real-life situations. Thus, it provides a sound understanding in microeconomic theory to formally analyze the behavior of individual agents. This course looks at the behavior of the consumer and the producer and also covers the behavior of a competitive firm.

**Course/ Learning Outcomes**

At the end of this course students will be able to:

CO 1: Classify microeconomics from the perspective of individual decision making as consumers and producers. (Remembering and understanding)

CO 2: Apply the microeconomic tools in factor markets and how firms work (Applying)

CO 3: Interpret the characteristics of firms and input markets in perfect competition. (Analyzing)

CO 4: Justify the use of microeconomic tools for analyzing real time situations. (Evaluating)

**Module I: Consumer Behavior (18 hours)**

The Economic Problem – Scarcity and Choice, Utility – Cardinal vs. Ordinal Utility; Cardinal Utility Theory – Marginal and Total Utility, Equi-marginal Utility; Consumers’ Equilibrium; Marginal Valuation; Consumers’ Demand Curve; Ordinal Utility Theory - Preference of Consumers; Indifference Curve; Budget Constraint; Consumer Surplus and Producer Surplus; Utility Maximization; Consumers’ Equilibrium; Income Effects and Substitution Effects of a Price Change; Price Consumption Curve; Income Consumption Curve; Derivation of Demand Curve from Price Consumption Curve

**Module II: Production and Costs (15 hours)**

Technology and Production Function; Isoquants; Production with One and More Variable Inputs; Law of variable Proportion; Returns to Scale; Economies and Diseconomies of Scale; Short Run and Long run Costs; Cost Curves in the Short Run and Long Run; Equilibrium of the Firm

**Module III: The Firm and Input Market in Perfect Competition (15 hours)**

Review of Perfect Competition - Equilibrium of the Firm and Industry in the Short Run and Long Run; The Derivation of Long Run Industry Supply Curve; Constant, Increasing, and Decreasing Cost Industry; Perfect Competition and Allocative Efficiency; Labour Markets – Basic Concepts; Demand for Labour; Shifts in Labour Demand Curves; Equilibrium in Labour market; Input Demand Curves; Labour Markets and Public Policy
Module IV: Market Failures (12 hours)
Externalities and Inefficiency; A Simple Bilateral Externalities; Public Goods and Free Riders Problems; Imperfect Markets; Asymmetric Information and Markets for Lemons; Moral Hazard; Adverse Selection; Signaling, Role of the State

Suggested Readings

Mapping of COs to Modules

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ENMA101T: INTRODUCTORY MACROECONOMICS
(4 credits- 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The course aims to introduce and explain the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variables like GDP, consumption, savings, investment, and balance of payments. Further, this course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and understand the basic concepts of macroeconomics including national income, money, business cycle and related concepts of closed economy (Remembering and Understanding).
CO 2: Apply some basic principles of macroeconomics. (Applying)
CO 3: Analyze the quantity theory of money, Keynesian model of income determination, IS-LM model and its application for real life economic decision making. (Analyzing)
CO 4: Interpret the various roles of monetary and fiscal policy in credit control and inflation. (Evaluating)

Module I: Introduction to Macroeconomics and National Income Accounting (15 hours)
Basic Issues Studied in Macroeconomics; Concepts of National Income- GNP, NNP, NI at Factor Cost and Market Prices; Measurements of Gross Domestic Product; Income, Expenditure and the Circular Flow; Real vs. Nominal GDP; Price Indices; National Income Accounting for an Open Economy; Limitations of the GDP concept

Module II: Money (18 hours)
Functions of Money; Quantity Theory of Money – Classical and Modern Approach; Post-Keynesian theories of Demand for Money- Patinkin, Baumol, Tobin; Determinants of Money Supply in India; High Powered Money; Credit Creation; Tools of Monetary Policy- RBI

Module III: Cyclical Fluctuation (8 hours)
Characteristics of Cyclical Fluctuation; Business Cycle in Market Economies; Short-Term vs. Long-Term Growth Trend; Theories of Business Cycles – Hawtrey, Samuelson, Hicks, Kaldor, Schumpeter; Impact of Recession on Trade Imbalances

Module IV: The Closed Economy in the Short Run (20 hours)
Classical and Keynesian Systems; Simple Keynesian Model of Income Determination; IS-LM Model; Fiscal Policy in Keynesian Model; Fiscal and Monetary Multipliers; Comparative study of Monetary and Fiscal Policies.

Suggested Readings

Mapping of COs to Modules

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**ENIC200T: INTERMEDIATE MICROECONOMICS**

Total Credit: 4 (60 Hours) (L-T-P: 4-0-0)

**Objective(s)**

This course presents a logical and coherent framework in which to organize observed economic phenomena. Microeconomic theory is based on the notion that individuals (and firms) have well-defined objectives (such as maximizing utility or profits) and behave systematically according to the incentives and constraints of their economic environment. It is this framework the course has been designed to gain a fundamental understanding of the choices people make in an economic setting.

**Course/Learning Outcomes**

At the end of this course students will be able to:

CO 1: Identify the concepts and terms of microeconomics. And classify the role of economic agents and their interdependence (Remembering and Understanding)

CO 2: Apply the basic principles of microeconomics. (Applying)

CO 3: Illustrate the behavior of consumer and producer in different situations. (Analyzing)

CO 4: The production techniques under perfect markets and discuss the use of microeconomic tools for examining real life problems (Evaluating)

**Module I: Consumer Choice under Risk and Uncertainty (15 hours)**

Choice Under Risk and Uncertainty – Uncertainty and Probability Distributions; Expected Value and Expected Utility; Maximizing Expected Utility; Expected Utility Hypothesis; Expected Utility Functions and Attitudes towards Risk – Risk Neutral, Risk Averse Risk Preference, Certainty Equivalent and Risk Premium; Demand for Risky Assets; Reducing Risks; Intertemporal Choice – Saving and Borrowing

**Module II: Market Structure (15 hours)**

Derivation of Long Run Industry Supply Curve; Constant, Increasing, and Decreasing Cost Industry; Monopoly Equilibrium; Pricing with Market Power; Degree of Monopoly Power; Price Discrimination under Monopoly; Equilibrium of Multi-plant Monopoly; Monopolistic Competition – Price and Output Determination; Excess Capacity under Monopolistic Competition; Duopoly Model– Cournot,Bertrand,Stackelberg; Oligopoly – Basic Structure; Kinked demand curve, Collusive and Non-collusive Oligopoly

**Module III: Welfare Economics (15 hours)**

Pareto Optimality; Social Welfare Functions – Bergson & Samuelson, Arrow; Maximization of Social Welfare; Grand Utility Frontier; Compensation Criteria- Kaldor and Hicks; Arrow’s Impossibility Theorem; Edgeworth Box; The Theory of Second Best; Social vs. Private Costs and Benefits

**Module IV: Game Theory (15 hours)**

Game Theory – Basic Ideas; Two-person Zero-Sum Game; Dominant Strategy; Prisoners’ Dilemma; Nash Equilibrium; Tit-for-tat Strategy; Non-Zero Sum Game – Basic Ideas, Examples; The Concept of Repeated Game; Competitive Strategy

**Suggested Readings**


Mapping of COs to Syllabus

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ENSM201T: STATISTICAL METHODS FOR ECONOMICS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course will provide a solid foundation in probability and statistics for students in economics and other social sciences. Students will learn topics including elements of probability theory, sampling theory, statistical estimation, and hypothesis testing. The course is designed to enhance the decision making process. Moreover, the course emphasizes topics needed for further study of econometrics and helps in developing research hypotheses for research projects.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and understand simple concepts of statistics. (Remembering and Understanding)
CO 2: Apply the statistical techniques to calculate various measures of central tendency, dispersion and probability. (Applying)
CO 3: Analyze the sampling and economic data and draw inferences from it. (Analyzing)
CO 4: Evaluate the statistical inferences in understanding real economic problem (Evaluating)

Module I: Probability Theory (15 Hours)
Sample Spaces and Events; Probability Axioms and Properties; Addition and Multiplication Theorem of Probability, Counting Techniques; Conditional Probability and Bayes’ Rule; Independence of Events

Module II: Random Variables and Probability Distributions (20 hours)
Defining Random Variables; Probability Distributions; Expected Values of Random Variables and of Functions of Random Variables; Properties of Commonly used Discrete and Continuous Distributions (Uniform, Binomial, Normal, Poisson and Exponential Random Variables); Joint Distribution; Covariance and Correlation Coefficients

Module III: Statistical Distributions and Hypothesis Testing (15 hours)
Normal Distribution; χ², t and F Distributions; Parameters and Statistics; Estimation of Parameters; Properties of Estimators; Testing of Hypotheses - Steps and decision making process; Distributions of Test Statistics; Testing Hypotheses related to Population Parameters; Type I and Type II Errors; Power of a Test

Module IV: Sampling and Parameter Estimation (15 hours)
Principal Steps in a Sample Survey; Methods of Sampling; Role of Sampling Theory; Properties of Random Samples; Errors in Statistics - Sampling vs. Non-sampling Errors; Estimation of Population Parameters; Properties of Estimators; Confidence Intervals for Population Parameters

Suggested Readings

Mapping of COs

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ENIA202T: INTERMEDIATE MACROECONOMICS
(5 credit - 75 Hours) (L-T-P: 3-0-0)

Objective(s):
This course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It also provides the macro-foundations to the various aggregative concepts used in the previous course. It introduces various theoretical issues related to an open economy. It also introduces the concept of inflation, its relationship with unemployment and some basic concepts in an open economy.

Course /Learning Outcomes
At the end of the course students will be able to:
CO 1: Understand macroeconomics from the perspective of policy making. (Understanding)
CO 2: Apply some basic principles of macroeconomics. (Applying)
CO 3: Draw Inferences from interactions between macroeconomic thoughts and real life situations. (Analyzing)
CO 4: Interpret the links between the domestic economy and the rest of the world. (Evaluating)

Module I: Aggregate Demand and Aggregate Supply Curves (15 hours)
Derivation of aggregate demand and aggregate supply curves; interaction of aggregate demand and supply; Multiplier analysis with AD curve and changes in price levels; Aggregate supply in the SR and LR

Module II: Macroeconomic Foundations (20 hours)
Consumption: Keynesian Consumption Function; Fisher’s Theory of Optimal Intertemporal Choice; Life-cycle and Permanent Income Hypothesis; Rational Expectations and Random-walk hypothesis of Consumption Expenditure; Investment: Determinants of Business Fixed Investment; Residential Investment and Inventory Investment; Marginal Efficiency of Capital and Investment

Module III: Inflation, Unemployment and Expectations (25 hours)
Inflation – Types, Causes, Effects; Measures to Control Inflation; Pull and Cost Push; Inflationary Gap; Inflation and its Social Costs; Anti-inflationary Measures; Structural Theories of Inflation; Inflation in Developing Countries; Inflation-unemployment Trade-off – Phillips Curve; Hyperinflation; Deflation – Meaning, Effects; Inflation vs. Deflation; Adaptive Expectations; Rational Expectations.

Module IV: Open Economy Models (15 hours)
Short-run Open Economy Models; Mundell-Fleming Model; Exchange Rate Determination; Purchasing Power Parity; Dornbusch’s Overshooting Model; Monetary Approach to Balance of Payments; International Financial Markets; Inflation and Unemployment in the Open Economy

Suggested Readings

Mapping of COs to Syllabus

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ENIE203T: INTERNATIONAL ECONOMICS
(5 Credit- 75 Hours) (L-T-P: 5-0-0)

Objective(s):
This course develops a systematic exposition of models that try to explain the concept, subject matter, direction, and consequences of international trade, and the determinants and effects of trade policy. Students will be exposed to various theories of international trade and their application. It concludes with an analytical account of the causes and consequences of...
the rapid expansion of international financial flows in recent years. Although the course is based on abstract theoretical models, students will also be able to learn the real-world examples and case studies.

**Course/ Learning Outcomes**

At the end of this course students will be able to:

- **CO 1:** Understand the key principles and the main theories of international economics. (Remembering and Understand)
- **CO 2:** Apply the theories and models of international trade for economic growth and global welfare. (Applying)
- **CO 3:** Analyze the links between trade, international finance, economic growth and globalization, with a particular emphasis on the experiences of developing countries. (Analyzing)
- **CO 4:** Evaluate international trade policies regarding increase in exports, international debt, and international institutions to solve domestic economic problems. (Evaluating)

**Module I: Introduction** 

(15 hours)

International Economics – Meaning, Importance and Subject Matter; Gains from Trade; Overview of World Trade; Globalization of the World Economy; International capital flows – significance and limitations of foreign capital; Foreign direct investment factors affecting direct investment, effects of direct investment; Current International Economic Problems and Challenges

**Module II: Theories of International Trade** 

(20 hours)

Offer Curves; Terms of Trade; The Ricardian Theory of Trade; Specific Factor Model of Trade; Heckscher-Ohlin Models; Leontief Paradox; New Trade Theories; Rybczinski and Stolper-Samuelson Theorem; The International Location of Production; Firms in the Global Economy – Outsourcing and Multinational Enterprises

**Module III: Trade Policy** 

(20 hours)

Instruments of Trade Policy; Trade Restrictions – Tariffs and Optimum Tariff; Nontariff Trade Barriers; Partial and General Equilibrium Analysis of a Tariff; Inward looking and outward looking trade policy; Economic Integrations – Free Trade Areas, Customs Unions, Common Markets, Optimum Currency Area, Economic Union; Dumping; Political Economy of Trade Policy; Controversies in Trade Policy

**Module IV: International Macroeconomic Policy** 

(20 hours)

Balance of Payments – Current and Capital Account; Foreign Exchange Markets – Types and Functions; Exchange Rates – Fixed vs. Flexible Exchange Rates, Spot and Forward Exchange Rates; Determination of equilibrium Exchange Rate; Foreign Exchange Risks – Hedging, Speculation, Interest Arbitrage; International Monetary Systems; WTO and International Trade; International Debt Crisis; Financial Globalization and Financial Crises

**Suggested Readings**

5. Södersten, Bo, & Geoffrey Reed., International Economics. Basingstoke: Macmillan, 2004

**Mapping of COs to Modules**

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**ENFE204T: FUNDAMENTALS OF ECONOMETRICS**

(4 Credits - 60 Hours) (L-T-P: 4-0-0)

**Objective(s)**

This course is an undergraduate level introduction to econometrics, a powerful tool applied to the analysis of economic phenomena. Students will learn the core concepts of estimation of economic parameters, prediction of economic outcomes, and statistical inference in this course. Moreover, the course covers the statistical tools needed to understand empirical economic research and to plan and execute independent research projects in future.

**Course/Learning Outcomes**

At the end of this course students will be able to:

- **CO 1:** Define the basic concepts like definition, scope and nature of econometrics. (Remembering and Understanding)
- **CO 2:** Apply various statistical tools in hypothesis testing and econometric research. (Applying)
- **CO 3:** Analyze the results of regression models using the OLS method and make decisions with hypothesis testing. (Analyzing)
Module I: Introduction to Econometrics (10 Hours)
Basics of Econometrics – Meaning and Methodology; Relation with Mathematical Economics and Statistics; Applications of Econometrics; Nature of Econometrics; Scaling and Units of Measurement

Module II: Estimation of Regression Model (20 hours)
Regression-Concepts and Functional forms; Classical Linear Regression and its Assumptions; Estimation of Simple Linear Regression models; Properties of Estimators; Goodness of Fit; Tests of Hypotheses; Confidence Intervals; Forecasting; Multiple Linear Regression-Adjusted R²; Partial Regression Coefficients; Testing Hypotheses – Individual and Joint

Module III: Violations of Classical Assumptions (15 hours)
Multicollinearity – Consequences, Detection, Remedies; Heteroscedasticity – Consequences, Detection, Remedies; Serial Correlation – Consequences, Detection, Remedies

Module IV: Simultaneous-Equation Models and its Identification (15 hours)
Nature and Problems of Simultaneous-equation models; Structural, Reduced-form and Recursive Models; Estimation through ILS and 2SLS methods; Identification of Simultaneous-equation models

Suggested Readings

Mapping of COs

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ENDE300T: DEVELOPMENT ECONOMICS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This subject will help the students to define and understand the different concepts of development. The course will help in comparing the changes in the process of development and compare among developed, developing and under-developed countries. The course will include different economic theories related to growth and development. Finally, the subject will learn to criticize and appraise different economic policies towards economic development.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and describe the different concepts of Economic growth and development (Remembering and Understanding)
CO 2: Demonstrate the changes in Classical, Neo-classical and modern theories of economic development (Applying)
CO 3: Compare and criticize the different strategies of economic development (Analysing)
CO 4: Evaluate and Explain the different sectoral problems and policies for development (Evaluating and Creating)

Module-I: Economic Growth and Development (15 hours)
Meaning of Economic Growth and Development; Scope; Measures of Development-GDP, PCI, HDI- Gender Index-PQLI (including adjusted indices); Characteristics of Under-developed, Developing and Developed Countries; Factors determining Economic growth; Capital formation ; Technological process and economic development; Hicks Neutral Technological Change; Harrods Neutral

Module-II: Classical, Neo-Classical and Modern Theories of Economic Growth (20 hours)
Adam Smith’s Theory of Economic Development; Malthus’s Theory; Marx Theory; Shumpeter theory of development; Rostow’s Theory of Growth; Solow Neoclassical Growth Model; Harrod-Domar Growth Model; The Neo-colonial Dependency Model;
Endogenous Growth Models-AK Model and Romer’s Model; Meade’s neoclassical model of economic growth-Joan Robinson’s Model of Growth

**Module-III: Strategies of Development (10 hours)**
Lewis’s theory of Economic Development; Big-Push Theory; Balanced and Unbalanced Growth Strategies; Critical Minimum Effort Theory; Social Dualism-Higgin’s Technology Dualism; Mahalanobis Growth Model; Wage Good Model; Michael Kremer’s O-Ring Theory

**Module-IV: Sectoral Problems and Policies (15 hours)**
Agriculture, Productivity and Economic Development; Land Reforms; Industrialization- Measuring Inequality- Lorenz Curve, Gini-Coefficient and Aggregate measures of inequality; Gender Inequality; Human Capital; Education and Health; Poverty; Kuznet’s Inverted U Hypothesis; Poverty- MPI- Policy Options on Income Inequality and Poverty in India- Unemployment-Problems and Policies in India

**Suggested Readings**
1. Todaro& Smith, Economic Development, Pearson Education

**Mapping of COs to Syllabus**

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**ENEE301T: ENVIRONMENTAL ECONOMICS (5-0-0)**
(5 Credit: 75 Hours) (L-T-P: 5-0-0)

**Objective(s)**
The course designed to understand the fundamental concepts, subject matter, nature and scope of environmental economics and key environmental issues and problems. The concept of market failure and externalities, Pareto efficiency, maximum social welfare and perfect competition, measures to control pollution and externalities, Pigouvian tax and subsidies, Compensation criterion, social choice and justice, property rights and Coase theorem etc. will be thoroughly discussed. Environmental concerns like climate change: global warming, ozone depletion and Biodiversity loss, policy instruments for environmental protection are the areas where serious discussion will be conducted.

**Course/Learning Outcomes**
At the end of this course students will be able to:

CO 1: Define the basic concepts of environmental economics. (Remembering)

CO 2: Understand the environmental issues in relation to the theory of externalities. (Understanding)

CO 3: Analyze environmental problems using economic principles. (Applying/Analyzing)

CO 4: Evaluate the diverse methods of environmental valuation for sustainable development. (Evaluating)

**Module I: Introduction (15 hours)**
Environmental Economics - Meaning, Nature, Scope; Interlinkage between Economy and Environment; Population and Environment; Poverty and Environment

**Module II: The Theory of Externalities (15 hours)**
Pareto Optimality and Market Failure in the Presence of Externalities; Property Rights and the Coase Theorem

**Module III: The Design and Implementation of Environmental Policy and Environmental Problems (20 hours)**
Overview; Pigouvian Taxes and Effluent Fees; Tradable Permits; Choice between Taxes and Quotas under Uncertainty; Market base and Non Market base instrument of Environmental pollution control; Implementation of Environmental Policy; Trans-Boundary Environmental Problems; Economics of Climate Change; Trade and Environment

**Module IV: Environment Valuation and Sustainable Development (20 hours)**
Non-Market Values: Use Value, Option Value, Bequest Value; Measurement Methods - Willingness to Pay and Willingness to Accept Compensation; Risk Assessment and Perception. Sustainable Development - Basic Concepts and Measurement; Perspectives from Indian Experience

Suggested Readings

Mapping of COs to Syllabus

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ENIF302T: INDIAN FINANCIAL SYSTEM
(4 Credit - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course aims at providing the basic knowledge of the Indian financial system and its components, institutions and their functions. It also helps to understand the workings of the financial institutions and their role in economic development. This also helps to understand the operation of the financial market and capital market.

Course/Learning Outcomes
At the end of the course students will be able to:
CO 1: Understand the basic ideas and developments of the Indian financial system. (Understanding)
CO 2: Demonstrate the workings of the Indian financial institutions. (Applying)
CO 3: Analyze the basic operation of the financial market and capital market. (Analyzing)
CO 4: Evaluate various roles and functions played by the Indian financial system in economic development. (Evaluating)

Module I: Introduction of Financial System (10 hours)
Financial System-meaning, concept, basic functions; Financial System and Economic Development; Components of Financial system; Overview of Indian Financial System

Module II: Money Market and Capital Market (15 hours)

Module III: Financial Institution, Instruments and Services (20 hours)
Financial Institution; Banking and Non-Banking Financial Institution, Distinction between Banking and Non-Banking Financial Institutions; Structure of Banking in India; Commercial bank, Co-operative Bank, Rural Bank- their features, types of Non-Banking Financial Institution; Financial Instruments and Services- concepts and characteristics, features of various Financial Instruments, emerging Financial Service- leasing, hire-purchase, merchant banking, depository, credit rating, mutual funds; Insurance Companies and Pension Funds

Module IV: Regulatory Institutions (15 hours)
Regulatory framework; Overview of Regulatory Framework of Financial System, functions of RBI, SEBI- objectives, scope of securities Contract (Regulation) Act 1956, relevant provision of India Companies Act 1956 in regard to securities market; Insurance Regulatory and Development Authority of India; Pension Fund Regulatory and Development Authority; Small Industries Development Bank of India (SIDBI); Ministry of Corporate Affairs

Suggested Readings
ENPO303T: POPULATION ECONOMICS
(4 Credit - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The course will examine the economic determinants of population change and demographic behavior including household formation, marriage, child bearing and rearing, mortality (and especially infant mortality) and key forms of human capital investment including schooling and migration. We will apply analytical tools of economics to investigate various economic and social consequences of population change.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the different theories related with population growth and development (Remembering and Understanding)
CO 2: Examine the changes in social and political economy due to demographic changes. (Applying)
CO 3: Identify the factors responsible for internal and international Migration. (Analyzing)
CO 4: Evaluate the population growth and trends of different states in India. (Evaluating)

Module I: Population theories and Development (10 hours)

Module II: Fertility, Nuptiality and Mortality (15 hours)
Fertility – Emerging Issues in Fertility Control; Fertility Analysis; Theories of Fertility; Nuptiality Concept and Analysis of Marital Status – Single Mean Age at Marriage, Synthetic Cohort Methods, Trends in Age at Marriage; Mortality – Death Rates, Crude Age-specific; Mortality at Birth and Infant Mortality Rate; Sex and Age Pattern of Mortality; Levels and Trends of Mortality rate; Life Table Construction and Uses

Module III: Distributional Pattern of Population (20 hours)
Population Trends in the Twentieth Century; Population Distribution; Population Explosion and its Dynamics; Pattern of Age and Sex Structure; Determinants of Age and Sex Structure; Demographic Effects of Sex and Age Structure; Economic and Social Implications; Age Pyramids Projections, Measures of Population Change; Evolution of Population Policy in India– The Shift in Policy from Population Control to Family Welfare

Module IV: Migration and Urbanization (15 hours)
Internal and International Migration Flows; Internal Migration its Effect on Population Growth and Pattern; Factors Affecting Migration; Theories of Migration Related to Internal Migration; International Migration Flows; Dynamics of the International Migration Process; Urbanization Growth and Distribution of Rural-urban Population in Developed and Developing Countries; Gravity Model

Suggested Readings
ENPB304T: PUBLIC ECONOMICS
(4 Credit- 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The course covers theory and evidence on government taxation policy. Topics include tax incidence, optimal tax theory, the effect of taxation on labor supply and savings, taxation and corporate behavior, and tax expenditure policy. The course also discusses the evolution of public choice theories and public expenditure theories. The impact of social safety net on productivity of the human capital, cost benefit analysis of government policies will be thoroughly covered.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the main concepts in public economic policies relating to public goods, public expenditures (Remembering/Understanding)
CO 2: Identify the main issues of budgeting and fiscal policies in context of income redistribution (Applying/Analyzing)
CO 3: Evaluate the public investment projects and decision making in the public sector. (Evaluating)
CO 4: Examine the usefulness and problems related to government subsidies and income support (Creating)

Module I: Government Activity and Public Economic Policies (15 hours)

Module II: Theories of Public Goods, Public Expenditures and Taxation (15 hours)

Module III: Budgeting, Fiscal Policies and Income Redistribution (15 hours)

Module IV: Public Investment Projects and the Public Sector (15 hours)

Suggested Readings
2. Hyman D N, Public Finance: A Contemporary application of Theory to Policy, Thomson South Western
4. Ulbrich, H., Public Finance in Theory and Practice, Thompson South Western

Mapping of COs to Syllabus

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ENLE305T: LABOUR ECONOMICS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The main objective of the course is to introduce students to core topics in the field of labour economics. The course covers topics such as wage and employment determination, immigration, unemployment, wage differentials and discrimination among many others. This course will encourage the students to develop independent research in labour economics and related fields.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and relate the main concepts of labour economics. (Remembering and Understanding)
CO 2: Identify the main issues of wage determination. (Applying)
CO 3: Analyze the theoretical issues in labour economics. (Analyzing)
CO 4: Explain the practical applicability of theories related to labour productivity and labour mobility and evaluate the key issues of the Indian labour market to solve the problems in the labour market. (Evaluating & Creating)

Module I: Introduction to Labour Economics (10 Hours)
Concept, Nature and Scope of Labour Economics; Labour Market – Concept, Labour Supply, Labour Demand; Measuring the Labour Force, Workers Preferences, Time and Budget Constraints, Hours of Work Decision; Production Function; Imperfect Information in Labour Market; Labour Flexibility

Module II: Wage Determination, Wage Differentials, Labour Efficiency and Discrimination (20 Hours)
Theories of Wage – Classical, Neoclassical, Modern; Employment Decision in the Short Run and Long Run; Homogeneous and Heterogeneous Workers and Jobs; The Hedonic Wage Function; Theory of Optimal Fringe Benefits; Labour Efficiency – Education in the Labour Market, Schooling Model; Efficiency Wage Models; Segmentation and Discrimination in Labour Market-The Crowding Model, Measuring Discrimination – The Oaxaca Decomposition; Impact of Trade Union and Collective Bargaining on Employers

Module III: Labour Productivity, Unemployment and Migration (15 Hours)
Labour Productivity – Concept, Measurement; Wages, Prices and Employment; Unemployment – Frictional, Structural, Demand-deficient Unemployment; Measurement of Unemployment – The Stock-Flow Model; Reducing Unemployment – Public Policies; Labour Mobility; Migration as an Investment in Human Capital; Determinants of Migration; Consequences of Migration; The Economic Benefits of Immigration

Module IV: Issues in Indian Labour Market (15 Hours)
Features of Indian Labour Market – Size and Composition in the Organized and Unorganized Labour Market; Major issues in the Indian Labour Market; Labour Productivity in India; Women and Child Labour in India; Agricultural and Rural Labour; Labour Market Institutions of Minimum Wage; Employment and Wage Policy in India; Informal Labour and Social Security Measures; Globalization and Labour Market

Suggested Readings
2. Datt, G., Bargaining Power, Wages and Employment: An Analysis of Agricultural Labour Market in India

Mapping of COs

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ENAE400T: APPLIED ECONOMETRICS
(5 Credits - 75 Hours) (L-T-P: 5-0-0)

Objective(s)
The main objective of this course is to introduce the students to the various econometric techniques under regression analysis that would help them in the decision making process. The course teaches the theory and application of contemporary econometric tools including time series analysis and panel data models. It also caters to the interest in econometric research applying various econometric tools to data in a variety of real life economic problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define advanced topics like empirical research, regression diagnostics. (Remembering and Understanding)
CO 2: Apply estimation methods to determine parameters of dynamic and panel data models. (Applying)
CO 3: Analyze the results of dynamic and panel data models along with regression diagnostics. (Analyzing)
CO 4: Evaluate the dynamic regression models and design dynamic regression models and panel data models to test hypothesis of real economic problems (Evaluating and Creating)

Module I: Stages in Empirical Econometric Research (15 hours)
Statement of the Problem; Review of Literature; Research Design and Methodology; Data Collection; Data Analysis; Interpretation

Module II: Regression Diagnostics and Specification (20 hours)
Functional Forms; Model Selection; Tests for Multicollinearity; Tests for Heteroscedasticity; Tests for Autocorrelation; Misspecification and Specification Bias

Module III: Advanced Topics in Regression Analysis (20 hours)
Dynamic Econometric Models: Distributed Lag Models; Autoregressive Models; Instrumental Variable Estimation; Simultaneous Equation Models

Module IV: Panel Data Models (20 hours)
Methods of Estimation; Fixed Effects Model; Random Effects Model; Applications of Statistical Package in parameter estimations for panel data models

Suggested Readings

Mapping of COs

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ENAG401T: AGRICULTURAL ECONOMICS
(5 Credits-75 Hours) [L-T-P: 5-0-0]

Objective(s)
The objectives of this course are to familiarize students with policy issues that are pertinent to Indian agriculture economics, to provide students with the tools necessary to analyze those issues, to raise students’ awareness of the challenges facing agricultural productivity, and to encourage students to consider potential solutions to those challenges.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Recall distinctive features of agriculture and the limited available resources which can influence the whole economy (Remembering & Understanding)
CO 2: Identify the new investment opportunities in agriculture to challenge economic problems like unemployment, inequality etc. (Applying)

CO 3: Examine the role of agricultural finance and marketing to achieve harmonious development (Analyzing)

CO 4: Elaborate the concept of globalization and agricultural policy and their implication on the society as a whole. (Evaluating and Creating)

Module I: Agricultural Resources and Allocation (15 hours)
Resources in Agriculture; Land as a Resource; Land Capability; Issues in Utilization of Land; Competition for Agricultural Land; Effects of Urbanization; Land Degradation; Water as a Resource; Institutional Arrangements and Issues in Water Allocation; Managing Disasters – Drought, Flood, Famine; Production Function in Agriculture; Watershed Management and Water Budgeting

Module II: Agricultural Production and Market (20 hours)
Supply Response in Agriculture; Issues Relating to Specification of Supply Response Function – Distributed Lags; Rigidities in Farm Supply Response – Supply Response of Individual Crops and Aggregate Production; Market Supply of Subsistence and Perennials Crop; Barriers to Internal Trade; Marketing Reforms; Behaviour of Agricultural Prices – Cobweb Cycles and Demand and Supply of Agricultural Products; Marketed and Marketable Surplus; Terms of Trade between Agriculture and Non-agriculture

Module III: Agricultural Finance (13 hours)
Role of Agencies; Inter-linked Markets; Subsidy and Taxation in Agriculture; Regulated Markets; Crop and Livestock Insurance; Food Security and Public Distribution System; Infrastructural Development; Rural Credit and Rural Indebtedness; Need for State Intervention, NABARD and Cooperative Societies

Module IV: Globalization and Agricultural Policy (12 hours)
Concept of globalization and the relevance of agricultural policies in India; Role of agriculture in economic development; Development Issues – Population, Food Security, Rural Poverty, Inequality and Environmental Concerns; Agricultural Policies-National Agriculture Policy, National Water Policy, National Seed Policy, National Fertilizer Policy, Credit Policy, Price Policy, Crop Insurance Policy

Suggested Readings

Mapping of COs to Syllabus

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ENHE402T: HEALTH ECONOMICS
(5 Credit: 75 Hours) (L-T-P: 5-0-0)

Objective(s)
This course is designed to obtain adequate knowledge on health economics theory and application in order to enable students to provide health policy analysis and make better decisions in the areas of health care. This course includes different subsets of health economics such as public health, global health policy, and economic evaluation of health care and government intervention in the healthcare delivery system. This course provides foundations to analyze contemporary health problems from an economic perspective to support healthcare professionals and policymakers.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and explain the concepts of health economics and application of economic concepts in the health sector. (Remembering and Understanding).
CO 2: Identify the demand and supply gap in the healthcare system to suggest healthcare professionals and policymakers. (Applying)

CO 3: Analyze the role of government in the health care delivery system and identify the scope of health financing to suggest healthcare professionals and policymakers. (Analyzing)

CO 4: Evaluate the health care programmes and policy to provide decisions concerning the allocation of resources. (Evaluating)

**Module I: Microeconomic Foundations of Health Economics (20 hours)**

Concepts, Definition of Health Economics; Measures of Health Status; Topics in Health Economic Theory – Production Function of Health, Grossman’s Model of Demand for Health; Supply-side Health Economics; Theory of Health Behavior; Market of Health Insurance; Causes of Market Failure in the Provision of Health Services – Moral Hazard, Adverse Selection, Supplier-induced Demand, Externalities; Issues of Equity and Efficiency in Healthcare Market

**Module II: Economic Evaluation in Healthcare (20 hours)**


**Module III: Public Policy on Health (15 hours)**

Public Policy in Health Care Delivery – Role of State, Rationale for Government Intervention in the Health Sector – Public and Private sector; Health Financing; Concept and Calculating Methods of Burden of Disease- HALE, QALYs and DALYs

**Module IV: Health Sector in India (20 hours)**

Overview of Health Care in India; Health System of India – Post Reform Scenario; Socio-economic Determinants of Health; Indicators of Health Outcomes; Health and Nutrition; Different Dimension of Health - Poverty, Malnutrition, Gender Perspectives in Indian context; Public Health Expenditure in India

**Suggested Readings**


**Mapping of COs to Modules**

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**ENED403T: ECONOMICS OF EDUCATION**

(5 Credit: 75 Hours) (L-T-P: 5-0-0)

**Objective(s)**

This course discusses the economic aspects of current issues in education, using both economic theory and econometric and institutional readings. Topics include discussion of basic human capital theory, the growing impact of education on earnings and earnings inequality, statistical issues in determining the true rate of return to education, the labor market and manpower planning. In addition, various policies of the government and the budget to address the issues of inclusivity in education will be discussed.

**Course/Learning Outcomes**

At the end of this course students will be able to:

CO 1: Understand the concept of welfare economics and its applicability in education sector (Remembering/Understanding)

CO 2: Evaluate the policy for improvement of the education sector from an economics perspective. (Applying)

CO 3: Examine the investment pattern in education and interpret the direct and indirect benefits of education in the development of society. (Analyzing)

CO 4: Evaluate the educational financing from the point of view of public and private expenditure (Evaluating)

**Module I: Economics of Education (20 hours)**

Human Capital – Types, Components; Human Capital Theory; Education as an Instrument for Economic Growth; Demand for Education; Supply of Education; Determinants of Demand for Education; Costs of Education – Private Costs, Social Costs;
Benefits of Education – Direct, Indirect, Social; Wastage and Stagnation in Education – Causes and Measures; Manpower Planning – Meaning, Techniques of Forecasting

**Module II: Education and Budget Allocation (15 hours)**
The Concept of Knowledge Economy – The Spread of Education across the World; Budgetary Allocations across Space and Time; Institutional Design; Alternative Systems for Service Delivery; Role of Imperfect Information, Incentives and Contracts

**Module III: Education and Planning (20 hours)**
Approaches to Educational Planning – Production Function Models, Manpower Requirement Approach, Input-Output Model, Gender Based Approach; Educational Planning in Developing Countries with Special Reference to India; Vocational Education in India; New Education Policy

**Module IV: Discrimination and Inequality in Education (15 hours)**
Models of Preference-based and Statistical Discrimination; Effective Policies to Address Historical Inequalities; Evaluating Policy Impact – The Estimation of Treatment Effects in Randomized Experiments and in Observational Data

**Suggested Readings**

**Mapping of COs to Syllabus**

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### MINOR COURSES

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**ENIN102T: INDIAN ECONOMY**  
(4 Credits-60 Hours)(L-T-P: 4-1-0)

**Objective(s)**

_The students will gain a better understanding of the economy of India as a whole with the completion of this course. Students will get an understanding of the myriad issues and components that make up the Indian economy, and they will do research into a variety of interconnected themes that are connected to the expansion and maturation of the Indian economy._

**Course/Learning Outcomes**

At the end of this course students will be able to:

- **CO 1:** Define the Macroeconomic Policies and their Impact on the Indian Economy. (Remembering & Understanding)
- **CO 2:** Explain the growth and trends of population and its impact on human resources. (Applying)
- **CO 3:** Identify the issues and measures related to various social-economic factors in the economy. (Creating)
- **CO 4:** Evaluate the impact of various development policies in the Agriculture Industry & Service Sector in the Indian Scenario. (Analyzing and Evaluating)

**Module I: Economic Development since Independence (20 hours)**


**Module II: Population and Human Development (19 hours)**

Demographic Trend and Issues – Meaning and Scope of Demography; Density of Population; Measures of Population Change; Structure and Distribution; Population as a Factor of Economic Development; National Population Policy; Demographic Dividend; Human Development Index Concepts and Measurements; India’s Human Development Record in Global Perspective; Education in India – Features, Trends, Issues; Health – Trends and Issues; Malnutrition in India

**Module III: Growth and Income Distribution (20 hours)**


**Module IV: Agriculture, Industry and Service Sector in India (17 hours)**

Changing structure of Indian agriculture; Sustainable agriculture-concept & constraint; Green Revolution-features and impact; Agricultural marketing and regulated market; Industrial Policies in India; Disinvestment and Privatization; Development of MSME sector; Growth & Composition of service sector; Role of service sector in Indian economy

**SUGGESTED READINGS**


Mapping of COs to Syllabus

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ENNE103T: ECONOMY OF NORTH EAST INDIA
(4 Credits: 60 Hours) (L-T-P: 4-0-0)

Objective(s)
This course is designed to expose the students to the overview of the North East Economy. It explains the trend and performance of agriculture, industry and service sector in the context of the North East scenario. It also includes the evaluation of various developmental policies for structural transformation of the region.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and understand macroeconomics policies and their impact on the North East Economy. (Remembering and Understanding)
CO 2: Identify the policies and performance in Industry and analyze the impact of various development policies in Agriculture and Industry in the Indian Scenario. (Applying)
CO 3: Explain the trends and performance in service sectors and the scope of growth of enterprises in the North Eastern region and the role of various policies in it. (Analyzing)
CO 4: Evaluate the various development policies and the different development initiatives in the North Eastern region along with some of the reasons for its failure. (Evaluating)

Module I: Overview and Characteristics of North East Economy (15 hours)
North Eastern Region as an economy; Characteristics of the economy; Trend and Pattern of GDP growth in NER; Demographic features of the NE economy; Poverty and Inequality in NER comparison with the Indian economy; Trends of Employment and Unemployment; Recent Developments in Human Resource; Regional disparities and Northeast India, Status of Development and Urbanization

Module II: Agriculture in North East Economy (12 hours)
Agriculture: features and challenges; Growth of Agricultural Sector in NE; Agricultural Finances-Sources and Limitations; Agricultural Policies of NE States; Agriculture-Industry linkage especially in NER, Problems of Agricultural Marketing in NE

Module III: Industry and Service Sectors in North East Economy (18 hours)
Industry: growth, composition and challenges, Growth of Micro Small and Medium Enterprises (MSME); North East Industrial and Investment Promotion Policy (NEIIPP) 2007 and 2017; Causes of Industrial Backwardness and their Remedies; Services sector- growth and challenges; Diversification of rural employment; Infrastructure and regional economic development

Module IV: Structural Transformation and Institutions in North East (15 hours)
Institutions and economic Development; Governance and development-government failure and its correction; Local self-government and development; Community participation and development, community failure; Role of DONER and NEC; New development initiatives in NER, Vision Document 2020 and Act East Policy

Suggested Readings

### Mapping of COs to Modules

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### ENET205T: HISTORY OF ECONOMIC THOUGHTS

**(4 Credits - 60 Hours) (L-T-P: 4-0-0)**

#### Objective(s)

This course will help to relate and understand the evolution of different economic theories led by classical, neo-classical and modern economists. Through philosophical foundations, the student will be able to relate different positions of economic thoughts. It will help to explain the policy implications of the theories and their usefulness in the context of current world scenarios in general and Indian Economy in particular.

#### Course/Learning Outcomes

At the end of this course students will be able to:

- CO 1: Relate, understand and explain the contributions on themes of economic analysis (Remembering, Understanding)
- CO 2: Identify their texts and link the different positions of economic thought. (Applying)
- CO 3: Evaluate political implications and link the different positions of economic thought to philosophical foundations. (Analyzing)
- CO 4: Explain and discuss the political implications and usefulness of their texts in context to the current World Scenario and Indian Economy in particular (Evaluating, Creating)

#### Module I: Pre-Classical and Classical Economic Thought (10 hours)

- Mercantilism: Tenets, Rise & Fall; Physiocracy; Tableau Economique of Quesnay; concept of Natural Order, Produit Net, Taxation, Trade; Contributions of Adam Smith, David Ricardo, T.R. Malthus, J.B. Say, J.S. Mill’s Restatement of Classicism.

#### Module II: Reaction against Classicism and the reconstruction of Economic Science (20 hours)

- Positive and Critical ideas of the Historical School; State Socialism – Ideas of J.K. Rodbertus and F. Lassalle; Scientific Socialism-Chief, tenets of Marxian Thought, Dialectical Materialism; The Labour Theory of Value; Theory of Surplus Value; The Law of Concentration of Capital; Marx and Modern Economists; Subjectivism and Marginalism – Factors giving rise to Subjectivism and Marginalism; Economic ideas of Walras and Carl Menger; Neoclassicism – Contributions of Alfred Marshall, Knut Wicksell and BohmBawerk

#### Module III: Keynesian Economics (10 hours)


#### Module IV: Indian Economic Thought (20 hours)

- Main themes of Kautilya’s Arthashastra; Modern Economic Ideas: Dada Bhau Naoroji, Ranade, Gokhle; M.K. Gandhi’s ideas on — Village, Swadeshi, Khadi, Cottage Industries and place of Machine; Welfare of Labour; Non-violent Economy; Decentralisation; Trusteeship; Sarvodaya

#### Suggested Reading

2. Roll, Eric, A History of Economic Thought
3. Hajela, T.N., History of Economic Thought
4. Bhatia, H.L., History of Economic Thought
5. Vohra, Munish, History of Economic Thought

### Mapping of COs to Syllabus

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ENGE206T: GENDER ECONOMICS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective(s)
The current subject will help us understand the concepts of gender economics. It includes knowing the different concepts of gender indicators, demographic profile of female population and gender development measures. It will also throw light on the role of women in decision making at different levels, focusing on visible and invisible work of women. Further the subject will cover women in the labor market and various economic issues and policy implications on improving gender equality in India.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Relate the demography concepts to understand the demography of a nation with special reference to women (Remembering and Understanding)
CO 2: Examine the various gender indices to understand the framework of policy relating to gender issues. (Applying)
CO 3: Inspect the factors responsible for gender discrimination in India (Analyzing)
CO 4: Evaluate and analyze the role of technology and institutions in addressing the problem of gender inequalities and women empowerment. (Evaluating and Creating)

Module I: Concept and Importance of Gender Economics (15 hours)
Importance of Gender Economics; Women in Patriarchal and Matriarchal Societies and Structures; Gender Bias in the Theories of Values; Demography of Female Population; Causes of Declining Sex Ratios and Fertility Rates; Women and their Access to Nutrition, Health and Education; Gender Planning Frameworks and Tools; Gender Inequality Indices – GII, MPI, WEIA, SIGI, GDI, GEM

Module II: Decision Making, Economic Activity and Women (15 hours)
Factors Affecting Decision Making by Women; Property Rights; Power of Decision Making at Household, Class, Community Level; Economic Status of Women and its Effect in WPR, Income Level, Health and Education in Developing Countries; Concept and Analysis of Women’s Work – Visible and Invisible Work, Economically and Socially Productive Work

Module III: Labour Market, Technology, Environment and Women (15 hours)
Factors Affecting Female Entry in Labor Market; Studies of Female work Participation in Agricultural and Non-agricultural Rural Activities; Wage Differentials in Female Activities; Structure of Wage Across Regions and Economic Sectors; Impact of Technological Development and Modernization on Women’s Work Participation; Women and Environment – Female Activities and Environmental Concerns

Module IV: Social Security, Gender Planning and Development Policies (15 hours)
Effectiveness of Collective Bargaining; Schemes for Safety net for Women; Need for Female Labour Unions; Gender Mainstreaming in Development Policies; Gender Sensitive Governance – Gender Budgeting, Democratic Decentralization (Panchayats) and Women’s Empowerment in India; The Kudumbashree Experience in Kerala, A comparative assessment on gender policies between developed and developing countries (with special reference to Asian countries)

Suggested Readings

Mapping of COs to Syllabus

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**ENPU307T: PUBLIC FINANCE**  
(4 Credit - 60 Hours) (L-T-P: 4-0-0)

**Objective(s)**  
This course is a non-technical overview of government finances with special reference to India. The course does not require any prior knowledge of economics. It will look into the efficiency and equity aspects of taxation of the centre, states and the local governments and the issues of fiscal federalism and decentralization in India. The course will be useful for students aiming towards careers in the government sector, policy analysis, business and journalism.

**Course/Learning Outcomes**  
At the end of this course students will be able to:  
CO 1: Discuss the nature and scope of public finance and its functions. (Understanding)  
CO 2: Demonstrate the different types of taxation and the effects of taxation. (Applying)  
CO 3: Analyze the effects of public expenditure and welfare aspects. (Analyzing)  
CO 4: Explain the types of public budget and deficits and its significance. (Evaluating)

**Module I: Introduction (10 hours)**  
Public Finance and Private Finance; Public Finance – Nature and Scope: Allocation Function, Distribution Function and Stabilization Function; Public Goods and their characteristics; Types of Public goods; Free Rider Problem and Market Failure; Externalities vis-à-vis Public Good

**Module II: Public Revenues andReceipts (20 hours)**  
Revenue and Non-Revenue Receipts; Sources of Tax Revenue and Non-tax Revenue; Direct and Indirect Tax; Goods and Service tax in India; New Direct tax code; Concepts of taxation: tax rate, buoyancy & elasticity of a tax: Proportional, Progressive and Regressive Taxation; Neutral and Non- Neutral Taxes; Taxable Capacity; Principles of Taxation; Objectives and Effects of Taxation; Impact, Shifting and Incidence of Tax

**Module III: Public Expenditure (20 hours)**  
Canons of Public Expenditure; Plan and Non Plan Expenditure; Effects of Public Expenditure and Welfare Aspects, Theories of Public Expenditure: Maximum Social Advantage, Maximum Aggregate Benefit, Lindahl Model of Voluntary Exchange; Crowding out effect; Tiebout Model; Wagner’s Law of Increasing State Activities; Wiseman-Peacock Hypothesis; Cost-Benefit Analysis

**Module IV: Budget and Deficit Financing (10 hours)**  
Structure of the Public Budget; Kinds of Budgets; Types of Deficits and their significance: Revenue Deficit, Fiscal Deficit and Primary Deficit; Fiscal Federalism in India and the Finance Commission; Fiscal Responsibility and Budget Management(FRBM) Act 2003; Recent Amendments to FRBM Act

**Suggested Readings**

**Mapping of COs to Syllabus**

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**ENRD308T: RURAL DEVELOPMENT**  
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

**Objective(s)**  
This course will help understand the rural economy and its features and its scope for development. The course will also help describe the financial system for agriculture and the credit and marketing system for the development of rural areas. Also, through this course, various development policies towards inclusive development will be illustrated.
Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Draw distinctive features of rural economy which can influence the economy of rural sector and understand the prevailing problems of rural economy and identify the scope for development of rural areas. (Remembering, Understanding)
CO 2: Elucidate the Agricultural Finance and rural credits system and marketing system. (Analyzing)
CO 3: Identify the new development strategies for development of rural economy. (Applying)
CO 4: Assess the various policy and programmes of rural development and use of economic prospective for the development of rural economy. (Evaluating, Creating)

Module I: Basic Concept of Rural Economy (15 hours)
Definition and Features of Rural Economy; Characteristics of Rural Sector; Rural Economic Structure in Indian context; Indicators of Rural Development; Causes of Rural Backwardness; Rural Demography – Size, Growth, Distribution of Rural Population; Rural-Urban Migration – Types, Pull and Push Factors; Rural Poverty and Poverty Alleviation Programmes

Module II: Transformation of Rural Economy (15 hours)
Transformation of Rural Economy – Sectoral Approach, Multi-sectoral Approach, Territorial Approach, Local Approach; Rural Development Strategies; Policies for Rural Economy Development – Land Policy, Agriculture Policy, Rural Industrialization Policy, Employment Policy

Module III: Agriculture and Rural Industrialization (20 hours)
Importance and Problems of Agriculture in Rural India; Agriculture Marketing – Problems and Prospects, Marketing of Agricultural Product, Co-operative Marketing; Concept of Agricultural Credit; Need for Agriculture Credit; Sources of Agricultural Finance; Role of NABARD in Rural Development; Allied Agricultural Activities – Dairy, Fishery, Horticulture, Sericulture; Development of Agro-based Industry; Role of Village Industry; Growth of MSME in Rural Economy; Appropriate Technology for Rural Industries Development; Government Policy and Programme for Entrepreneurship Development in Rural India

Module IV: Rural Governance (10 hours)
Concept of Decentralization and its Significance in Rural Development; Role of Panchayat Raj Institutions in Rural Development; Rural Development Institutions and Administration- SIRD, DRDA; e-Governance and its Impact on Rural Development

Suggested Readings

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ENID404T: INDUSTRIAL ECONOMICS
(3 Credits - 45 Hours) (L-T-P: 3-0-0)

Objective(s)
This course provides an introduction to current theory and empirical work in Industrial economics. It starts by examining the internal structure of firms. It then moves on to the analysis of various aspects of strategic interaction between firms and the determinants of industrial structure. Finally, it discusses the role of policy in the context of competition and industrial policies and regulation. The emphasis will be throughout on understanding how the theoretical tools can be used to analyze real world issues.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define various concepts of Non-Price Competition and Imperfect Market Structure (Remembering/ Understanding)
CO 2: Apply the different concepts of game theory to understand strategic behaviour in imperfectly competitive markets (Applying).
CO 3: Examine the impact of price and non-price barriers on competition. (Analyzing)
CO 4: Discuss the role of regulation on efficiency in imperfectly competitive markets. (Evaluating/Creating)

Module I: Market Structure and Strategic Interaction (10 Hours)
Introduction to Industrial Economics – Type of organizational form; Industrial location analysis, Static and Dynamic models of oligopolistic competition; Monopolistic competition and dominant firm models

Module II: Entry Costs, Barriers, Mergers and Vertical Integrations (10 Hours)
Enter costs and market structure; Free entry and social welfare; Barriers to entry - Limit price theory; Pricing Decision - overinvestment in capacity, product proliferation; Mergers and Vertical Integration

Module III: Non-Price Competition (15 Hours)
Product differentiation - Horizontal vs. vertical; Price competition with differentiated products, Market structure and advertising - Informative and pervasive advertising, Effects on competition; Determination of the monopolist optimal advertising expenditure, Market concentration

Module IV: Regulation (10 Hours)
Introduction to competition policy and regulation - effects of government actions on firms and market structure; The natural monopoly case; Competition policy; Price regulation mechanisms

Suggested Readings

Mapping of COs to Syllabus

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ENRM405T: RESEARCH METHODOLOGY IN SOCIAL SCIENCES
(2 Credits - 30 Hours) (L-T-P: 2-0-0)

Objective(s)
The main aim of this course is to introduce the research methodology for scientific research including economics and other social sciences. Students will learn the meaning and importance of research along with the philosophical perspective of it. Topics covered in this course are formulation of research proposals, reviewing the literature and choosing appropriate methodologies for data collection and analysis. This course is intended to prepare students for research projects during their graduation program.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: CO1: Understand the basic concepts of research including meaning, types, importance, and philosophical perspectives. (Remembering and Understanding)
CO 2: CO2: Apply the various philosophical perspectives in social science research along with the ontological and epistemological issues in it. (Applying)
CO 3: CO3: Analyze the different stages of research in social science enhancing better research in social science. (Analyzing)
CO 4: CO4: Evaluate research in social science and its trend with greater reflection of plausible philosophical perspectives. (Evaluating and Creating)

Module I: Introduction (10 Hours)
Meaning and Purpose of Research; Types of Research- Pure and Applied, Historical and Futuristic, Analytical and Synthetic, Descriptive and Prescriptive, Survey and Experimental Researches; Significance of research; Scientific Method- Inductionism and Deductionism; Ethics in Research

Module II: Philosophical Perspectives of Social Science Research (10 Hours)
Philosophical Foundations- Ontological and Epistemological Issues in Social Science Research; Nature of Science and Social Science; Methodological Perspective- Positivism, Hermeneutics, Reflexivity, and Feminist methodology

Module III: Stages of Research (20 Hours)
Research Problem- Identification, Selection and formulation of research Problem; Literature Review- Importance and types of literature review; Identifying Research Gaps; Hypothesis Testing- Meaning, Sources and Formulation of Hypothesis; Research Design; Data Collection; Analysis and Interpretation; Research Reports- Types, Contents; Principles of good report writing; References and Annotation

Suggested Readings
1. Ahuja, R., Research Methods, Rawat Publications, Jaipur (India), 2001

Mapping of COs

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ENC406T: CONTEMPORARY DEVELOPMENT POLICIES
(3 Credits- 45 Hours)(L-T-P: 3-0-0)

Objective(s)
The main objective of the course is to inform readers on recent developments in the Indian economy in an understandable way. The course lays a heavy emphasis on giving students simply accessible information because knowledge is necessary to arrive at the optimal solution. Students will get a fundamental grasp of the concerns, difficulties, and challenges that the economy is currently facing.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the socio-economic issues and India’s macroeconomic problems (Understanding & Remembering)
CO 2: Explain the recent economic reforms in the Indian economy since 1991. (Applying)
CO 3: Examine the impact of various development policies in Agriculture, Industry and Service Sector in the Indian Scenario. (Analyzing)
CO 4: Discuss their understanding of the usefulness of various development policies. (Evaluating and Creating)

Module I: Contemporary Socio-Economic Policies (13 Hours)
National Pension Scheme for Traders and The Self-employed Persons (NPS); Pradhan Mantri Jeevan JyotiYojana (PMJJBY); Pradhan Mantri Suraksha Bima Yojana (PMSBY); Atal Pension Yojana; Janani Shishu Suraksha Karyakaram (JSSK); Universal Immunisation Programme; Mission Indradhanush (MI); Janani Suraksha Yojana (JSY); Rashtriya Madhyamik Shiksha Abhiyan (RMSA); Sarva Shiksha Abhiyan; Mid Day Meal; Pradhan Mantri Awas Yojana (Grim); Pradhan Mantri Gram SadakYojana (PMGSY); Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)

Module II: Agricultural Sector Schemes in India (10 Hours)
Soil Health Card Scheme; Paramparagat Krishi Vikas Yojana (PKVY); Pradhan Mantri Krishi Sinchayee Yojana (PMKSY); National Agriculture Market (e-NAM); Pradhan Mantri FasalBimaYojana (PMFBY); Interest Subvention Scheme (ISS); National Mission For Sustainable Agriculture (NMSA); Gramin Bhandaran Yojna; Livestock insurance Scheme; Micro Irrigation Fund (MIF); PM KisanMaanDhanYojana; Krishi UDAN scheme; Agriculture Infrastructure Fund

Module III: Programmes and Initiatives for Industries in India (12 Hours)
Make in India; Industrial Corridor Development Programme; Ease of Doing Business; National Single Window System; PM Gati Shakti National Master Plan; National Logistcs Policy; Production Linked Incentive Scheme; Credit Guarantee Trust Fund for Micro & Small Enterprises; A Scheme for Promoting Innovation, Rural Industry & Entrepreneurship (ASPIRE); National Manufacturing Competitiveness Programme; Market Promotion & Development Scheme; Revamped Scheme of Fund for Regeneration of Traditional Industries (SFURTI); Trade and Industry Related Functional Support Services (TIRFSS); Welfare Measures (Pradhan MantriSurakshaBimaYojana (PMSBY)
Module IV: Contemporary Schemes for the Service Sector (10 Hours)
Future Skills PRIME; Next Generation Incubation Scheme (NGIS); Production Linked Incentive (PLI) Scheme; National Broadband Mission; Pradhan Mantri Jan Dhan Yojana; Mahatma Gandhi National Fellowship; PM Ayushman Bharat Health Infrastructure Mission; Pradhan Mantri Kaushal Vikas Yojana (PMKVY); Skill India Mission; Digital India Mission

Suggested Readings
4. Kapila U, Indian economy since independence, Academic foundation, New Delhi
5. Government of India, Economic Survey (Annual), Economic Division, Ministry of Finance, New Delhi
6. Ahluwalia, I.J. & I.M.D. Little (Eds.), India’s Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi, 1999

Mapping of COs to Syllabus

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Module I</th>
<th>Module II</th>
<th>Module III</th>
<th>Module IV</th>
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<tr>
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SKILL ENHANCEMENT COURSES

<table>
<thead>
<tr>
<th>Semester</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>S E Course 1</td>
<td>ENME104L</td>
<td>Fundamentals of Mathematical Economics</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>S E Course 2</td>
<td>ENDA105L</td>
<td>Data Analysis and Interpretation</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>S E Course 3</td>
<td>ENSP207L</td>
<td>Hands-on training on Data Analysis with a Statistical Package</td>
<td>3</td>
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</tbody>
</table>

ENME104L: FUNDAMENTALS OF MATHEMATICAL ECONOMICS
(3 Credits - 45 Hours) (L-T-P: 3-0-0)

Objective(s)
The main purpose of this rudimentary course in mathematical economics is to provide students the necessary mathematical skills to understand advanced courses in economics. The course is devised to enhance the technical skills in the areas of algebra and calculus and other rudimentary knowledge in mathematics. The course aims to provide both the analytical and computational skills that are required for the analysis of economic problems.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define and explain the basic concepts of mathematics including set, functions, determinants and matrices. (Remembering and Understanding)
CO 2: Apply the mathematical techniques to elucidate the problems of economic theory. (Applying)
CO 3: Analyze economic theory and draw inferences in context of mathematical techniques. (Analyzing)
CO 4: Explain the need of mathematical techniques in understanding real economic theory and develop mathematical models to solve numerical problems in real life economics. (Evaluating and Creating)

Module I: Mathematical Foundations (10 hours)
Number System; Set Theory; Solutions to Simple Equations; Determinants and Matrices; Elementary Types of Functions - Quadratic, Polynomial, Power, Exponential, Logarithmic; Algebraic Properties and Applications

Module II: Differentiable Functions (15 hours)
Limits and Continuous Functions-Operations and Applications; Differentiations- Operations and Applications; Marginal functions and economic applications; Single-variable Optimization; Economic applications- Profit maximization, Cost minimization; Second and Higher Order Derivatives – Properties and Applications; Convex Functions; Local and Global Optima; Multi-variable Optimization

Module III: Integration (10 hours)
Meaning and Significance; Basic Rules of Integration; Applications in Economics; Indefinite and Definite Integrals; Integration by Parts and Partial Fraction

Module IV: Difference Equations (10)
Basic forms; Finite Differences; Linear Difference Equations- Homogenous and Non-homogenous; Solution of First Order Difference Equation; Applications

Suggested Readings
1. K. Sydsaeter & P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia: Delhi, 2002

Mapping of COs

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Module I</th>
<th>Module II</th>
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<th>Module IV</th>
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<td>CO4</td>
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</table>

ENDA105L: DATA ANALYSIS AND INTERPRETATION
(3 Credits-45 Hours) (L-T-P: 4-1-0)

Objective(s)
The objective of this course is for the purpose of providing an introduction to the underlying concepts and vocabulary that are essential to statistical analysis. The goal of the course is to increase the student’s grasp of how to effectively apply statistical
techniques. In the context of multivariate analysis, students will be able to explain the concepts of correlation and regression analysis.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Understand the key statistical terms related to data the principles of statistical measures (Remembering and Understanding)
CO 2: Apply the various statistical measures and their forecasting techniques in real life problems. (Applying)
CO 3: Analyze the various statistical results like hypothesis testing and forecasting in practice. (Analyzing)
CO 4: Evaluate the statistical results employing various hypothesis testing tools with various statistical packages (Evaluating and Creating)

Module I: Basic Statistical Tools in MS Excel (15 hours)
Measures of Central tendency - Arithmetic Mean (Simple and Weighted), Geometric Mean, Harmonic Mean, Median, Mode, Quartiles, Measures of Dispersion; Correlation – Karl Pearson’s Correlation Coefficient and its Properties, Spearman Rank Correlation Coefficient; Regression – Simple Linear Regression Line, Interpretation of Regression Coefficients, Time Series Analysis, Additive and Multiplicative Models, Determination of Trend

Module II: Statistical Inferences (15 hours)
Population Parameter and Sample Statistic; Point and Interval Estimation; Hypothesis – Concept of Null And Alternative Hypothesis, Simple and Composite Hypothesis, Characteristics of Good Hypothesis; Statistical Errors – Type I and Type II Errors; Critical Region, Size and Power of a Test; Level of Significance and P-value; Hypothesis Testing – Formulation of Statistical Hypotheses, Testing Hypotheses Related to Population Parameters; Sampling Distribution of a Statistic; Important Statistical Test and Inference – Z Test, T Test, F Test and X² Test

Module III: Introduction to Statistical Packages (15 hours)
Introduction to Statistical Package (Open Sourced); Working - Preparing the Data File, Creating Data File and Entering Data, Defining the Variables, Entering Data, Modifying Data File, Import File, Screening and Cleaning Data; Frequency and Cross Tabulation, Descriptive/Summary Statistics, Estimating Correlation Coefficient and Regression Coefficients, Constructing Basic Diagrams

SUGGESTED READINGS
2. Agarwala, B.L., Basic Statistics, New Age International, 2019

Mapping of COs to Syllabus

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Module I</th>
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<th>Module III</th>
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</table>

ENSP207L: HANDS-ON TRAINING ON DATA ANALYSIS WITH A STATISTICAL PACKAGE
(3 Credits - 45 Hours) (L-T-P: 3-0-0)

Objective(s)
The purpose of this course is to provide students the necessary hand-on skills to use at least one statistical package to analyze data. This course aims to provide both the digital and analytical skills that are required for the analysis of data mainly employed in social science research.

PREREQUISITES
- Personal laptop or tablet (own device) for this course is mandatory.
- Familiarity with basic concepts in statistics, such as measurement levels, mean, median, mode and standard deviation.
- Firm grasp of MS Word and MS Excel is helpful.
- Basic understanding of the purpose and functions of statistical softwares is helpful.

**Course/Learning Outcomes**
At the end of this course students will be able to:
CO 1: Define and understand the key terms related to data and data analysis. (Remembering and Understanding)
CO 2: Apply the MS Excel for data entry and calculation of various measures of central tendency, dispersion. (Applying)
CO 3: Analyze the computer generated output provided by any open-source statistical package and draw inferences from it. (Analyzing)
CO 4: Evaluate the statistical inferences from the outputs provided by statistical software in understanding real economic problem (Evaluating)

**Module I: Introduction to Data and Statistical Packages (25 Hours)**
Data – Meaning and Nature; Types of Data – Nominal, Ordinal, Interval and Ratio; Sources of Data – Primary and Secondary Data; Analysis of Data – Quantitative and Qualitative Data; Time Aspect of Data – Cross Sectional, Time Series and Pooled Data; Accuracy of Data; Concept of Variable; Applications of MS-Excel in data analysis - File, Edit, View, Data, Data Set Creation and Management; Data entry and Data Cleaning; Introduction to statistical packages

**Module II: Calculations of Descriptive Statistics (10 Hours)**
Frequency; Summation; Maximum; Minimum; Mean; Median; Mode; Standard Deviation; Skewness; Covariance; Correlation – Bivariate, Partial, Rank, Correlation Matrix; Simple Linear Regression

**Module III: Graphical Presentation of Data (10 Hours)**
Diagrammatic Presentation; One Dimensional – Single, Subdivided, Multiple Deviation; Two Dimensional – Histogram, Pie Diagram; Three Dimensional – Rectangular, Cube; Pictograms and Cartograms; Scatter; Line and Radar Diagrams; Tabular Presentation – Single, Double, Multiple

**Suggested Readings**

**Mapping of COs**

<table>
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<tr>
<th>Course Outcomes</th>
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**INTERNSHIP/APPRENTICESHIP/MINOR PROJECT**

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<td>ENIN309I</td>
<td>Internship</td>
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</table>

**ENIN106I / ENIN208I: INTERNSHIP (Exit of 1st Year or 2nd Year)**
(4 Credits: 120 Hours)

**ENIN309I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)**
(2 Credits-60 Hours)

**Internship Course**
The student will be required to join for internship during the tenure. The student can find institutes providing internships on their own or through online portals such as Internshala. Internshala provides opportunities for students to have hands-on experience with organizations and also earn some remuneration along with certificates of participation.
ENPR306P: PROJECT ON RESOURCE MAPPING (RURAL/URBAN)
(4 Credits-120 Hours)

Resource Mapping is a method for collating and plotting information on the occurrence, distribution, access and use of resources within the economic and cultural domain of a specific community. Resource maps may be used by the community itself (with or without facilitators) for internal discussions or to relate to outsiders; are essential inputs both for insiders and outsiders for planning and monitoring purposes; and support researchers in the conduct of in-depth assessments of particular resources.

The aim of this course is to equip the students with the practical knowledge of the various resources (Human resource, natural resource, financial resource etc.), of a specific geographical location and analysis the problem and prospect of the utilization of the resources in the selected geographical area. The students will work as team and frame their project related to resource mapping of a selected geographical area under the supervision of an allotted supervisor from the Department.

### RESEARCH PROJECT /DISSERTATION

<table>
<thead>
<tr>
<th>Semester</th>
<th>Category</th>
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<th>Course Name</th>
<th>Credits</th>
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<td>Research Project/Dissertation</td>
<td>ENDI407P</td>
<td>Research Project Phase I</td>
<td>6</td>
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<tr>
<td>8</td>
<td>Research Project/Dissertation</td>
<td>ENDI408P</td>
<td>Research Project Phase II</td>
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<table>
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<td>Research Project/Dissertation</td>
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<td>Dissertation I</td>
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<td>8</td>
<td>Research Project/Dissertation</td>
<td>ENDI410P</td>
<td>Dissertation II</td>
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</tbody>
</table>

**BA ECONOMICS (Honours)**

**ENDI407P: RESEARCH PROJECT PHASE I**
(6 credits – 180 hours) (L-T-P: 0-0-12)

The work for the Research project is spread over Semester VII and Semester VIII as Research project Phase-I and Research project -II respectively.

This course will enable the students to develop independent critical thinking abilities as well as oral and written communication skills when a research project is included in a course that also provides a strong academic basis. The research project has an impact on worthwhile learning goals that have a long-term impact as undergraduates get ready for professional service.

In the first phase of the research project the student has to select an acceptable study topic and properly articulate and state a research question in his/her chosen area of specialization. They have to assemble the pertinent literature for a chosen research topic and, where appropriate, frame research hypotheses. Students have to plan a research design for a chosen research topic, including any necessary sampling, observational, statistical, and operational designs.

**ENDI408P: RESEARCH PROJECT PHASE II**
(6 credits – 180 hours) (L-T-P: 0-0-12)

The work for the Research project is spread over Semester VII and Semester VIII as Research project Phase-I and Research project -II respectively.

This course is a continuation of the phase I of Research project, in Phase II the students have to give a final touch to the research project and bring it to a presentable form.

In the phase II of the research project base on the selected research topic in phase I, the students have to compile relevant data, interpret & analyze it and test the hypotheses wherever applicable. Based on the analysis and interpretation of the data collected, student manager will be able to arrive at logical conclusions and propose suitable recommendations on the research problem. The students have to create a logically coherent project report and will be able to defend his / her work in front of a panel of examiners.

**BA ECONOMICS (Honours) with Research**

**ENDI409P: DISSERTATION I**
(18 Credits -540 Hours) (L-T-P: 0-0-36)
The students would be required to submit dissertation. Dissertation submitted by the students would be evaluated by External Examiners appointed by the University. The work for the Research project is spread over Semester VII and Semester VIII as Dissertation Phase-I and Dissertation Phase-II respectively. The total dissertation grades are distributed between the two semesters i.e. 18 credits in Semester VII and 20 credits in Semester VIII equaling 38 credits in total. The aim of the course is to equip the students with presentation skills and develop academic writing skill. Moreover, the students will also be able to apply the statistical research training acquired in the taught element of the program by designing an appropriate research strategy and research methodology to carry out the research.

In Dissertation Phase-I, the students have to independently think of a research idea and, by the end of the semester, has to defend a research proposal based on the idea i.e. need to present the Synopsis by the end of the VII semester.

### Structure of Dissertation Phase-I

<table>
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<tr>
<th>Sl. No.</th>
<th>Tentative Stages to be completed</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Research idea or concept note, i.e., Statement of the Problem</td>
</tr>
<tr>
<td>2.</td>
<td>Review of Literature</td>
</tr>
<tr>
<td>3.</td>
<td>Research Methodology&lt;br&gt;Sampling, Sample size determination, Selection of sample, Analytical tools to be used, Questionnaire preparation, Preliminary exploration of data i.e. Pilot Survey</td>
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<tr>
<td>4.</td>
<td>a) Synopsis Presentation&lt;br&gt;b) Submission of Modified Synopsis to the Department</td>
</tr>
<tr>
<td>5.</td>
<td>Students have to collect all the required data during the semester</td>
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### ENDI410P: DISSERTATION II

(20 Credits - 600 Hours) (L-T-P: 0-0-40)

The students would be required to submit dissertation. Dissertation submitted by the students would be evaluated by External Examiners appointed by the University. The work for the Dissertation is spread over Semester VII and Semester VIII as Dissertation Phase-I and Dissertation Phase-II respectively. The total dissertation grades are distributed between the two semesters i.e. 18 credits in Semester VII and 20 credits in Semester VIII equaling 38 credits in total.

The aim of the course is to fine-tune the dissertation he/she working in the Phase-I and during the work, the students will also learn how to apply the statistical and econometric tools in their own research.

In Dissertation Phase-II, the student has to carry out data analysis and write the dissertation and defend it by the end of the fourth semester. The dissertation will include original research question(s) if any, critical review of the relevant literature, analytical tools employed in response to the research questions, data analysis and interpretation. Finally, the students need to submit the dissertation to the university authority maintaining all instructions provided by the university. Under the process, the students will be guided by an assigned supervisor of the department to do the work.

### Structure of Dissertation Phase-II

<table>
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<tr>
<th>Sl. No.</th>
<th>Tentative Stages to be completed</th>
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<tbody>
<tr>
<td>1.</td>
<td>Validation of data, data entry and preliminary analysis of data (drawing graphs, trend lines, etc.)</td>
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<td>Main data analysis</td>
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<td>3.</td>
<td>Dissertation writing and Proof reading</td>
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<td>Submission and Viva Voce</td>
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DEPARTMENT OF EDUCATION

PROGRAMME: BACHELOR OF ARTS in EDUCATION (BA)

DEGREE: BA EDUCATION (HONOURS)/ BA EDUCATION (HONOURS) WITH RESEARCH

VISION:
To build a pool of intellectually competent educational leaders and teacher educators leading on the process of education in general, and teacher education in particular, which nurtures individual autonomy and social development by ensuring quality with peace across the globe

MISSION:
To facilitate the expression of leaders hidden within the students developing some cognitive, affective and psychomotor abilities and making them a sound citizen of the country and the world as a whole

PROGRAM OUTCOMES
PO 1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO 3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO 4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO 6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES
PSO 1: To inculcate the sense of self and lifelong learning among the students with an appropriate critical thinking and managerial skill.
PSO 2: To inculcate an effective social interaction and ethical values among the students.
PSO 3: To enable the students to be effective in cognitive and psychomotor abilities in different situations.
PSO 4: To create the skills of teaching and research among the students.

COURSE LIST

<table>
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<tr>
<th>Semester 1</th>
<th>3 Year UG Degree</th>
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<td>Minor</td>
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<td>Skill Enhancement</td>
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<td>Common Value Added</td>
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<td>SERVICE LEARNING (THEORY)</td>
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<td>PSYCHOLOGICAL TESTING</td>
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<td>Major</td>
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<td>EDUCATIONAL ADMINISTRATION AND MANAGEMENT</td>
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<td>TEACHING LEARNING METHODS AND PEDAGOGY</td>
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<td>DEVELOPMENT OF EDUCATION IN INDIA</td>
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<td>HUMAN RIGHTS EDUCATION</td>
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ADBU|Regulations and Syllabus|2023-24|511
DETAILED SYLLABUS
MAJOR COURSES

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EDFE100T: FOUNDATIONS OF EDUCATION
(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Objective
To help students in developing a fundamental knowledge of the educational process.

Course Outcomes
At the end of the course students will be able to:
CO 1: Describe the concept, objective, functions of education (Remembering)
CO 2: Identify the forms and bases of education (Understanding)
CO 3: Analyze the curriculum and dimensions of education (Analyzing)
CO 4: Apply different methods for teaching and creating learning among the students (Applying)

Module I: Meaning, Aims and Objective of Education (15 Hours)
Education: meaning, concept, nature and Functions - Narrow and broader concepts of education. Education as a process, a product and a discipline. Aims of education – individual, social and national aims. Objectives of Education – Four pillars of education (Delor’s Report: Learning to Know, Learning to Be, Learning to Do, and Learning to Live Together)

Module II: Forms and Bases of Education (15 Hours)
a. Forms of Education: Formal education, informal education and non-formal Education – Meaning, concepts, nature and importance
b. Bases of Education: philosophical, psychological, sociological and biological

Module III: Dimensions of Education (15 Hours)
The learner, the teacher-qualities and responsibilities; curriculum and co-curricular activities- meaning and modern concept, need and importance; Educational Institutions – school, family and social institutions, religious institutions, state, etc. – their roles in education.

Module IV: Child-Centrism in Education and Educational Methods (15 Hours)
Practices and significance of child centered education; Play and play-way in education - Kindergarten, Montessori, basic education and project method.

Suggested Readings

Mapping of COs to Modules

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EDPF101T: PHILOSOPHICAL FOUNDATIONS OF EDUCATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objective
To help students learn the contribution of philosophy and philosophers in shaping the different aspects of education.

Course Outcomes
At the end of the course students will be able to:
CO 1: Define, explain, relate, and analyze the relationship between philosophy and education. (Remembering, Understanding, Application, Analysis)
CO 2: Reflect upon the biography, philosophical and educational ideologies of Western and Indian thinkers. (Remembering, Understanding, Application, Analysis)
CO 3: Gain insight into the educational implications of the different Indian and Western schools of philosophy. (Remembering, Understanding, Application, Analysis, Evaluation)
CO 4: Comprehend the basics of Philosophy of Knowledge and Value as a part of Education. (Remembering, Understanding, Application, Analysis, Evaluation)

Module I: Philosophy and Education (10 Hours)
Meaning and nature of Education and philosophy; Concept of educational philosophy, Objectives of studying educational philosophy, relationship and influence of philosophy on education

Module II: Western and Indian Philosophical ideologies (20 Hours)

- Indian: Aurobindo Ghosh, Sarvepalli Radhakrishnan, Amartya Sen and his capability approach to education
- Western: Socrates, Plato, Ivan Illich

Module III: Schools of Philosophy (20 Hours)

- Indian schools of Philosophy: Vedic philosophies and Buddhism - in terms of knowledge, reality and value.
- Western Schools of Philosophy: Idealism, Naturalism, Pragmatism, Realism, Humanism: special reference to principles, aims of education, curriculum, teaching methods, teacher, discipline, role and place of student.

Module IV: Epistemology and Axiology in Education (10 Hours)

- Knowledge - Nature, role of knowledge, Sources of knowledge
- Values – concept, need, types and importance, Core values enshrined in the constitution of India. Fostering values among students

Suggested Readings
Mapping of COs to Modules

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EDPB200T: PSYCHOLOGICAL BASES OF EDUCATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objective
To help students learn to apply the knowledge of psychological principles and theories to improve students’ learning.

Course Outcomes
At the end of the course students will be able to:

CO 1: Understand the implications of psychological concepts and principles in the field of culturally diversified classrooms. (Remembering, Understanding, Application, Analysis, Evaluation)

CO 2: Develop critical insight into the process of human learning and factors responsible. (Remembering, Understanding, Application, Analysis, Evaluation, Creating)

CO 3: Create awareness about intelligence and its assessment. (Remembering, Understanding, Application, Analysis, Evaluation)

CO 4: Create awareness about adjustment and its methods. (Remembering, Understanding, Application, Analysis, Evaluation, Creating)

Module I: Educational Psychology and Cultural Diversity in Classrooms (20 Hours)
Educational Psychology-its meaning, nature, scope and aims, Relationship between Education and psychology, Importance of knowledge of educational psychology for the teacher, creating positive learning environments
Cultural Diversity: Concept and types; Low Socio Economic students and their achievement, teaching students living in poverty; Gender and its stereotyping- inherent threats, avoiding gender biases in teaching; multicultural education and culturally relevant pedagogy/teaching

Module II: Learning and transfer of learning (15 Hours)
Meaning, Nature of, learning and maturation, types of learning, Laws of learning, theories of learning: Trial and Error learning, Classical Conditioning, Operant Conditioning; Factors affecting Learning Transfer of learning: Concept, types, Educational implications

Module III: Intelligence and its assessment (15 Hours)
Intelligence: Definition, Nature and Theories: Two Factor Theory of Intelligence, Guilford structure of Intellect; Intelligent Quotient (IQ), Emotional Intelligence, Assessment of Intelligence

Module IV: Psychology of Adjustment (10 Hours)
Concept, Adjustment as achievement or process, Characteristics of a well-adjusted person, Methods of adjustment- direct and indirect

Suggested Readings

Mapping of COs to Modules

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EDES201T: EDUCATION AND SOCIETY
(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Objective
To assist students in comprehending the role of sociological elements in creating education and society.

Course Outcomes
At the end of the course students will be able to:
CO 1: Discuss the concept of sociology of education and agencies of education. (Remembering)
CO 2: Describe the role of education in transmission and preservation of culture, cultural change and social change. (Understanding)
CO 3: Analyze the types of social group and the importance of national integration, international understanding and democracy in a diverse social context. (Analyzing)
CO 4: Evaluate the role of education solving social problems. (Evaluating)

Module I: Sociology and Education and Agencies of Education (20Hours)
Meaning of educational sociology and sociology of education; relationship between sociology and education; sociological determinants of education; agencies of education-family, school, community, religious institutions, state

Module II: Education, culture and social change (20Hours)
Meaning, concept, nature and components of culture, their role in transmission and preservation of culture; cultural lag and cultural change; social change—social mobility, stratification and the roles of education in bringing about change in social change

Module III: Education and Society (20Hours)
Education and social groups-types of groups, social interaction and its educational implications, socialization concept, factors and implications; education for national integration, international understanding and democracy

Module IV: Current Social Problems in India (15 Hours)
Equalization of educational opportunities; role of education in solving social problems such as illiteracy, nutrition, sanitation and unemployment; lifelong education

Suggested Readings

Mapping of COs to Modules

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EDEA202T: EDUCATIONAL ADMINISTRATION AND MANAGEMENT
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Objective
To help students learn the importance of a good administrator and enhance the various skills required to become an effective educational administrator.
Course Outcomes
At the end of the course students will be able to:
CO 1: Define and explain the concept of educational administration, its types, elements, characteristics, functions and factors influencing educational administration. (Remembering, Understanding, Analysis)
CO 2: Explain the concept of school and school management and analyze the qualities and role of school personnel and their professional ethics. (Remembering, Understanding, Application, Analysis)
CO 3: State and explain the concept of institutional planning and identify the different steps and approaches of institutional planning. (Remembering, Understanding, Application, Analysis)
CO 4: Define and explain educational supervision, and its types and apply the principles of supervision in educational management and administration. (Remembering, Understanding, Application, Analysis)

Module I: Introduction to Educational Administration (15 Hours)
Meaning, Definition, Nature of EA; Scope of EA; Objectives of EA; Types of EA, Elements of EA, Characteristics of Administration; Functions of EA, Factors influencing EA. Autocratic and Democratic administration

Module II: School Management (20 Hours)
Concept of School, Need of School, Meaning and Definitions of School management; Process of School Management, Qualities of a Headmaster/Principal; Role of teachers in school management; Essential Qualities of Teachers, Professional ethics

Module III: Institutional planning (20 Hours)
Meaning of Planning; Concept of Institutional Planning; Importance of Institutional Planning; Aims of Institutional Planning; Steps and Preparation of Institutional planning; Approaches of Educational Planning – Man Power and Rate of return approach.

Module IV: Educational Supervision (20 Hours)
Meaning and Nature of Educational Supervision; Concept of Inspection; Difference between Inspection and Supervision; Aims, Types, Scope of Educational Supervision; Educational Supervision Procedures; Principles of Educational Supervision; Problems in Educational Supervision; Effective supervision; Functional basis of supervision.

Suggested Readings
5. Advances in Educational Administration, Volume 10, 1–4. Elsevier Ltd.

Mapping of COs to Modules

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EDTL203T: TEACHING LEARNING METHODS AND PEDAGOGY
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Objective
To help students develop insight into the different elements of teaching learning process to be able to create and organize their own approaches to teaching.

Course Outcomes
At the end of the course students will be able to:
CO 1: Analytical insight into the various concepts of teaching phenomenon. (Remembering, Understanding, Application, Analysis, Evaluation)
CO 2: Analyze the classroom implications of theories, principles and maxims of teaching. (Remembering, Understanding, Application, Analysis, Evaluation)
CO 3: Become aware of organizing purposeful and child centered teaching. (Remembering, Understanding, Application, Analysis, Evaluation)
CO 4: Examine the importance of teaching models for directing classroom instruction. (Remembering, Understanding, Application, Analysis, Evaluation)

CO 5: Develop the skills of lesson planning. (Application)

Module I: Concepts of teaching (20 Hours)
- Meaning of teaching: Authoritative, democratic, laissez-faire
- Teaching from a descriptive point of view; Teaching from a success point of view.
- Variables and functions of teaching.
- Levels and phases of teaching.
- Modalities of teaching and their differences: Conditioning, training, instruction and indoctrination.

Module II: Theories and Principles of Teaching (15 Hours)
- Nature of theory of teaching.
- Significance of theory of teaching.
- Types: Formal, descriptive and normative.
- Principles and maxims of teaching.

Module III: Instructional Objectives and Methods of Teaching (20 Hours)
- Concept of instructional objectives and learning outcomes.
- Taxonomy of instructional objectives with special reference to cognitive objectives.

Module IV: Models of teaching and Lesson Plan (20 Hours)
- Meaning of models of teaching.
- Discussion of one model from each of the four categories of models of teaching.
- Techno-pedagogy.
- Meaning and significance of lesson plan.
- Types of lesson plan: knowledge, skill and appreciation.
- Approaches of lesson plan.
- Elements of a good lesson plan.
- Preparation of lesson plan.
- Disadvantages of lesson plan.

Suggested Readings:

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EDDE204T: DEVELOPMENT OF EDUCATION IN INDIA
(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Objectives
To familiarize students with the past and present developmental initiatives taken in the field of education, and to understand the present issues and concerns of education.

Course Outcomes
At the end of the course students will be able to:
CO 1: Review the Ancient and Medieval system of Education in India (Remembering)
CO 2: Identify the different educational policies adopted during the British Rule (Understanding)
CO 3: Analysis the development of Education in Independent India and Assam (Analysis)
CO 4: Evaluate the contemporary concerns and issues of Indian Education through various initiatives of the Government of India (Evaluation)

Module I: Education in Ancient India (15 Hours)
Vedic system of Education—Aims, Methods of Teaching, Curriculum, Teacher-pupil relationship, Discipline, Education of Women; Buddhist Period—Aims, Methods of Teaching, Curriculum, Teacher-Pupil Relationship, Discipline, Education of Women; Medieval Period—Aims, Methods of Teaching, Curriculum, Teacher-Pupil Relationship, Discipline, Education of Women

Module II: Education during the British Period in India (15 Hours)

Module III: Education in Post-Independence India (15 Hours)

Module IV: Issues and Challenges in Indian Education at School Stage (15 Hours)
Concept of UEE and its problems; Operation Blackboard (OBB), District Primary Education Programme (DPEP), Sarva Shiksha Abhiyan (SSA) and RTE-Act2009; Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Concept, Scope and need of Vocational Education; Objectives of Vocational education; NPE-1986, POA-1992, and NEP 2020 with reference to Vocational Education; Use of ICT

Suggested Readings

Mapping of COs to Modules

EDHG300T: HUMAN GROWTH AND DEVELOPMENT
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Objective
To help students realize the importance of the knowledge of human growth and development in various stages of human life and ensuring effective learning.

Course Outcomes
At the end of the course students will be able to:
CO 1: Explain the concept of Growth and Development and its associated variables(Understanding)
CO 2: Explain the concepts of maturation and individual differences, their effect on human growth and development (Application)
CO 3: Describe childhood and adolescence as stages of development along with their developmental characteristics and role of the teacher in addressing their needs(Evaluate)
CO 4: Critically analyze the theories of development and use the knowledge of the various theories of growth and development and its associated variables in addressing the diversity of the classroom (Analyze)

Module I: Introduction to Growth and Development (20 Hours)
Concept and characteristics of Growth and Development, Difference between growth and development, Principles of growth and development and its implications for education; Dimensions of Development; Factors that influence growth and development: Heredity and Environment; Stages of Human growth and development (characteristic features): Prenatal Development, Post-natal Development

Module II: Maturation and Individual Differences (20 Hours)
Maturation: Concept, Effect of Maturation on Human growth and development, Educational implications of maturation; Individual Differences: Concept, Dimensions/ Types of individual differences, Causes of individual differences, Educational implications of individual differences, Strategies to accommodate individual differences in the classroom

Module III: Childhood and Adolescence (15 Hours)
Childhood: Concept, Developmental characteristics and role of teacher in addressing their needs; Adolescence: Concept, Developmental characteristics, problems encountered by adolescents, role of the teacher in addressing adolescent problems

Module IV: Theories of Development and their Educational Implications (20 Hours)
Piaget’s Cognitive Theory; Freud’s Psycho-sexual Theory; Erickson’s Psycho-social Theory; Bronfenbrenner’s Bio-ecological Theory; Kohlberg’s theory of Moral Development; Chomsky’s theory of Language Development; Havighursts’ Developmental Tasks throughout one’s life span

Suggested Readings

Mapping of COs to Modules

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EDET301T: EDUCATIONALTECHNOLOGY
(5 Credits – 75 Hours) (L-T-P: 4:0:1)

Objectives
To inculcate in students the skill of utilising technology in the teaching learning process.

Course Outcomes
At the end of the course students will be able to:

CO 1: Become aware of the contribution of educational technology to the teaching-learning process. (Remembering, Understanding, Application, Analyze, Evaluate)

CO 2: Explain the process of communication and various instructional technology (Remembering, Understanding, Application, Analyze, Evaluate)

CO 3: Understand the implications of behavioural technology for improved teacher behaviour. (Remembering, Understanding, Application, Analyze, Evaluate)

CO 4: Identify the various emerging trends in technology and the multimedia approach in the classroom for the purpose of teaching (Remembering, Understanding, Application, Analyze, Evaluate)

Module I: Introduction to Educational Technology (20 Hours)
Emergence of educational technology, different views on educational technology, definition, meaning, nature and scope of educational technology, educational technology in formal and non-formal education, educational technology and quality education, problems of educational technology in the Indian context
Module II: Communication and Instruction (20 Hours)
Concept and need of communication; Forms of communication; Barriers of communication Model of communication process; Classroom communication: Verbal and Nonverbal; Instructional Technology: Programmed Instruction (PI), Personalized system of Instruction (PSI), Computer Assisted Instruction (CAI)

Module III: Behavioural Technology (20 Hours)
Need and Nature of behavioral technology; Features of teaching behavior; Concept of teaching skills and their identification; Need, nature and steps of Micro-teaching; Interaction Analysis with special reference to Flanders; Simulated Social Skill Training (SSST)

Module IV: Practicum in Emerging Trends of Educational Technology (30 Hours)
- Preparing videos using various applications
- Creation of e-content in alignment with MOOCs
- Learning Management System

Suggested Readings
3. Flanders, Ned A (1972) : Analyzing Teacher Behaviour, California, Addison Wesley

Mapping of COs to Modules

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EDEL302T: ELEMENTARY STATISTICS IN EDUCATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objectives
To create ability among the students for handling quantitative data and interpreting computed results.

Course Outcomes
At the end of the course students will be able to:
CO 1: To acquaint the students with the concept, nature, and relevance of statistics to educational studies. (Remembering, Understanding, Application, Analysis, Synthesis)
CO 2: To make the students well aware of the organization, presentation of data and finding out central values. (Remembering, Understanding, Application, Analysis, Synthesis, Evaluation)
CO 3: To create understanding among the students about the variations of the scores in any distribution. (Remembering, Understanding, Application, Analysis, Synthesis, Evaluation)
CO 4: To create understanding among the students about the conceptual framework of normal probability curve and the relationship of variables. (Remembering, Understanding, Application, Analysis, Synthesis, Evaluation)

Module I: Nature of Statistics (15 Hours)
Meaning and nature of Statistics; Utility of statistics in education; Organization of data in frequency table; Graphical representation of data-freQUENCY, polygon, histogram, cumulative frequency curve and ogive; Functions and limitations of statistics.

Module II: Measures of Central Tendency (15 Hours)
Meaning and importance of Measures of Central Tendency; Three common measures of central tendency: Mean, Median and Mode; Definition of mean, computation of mean from ungrouped data and grouped data. Incase of grouped data-long and short method; Merits and demerits of mean; Definition of median, computation of median from ungrouped and grouped data; Merits and demerits of median; Definition of mode, computation of mode from ungrouped data and grouped data, merits and demerits of mode; When to use mean, median and mode

Module III: Measures of Variability (15 Hours)
Meaning and importance of Measures of Variability; Types of measures of variability: Range, average deviation, standard deviation, and quartile deviation; Computation of Range and its merits and demerits; Computation of Average Deviation (AD)
from ungrouped and grouped data, merits and demerits of AD; Computation of SD from ungrouped and grouped data, merits and demerits of SD; Computation of Quartile Deviation from ungrouped and grouped data, merits and demerits of QD; Percentile and Percentile Ranks; When to use range, AD, SD, and QD

**Module IV: Relationship between Variables (15 Hours)**
Definition of Correlation, Correlation and causation; Types of correlation; Meaning of linear correlation and degree of relationship; Methods of determining correlation- Graphic methods and Mathematical method; Product Moment Method and rank Difference Method; Factors affecting correlation; Nature and features of Normal Probability Curve

**Suggested Readings**

**Mapping of COs to Modules**

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**EDME303T: MEASUREMENT AND EVALUATION IN EDUCATION: I**
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

**Objectives**
To help students develop insight and skill of measuring and evaluating students learning.

**Course Outcomes**
At the end of the course students will be able to:

CO 1: To create understanding among the students about concept and nature of educational measurement and evaluation. (Remembering, Understanding, Analysis)

CO 2: To make the students well aware of the nature of objective cum outcome based education with special reference to taxonomy of educational objectives. (Remembering, Understanding, Application, Analysis, Synthesis)

CO 3: To make the students well aware of the types of evaluation. (Remembering, Understanding, Application, Analysis)

CO 4: To create understanding about the measurement of different dimensions and their interpretations. (Remembering, Understanding, Application, Analysis)

**Module I: Introduction to Measurement and Evaluation in Education (15 Hours)**
- Concept and historical background of measurement
- Types of measurement and scales of measurement
- Functions of measurement in education
- Concepts of assessment and evaluation
- Relationship between assessment and evaluation
- Principles and steps of evaluation
- Scope of measurement and evaluation in education

**Module II: Nature of Educational Objectives and Outcome Based Education (15 Hours)**
- Meaning and need of educational objectives
- Educational aims, educational objectives and instructional objectives
- Purpose of Taxonomy of educational objectives
- Cognitive, affective, and psychomotor objectives and their taxonomy
- Writing instructional objectives in behavioural form
- Concepts of objective cum outcome based education for ensuring quality education

**Module III: Measurement and Evaluation of an Individual (15 Hours)**
- Types of evaluation
- Measurement of intelligence, interest, and aptitude of students
- Measurement of achievement of students
• Tools/ tests of intelligence, interest, aptitude, and achievement
• Teacher made achievement test and standardized achievement test
• Characteristics of a good test
• Educational diagnosis

Module IV: Planning and Execution of Evaluation Programme (15 Hours)
• Features of an effective evaluation programme
• Functions of evaluation programme
• Steps for planning a good evaluation programme
• Execution of the evaluation programme
• Recording and reporting date
• Use of data for guidance and counseling

Suggested Readings

Mapping of COs to Syllabus

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EDTE304T: TEACHER EDUCATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objective
To inculcate in students the qualities of being an effective teacher and the various scopes associated with it.

Course Outcomes
At the end of the course students will be able to:
CO 1: Explain the meaning, nature, features and scope of teacher education (Remembering)
CO 2: Describe the concept of Pre-service and In-service Teacher education and its various dimensions. (Understand)
CO 3: Identify the various approaches to Teacher Education programme(Analyse)
CO 4: Evaluate the current trends in the field of Teacher Education (Application)

Module I: Introduction to Teacher Education (15 Hours)
Meaning, nature and scope of Teacher Education; Historical background of Teacher Education in India; Objectives of Teacher Education; Paradigm shifts in education and preparation of teachers

Module II: Pre-Service and In-Service Teacher Education (10 Hours)
Concept of Pre-service & In-service Teacher Education; Features of Pre-service & In-service Teacher Education; Terms and conditions for Pre-service & In-service Teacher Education Programs as per NCTE

Module III: Approaches to Teacher Education (15 Hours)
Behaviouristic and constructivist approaches; Disciplinary and Inter-disciplinary approach; Modification of teaching behaviour: Simulated teaching, Flanders’ Interaction Analysis Category System; Integrated Teacher Education Programme; Information Literacy and using ICT in classroom.

Module IV: Emerging Trends and Research in Teacher Education (20 Hours)
Modes of Transaction; Micro Teaching and SSST Team Teaching; Practice Teaching and Internship; Research in Teacher Education; Process of Action Research Technology in Teacher Education; Emerging trends in Teacher Education; Issues and challenges in teacher education
Suggested Readings
6. NCERT: The Third Indian Year Book on Education, New Delhi, NCERT (1968)
7. NCTE : Teacher Education Curriculum - A Framework, New Delhi, NCERT (1978)
9. Shirmali, K.L: Better Teacher Education, New Delhi, Ministry of Education, Govt. of India

Mapping of COs to syllabus

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EDEC305T: EARLY CHILDHOOD CARE AND EDUCATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Objectives
To help students understand the importance of stimulating environment, nutritious food and care during the early stages of human growth and development.

Course Outcomes
At the end of the course students will be able to:

CO 1: State and explain the concept, need, significance and principles guiding the framework of ECCE. (Remembering, Understanding)

CO 2: Explain and analyze the underlying philosophies of ECCE. (Understanding, Analysis)

CO 3: State the various policies, programmes and initiatives on ECCE and evaluate the accuracy and relevance of these policies, programmes and initiatives (Remembering Understanding, Evaluation)

CO 4: State the meaning and approaches of the curriculum and apply the play-way approach in teaching the learners of ECCE stage. (Remembering, Understanding, Application)

Module I: Nature of ECCE and Principles of Development in Early Years (14 Hours)
Meaning, Definitions and Significance of ECCE in the context of Universalization of Elementary Education; Objectives and principles guiding the framework of ECCE; Developmental milestone goals of ECCE centres; Meaning of Growth and Development; Principles guiding growth and development; Characteristics of children at ECE stage.

Module II: Philosophies on ECCE (12 Hours)
Philosophy of John Dewey; Friedrich Froebel; Maria Montessori; Gijubhai Badeka; Tarabai Modak

Module III: Policies, Programmes and Initiatives on ECCE in India (17 Hours)
Development of ECCE in India; National Children’s Policy 2013; NPE-1986 and its Programme of Action (POA)1992; NEP-2020 and ECCE; Convention on Rights of the child, 1989; Providers of ECCE - government, private and NGOs; ICDS and SSA.

Module IV: Curriculum of ECCE (17 Hours)
Meaning of Curriculum; Approaches of the curriculum; Play Way Approach- Meaning of play; benefits of play; Types of Play; Importance of integrating play into the curriculum; Enhancing Communication Skills through play way approach; Teacher’s Role and activities to promote communication; Literacy and Numeracy Meaning of Literacy; Meaning of numeracy; Components of literacy and numeracy for an early years curriculum; Play-centred activities for literacy and numeracy; Play way method in supporting reading skills Pre-reading Activities and games.

Suggested Readings
11. Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through age eight, 3rd Edition, Editors - Carol Copple and Sue Bredekamp

Mapping of COs to Modules

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EDCS400T: - CURRICULUM STUDIES
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Objective
To inculcate in the learners the skill of developing an effective curriculum.

Course Outcomes
At the end of the course students will be able to:
CO 1: Identify the components, principles, goals and objectives of curriculum development (Remembering)
CO 2: Demonstrate the different bases of the curriculum construction (Understanding)
CO 3: Analyze the different dimensions, approaches of curriculum designing and the role of teachers in bringing about changes and modification in the curriculum (Analyzing)
CO 4: Apply the methods and process of curriculum development and examine the relevance of the existing curriculum (Application)

Module I: Nature of Curriculum (15 Hours)
Defining curriculum, Components of curriculum, Principles of curriculum, Goals and objectives for curriculum development, Characteristics of a good curriculum

Module II: Bases of Curriculum Construction (15 Hours)
Philosophical bases: Naturalism, Idealism, Pragmatism, Sociological bases: Society, education and schooling, social change and curriculum, Psychological bases: Learning theories and curriculum, humanistic psychology

Module III: Approaches to Curriculum Development (15 Hours)

Module IV: Process of Curriculum Development and the role of teachers in Curriculum Development (15 Hours)
Process of curriculum development: Assessment of educational needs, Formulation of objectives Selection and organisation of content, Selection and organisation of learning experiences, Evaluation Role of teachers in curriculum development and some issues in curriculum development, Irrelevant curriculum, Emerging curriculum.

Suggested Readings
Mapping of COs to Syllabus

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**EDIE401T: INCLUSIVE EDUCATION**

(5 Credits – 75 Hours) (L-T-P: 4-0-1)

**Objective**

*To create empathy and a scientific attitude among the students towards the education of special needs children.*

**Course Outcomes**

At the end of the course students will be able to:

CO 1: To create awareness among the students regarding the concept of Inclusive Education and its evolution. (Remembering, Understanding, Application, Analysis)

CO 2: To make the students aware about the prevailing legal provisions and policies available for inclusion. (Remembering, Understanding, Application, Analysis)

CO 3: To create awareness about the required infrastructural facilities, pedagogical strategies, Teacher’s role and competencies, and assistive and adaptive technologies available for inclusive classroom. (Remembering, Understanding, Application, Analysis, Evaluation)

CO 4: To familiarize the students with the barriers to inclusive Education and its interventions. (Remembering, Understanding, Application, Analysis, Evaluation)

**Module I: Introduction to the concept of Inclusive Education and its evolution (15 Hours)**

- Concept and Definitions
- Principles of Inclusive Education
- Scope and Target Group: Diverse learners, Marginalized groups and learners with disabilities.
- Evolution of the philosophy of Inclusive Education: Special, Integrated and Inclusive Education.
- Types / Models of Inclusive Education:
  - Full Inclusion
  - Partial Inclusion
- Benefits of inclusion:
  - For children with Disabilities
  - For children without Disabilities
- Need and importance of Inclusive Education.
- Factors affecting Inclusion

**Module II: Legal Provisions: Policies and Legislations for Inclusive Education (18 Hours)**

- National Policy of Education 1986
- Programme of Action 1992
- Persons with Disabilities Act 1995
- National Policies of Disabilities 2006
- Concession and facilities to Diverse learners: Academic and Financial (Rehabilitation Council of India Act 1992)
- New Education Policy 2020

**Module III: Planning and management of Inclusive Classrooms (15 Hours)**

- Infrastructure
- Inclusive pedagogy:
  - Social learning
  - Activity based learning
  - Multisensory teaching
  - Reflective teaching
  - Collaborative and cooperative teaching
  - Team teaching
  - Peer tutoring
  - Remedial instruction
  - Individualized Educational Programme
Teacher in an Inclusive Classroom: Role and competencies
Assistive and adaptive technology for diverse learners

Module IV: Barriers to Inclusive Education and Interventions (12 Hours)
- Attitude
- Labelling
- Peer Rejection
- Accountability
- Traditional Orientated Teaching etc.

Interventions:
- Environmental Intervention
- Social Intervention
- Academic Intervention

Module V: Practicum: (Assignment- any one) (30 Hours)
i. Survey the nearby schools and present a report on its inclusive settings.
ii. Survey the nearby schools and present a report on the attitude of teachers and students (both differently-abled and normal) towards Inclusive Education.
iii. Survey the nearby schools and identify the inclusive pedagogy as adopted by them and present a report.
iv. Organize awareness camps on the benefits of inclusive education.

Suggested Readings:

Mapping of COs to Syllabus

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EDAS402T: ADVANCED STATISTICS IN EDUCATION (5-0-0)
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Objective
To make the students capable of dealing with quantitative data by using varieties of advanced statistical techniques.

Course Outcomes
At the end of the course students will be able to:

CO 1: To create understanding among the students about the applications of inferential statistics at higher levels in research (Remembering, Understanding, Application, Analysis, Evaluation)

CO 2: To enable the students to make use of correlation for testing hypothesis in case of grouped data, regression analysis, and factor analysis(Rebermbering, Understanding, Application)

CO 3: To acquaint the students with the concepts of non-parametric tests and their application in the field of educational research. (Remembering, Understanding, Application, Analysis)

CO 4: To create interest, motivation and critical thinking in the process of quantitative type of research studies in education (Remembering, Understanding, Application, Analysis, Evaluation)

Module I: Introduction to Normal Probability Curve and Correlation (20 Hours)
- Nature, principles, and theories of probability, and Bionomical Distribution
• Normal probability curve and its properties
• Areas under normal probability curve
• Skewness and kurtosis
• Applications of normal probability curve
• Measures of relationship with grouped data: product moment through scatter gram
• Biserial, point biserial, tetrachoric correlation, Phi coefficient
• Partial and multiple correlation
• Regression and prediction

Module II: Introduction to Inferential Statistics (20 Hours)
• Meaning of inferential statistics
• Concepts of statistics and parameter and standard error
• Levels of significance and confidence limits, degree of freedom
• Concepts of one tailed and two tailed tests
• Concepts of type I and type II errors
• Application of z test and t test for testing hypotheses

Module III: Analysis of Variance (20 Hours)
• Concept and need of ANOVA
• Use of one way, two way, and three way Analysis of variance
• Assumptions of ANOVA
• Analysis of co-variance (ANCOVA) and its assumptions
• Experimental designs and relevance of ANOVA and ANCOVA
• Factor analysis with important methods
• Linear regression analysis

Module IV: Non-Parametric Tests in Educational Research (15 Hours)
• Meaning and need of non-parametric tests
• Assumptions of non-parametric tests
• Difference between parametric and non-parametric tests
• Chi-square test
• Sign test, median test

Suggested readings

Mapping of COs

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EDEE403T: MEASUREMENT AND EVALUATION IN EDUCATION-II
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Objectives
To make the students well aware of the total conceptual framework of educational measurement and evaluation

Course Outcomes
At the end of the course students will be able to:
CO 1: To inculcate the skill of construction and standardization of test and attitude scale among the students. (Remembering, Understanding, Application, Evaluation)
CO 2: To make the students well aware of the concept of norms and transformation of scores. (Remembering, Understanding, Application, Evaluation)
CO 3: To inculcate the skill of item writing for an achievement test. (Understanding, Analysis, Synthesis, Evaluation)
CO 4: To make the students well aware of describing and summarizing measurement results. (Application, Analysis, Synthesis, Evaluation)

Module I: Tools of Measurement (20 Hours)
- Need of tools in the process of measurement
- Characteristics of a good and scientific tool
- Construction and standardization of an achievement test, questionnaire, and attitude scale
- Manual of the test
- Concepts of reliability and validity

Module II: Transformation of Scores (20 Hours)
- Concept of standard score
- Need and importance of standard scores
- Conversion of raw scores in z-score, T-score, C-score, and Stanine scores
- Norms, age, grade, and percentiles

Module III: Items writing for the test (20 Hours)
- Need and types of items of the test
- Comparison of objective and essay type test items
- Number of items
- Level and distribution of difficulty
- Guidelines for writing effective multiple choice type, true-false type and other objective type items
- Guidelines for writing effective essay type items
- Measuring complex achievement: interpretive exercises, merits and demerits
- Guide line for constructing interpretive exercises

Module IV: Describing and Summarizing Measurement Results (15 Hours)
- Scores of individuals on test
- Organizing scores into a frequency table
- Graphical representation
- Describing scores distribution in terms of central tendency, variability, normality, percentiles, correlation (product-moment and rank difference)
- Grading systems, methods of assigning grades

Suggested Readings

Mapping of COs to Syllabus

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MINOR COURSES

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EDGC102T: GUIDANCE AND COUNSELLING IN EDUCATION
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objective
To familiarize the students with various concepts, tools and techniques of guidance and counselling and to acquire the necessary skills needed for guidance and counselling

Course Outcomes
CO 1: Define and explain the concept of guidance, its nature, needs and principles and the role of a teacher as a guide. (Remembering, Understanding, Applying)
CO 2: State and explain the types of guidance and analyze the components of educational vocational and personal guidance, and perform the guidance activities. (Remembering, Understanding, Analysis, Applying)
CO 3: Define and explain the concept of counselling, differentiate the different types of counselling and find out the qualities of an effective counsellor. (Remembering, Understanding, Applying)
CO 4: Describe the tools and techniques of guidance and counselling and organize the guidance and counselling services. (Remembering, Understanding, Applying)

Module I: Introduction to Guidance (10 Hours)
Meaning and Definition; Nature of Guidance; Functions of Guidance; Historical background of the guidance in India; Need and Principles of Guidance; Teacher as a Guide.

Module II: Types of Guidance (17 Hours)
Educational Guidance, Vocational Guidance, Personal Guidance; Organisation of guidance and Counselling services

Module III: Concept of Counselling (14 Hours)
Meaning and Definition; Nature of Counselling; Need for Counselling in educational Institutions; Types of Counselling: Directive, Non-directive Counselling and Eclectic Counselling; Qualities of an effective counsellor

Module IV: Tools and Techniques of Guidance and Counselling (17 Hours)
Testing techniques- Intelligence, Creativity, Interest, Aptitude and Personality traits; Non-testing Techniques: Observation, Interview, Case study, Cumulative records.

Suggested Readings

Mapping of Cos to Modules

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EDTT103T: TEACHER AND TEACHING SKILLS
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objective
To make the students well aware of skills of teaching

Course Outcomes
CO 1: To create awareness among the students about the conceptual framework of teaching-learning process. (Remembering, Understanding, Applying)
CO 2: To make the students well aware of the concept of teaching skills and approach of inculcating teaching skills. (Remembering, Understanding, Applying)
CO 3: To create understanding among the students about educational objectives required by any effective teacher. (Remembering, Understanding, Applying)
CO 4: To acquaint the students about the concept and goals of teaching practice and approaches to lesson planning. (Remembering, Understanding, Applying)

Module I: Introduction to Teaching and Structure of Teaching-Learning Process (12 Hours)
Concept, meaning and definition of teaching, Structure of teaching; Teaching as profession; Principles and maxims of teaching.

Module II: Teacher and Teaching Skills (16 Hours)
Qualities of an effective teacher; Concept of teaching skills and sources of teaching skills; Micro teaching as an approach to ensure mastery over teaching skills; Micro lesson planning and its implementation.

Module III: Educational Objectives (16 Hours)
Aims of education, general objectives and specific objectives; Utility of taxonomy of objectives; Taxonomy of cognitive, affective and psychomotor objectives

Module IV: Teaching Practice and Macro Lesson Plan (20 Hours)
Concept, need and objectives of teaching practice; Concept and need of macro teaching; Difference between macro teaching and micro teaching; Meaning and importance of macro lesson plan; Development of lesson plan for macro teaching.

Scheme of Evaluation
Internal Evaluation: 40 Marks
Class Test: 20 Marks
Assignment: 10 Marks
Attendance: 5 Marks
Non-formal Behaviour: 5 Marks

External Evaluation: 60 Marks
Teaching Practice: 5 days and Delivering 5 Lesson Plan: 30 Marks
One final lesson plan presentation: 20 marks
Viva Voce: 10 Marks

Suggested Readings
Mapping of Cos to Modules

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EDTH205T: EDUCATIONAL THINKERS
(4 Credits - 60 hours) (L-T-P: 4-0-0)

Objective
To make the students well aware of Indian and Western educational thinkers.

Course Outcomes
CO 1: To create awareness among the students about the philosophical thoughts and education. (Remembering, Understanding, Applying)
CO 2: To make the students well aware of the contributions of Indian educational thinkers. (Remembering, Understanding, Applying, Analyzing, Evaluating)
CO 3: To make the students well aware of the contribution of Western educational thinkers. (Remembering, Understanding, Applying, Analyzing, Evaluating)
CO 4: To create understanding among the students about some similarities and differences among educational thinkers. (Understanding, Applying, Analyzing, Evaluating)

Module I: Introduction to Philosophical Thoughts of Education (10 Hours)
- Philosophies and their impact on education
- Indian philosophical traditions and their educational implications
- Indian society and education with special reference to British period

Module II: Indian Educational Thinkers (20 Hours)
- Swami Dayanand: Life sketch and his contribution in educational process
- Swami Vivekanand: Life sketch; Basics of his philosophy and its relevance to education.
- Rabindranath Tagore and Sri Aurobindo Ghosh: their contribution in the field of education
- M. K. Gandhi: Life sketch and his contributions in the field of education
- Indian educational thinkers with special reference to NPE 1986 and NEP 2020

Module III: Western Educational Thinkers (20 Hours)
- John Dewey: life Sketch and philosophy of education.
- Froebel and Maria Montessori: Their life sketch and contribution in education
- Indian education policies and Western thinkers

Module IV: Analytical Views on Indian and Western Educational Thinkers (10 Hours)
- Similarities in educational thoughts of Indian and Western thinkers
- Differences in educational thought of Indian and Western thinkers
- Indian National Curriculum Framework- 2005 and Indian and Western educational thinkers

Suggested Readings
Mapping of Cos to Modules

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EDHE206T: HUMAN RIGHTS EDUCATION
(4 Credits- 60 hours) (L-T-P: 3-1-0)

Objective
To familiarize the students with Human Rights and Human Rights education, rights of children and to inculcate value education among them

Course Outcomes
CO 1: Recognize the origin, meaning, concept, objectives provisions of human rights and human rights education (Understanding)
CO 2: Identify various international covenants and conventions fostering human rights and gender equity (Understanding)
CO 3: Analyze the functions of various national and international human rights bodies and approaches to teach human rights at different ladders of school education (Analyzing)
CO 4: Apply the concept and objectives of value education in realizing Human Rights (Applying)

Module I: Introduction to Human Rights Education (20 Hours)
Origin and historical account of Human Rights; Description of UN Charter and UDHR; Meaning of Human Rights and Human Right Education; Constitutional Provisions for Human Rights

Module II: International Covenants, Convention and Gender Equity (15 Hours)
International Covenants on Economics, Social and Cultural Rights; Convention of Rights of Child and role of ILO; Right to Education Act-2009

Module III: Human Rights and Duties (15 Hours)
Human Right Protection Act and role of NHRC, SHRCs, UN, UNESCO; Curriculum framework of Human Rights Education; Approaches of Teaching for Human Rights Education

Module IV: Value Education (10 Hours)
Concept of Value; Sources of Value: Biological, Psychological, Sociological and Spiritual; Meaning, nature and objectives of Value Education; Value clarification approach

Suggested Readings

Mapping of Cos to Modules

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EDPE307T: PEACE EDUCATION
(4 Credits- 60 hours) (L-T-P: 4-0-0)

Objective
The objective of the course is to learn about the importance of peace and the role of social organizations, thinkers and various movements that promotes peace amongst mankind.
Course Outcomes
CO 1: Describe the importance of peace and the role of social organizations towards peace. (Remembering, Understanding)
CO 2: Explain the various roles of agencies in promoting peace (Remembering, Understanding)
CO 3: Analyze the concept of peace as held by different thinkers. (Analyzing)
CO 4: Discuss the various global issues and peace movements. (Evaluating)

Module I: Understanding peace as a dynamic social reality (10 Hours)
Basic concepts of Peace and Peace Education; nature, meaning, objectives; Theories of peace – democratic peace and active peace

Module II: Role of agencies in promoting peace (13 Hours)
Role of social organizations: Family, Religion, Mass Media, Community, School

Module III: Thinkers on Peace (17 Hours)
Some thinkers on harmony: Dalai Lama, Gandhi, Mother Teresa; Gautam Buddha; Montessori; Friere; Concept of peace education; peace teacher, peace method and other enabling practices in an educational setting

Module IV: Global issues and peace movements (12 Hours)
Underlying causes of violence and war; Global peace movement; Promoting positive peace; Human rights, population control, non-alignment movement, campaign for nuclear disarmament and role of world organizations in promoting peace

Activities to be conducted: (8 hours) (any 01)
1. Field visit to place/organization-government/non-government working towards building peace
2. Exhibition on Peace related themes
3. Strategies to create peace building: Meditation, Yoga, Dramatization, Debate

Suggested Readings
12. Montessori, M. Peace and Education. India: The Theosophical Publishing House.(1943)

Mapping of COs to Modules

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<th>Course Outcomes</th>
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EDWE308T: WOMEN EMPOWERMENT (3-0-1)
(4 Credits- 60 hours) (L-T-P: 3-0-1)

Objective(s)
The objective of the course is to learn about the importance of women empowerment, their raising self-esteem and self-confidence thereby eliminating the discrimination and all forms of violence against women and girl child through education and different government policies.

Course Outcomes
CO 1: To familiarize students with the concept of women empowerment. (Remembering)
CO 2: To make students aware about the importance and factors affecting Women empowerment. (Remembering, Analyzing)
CO 3: To be aware about the government plans and policies on Women Empowerment. (Remembering, Applying)
CO 4: To analyze the various schemes related to Women empowerment. (Analyzing)

Module I: Concept of Women’s Empowerment (15 Hours)
Women Empowerment: Meaning, definition, characteristics; Importance of Women Empowerment; Dimensions of Women Empowerment; Principles of Women Empowerment; Models of Women Empowerment

Module II: Women Empowerment in India (15 Hours)
Factors affecting Women Empowerment in India; Concept of Gender discrimination; Women’s Rights; Health conditions and work related issues of women; Women empowerment through education

Module III: Constitutional Articles, Government Plans and Programmes for Women Empowerment (15 Hours)
Constitutional Articles: Economic Empowerment; Political Empowerment; Social Empowerment; Government Plans and Programmes; Economic Empowerment; Schemes for Women Empowerment: Beti Bachao Beti Padhao (BBBP) Scheme; One Stop Centres (OSCs); The Scheme of Universalization of Women Helpline; UJJAWALA; Swadhar.

Module IV: Practicum: (any one) (30 hours)
I. Visiting women self - help groups.
II. Organizing flash mob, skits in neighboring areas.
III. Reporting on one stop Centre scheme by Government of India.
IV. Releasing a magazine on status of women then and now.

Suggested Readings
2. Das Phunu (2016): Contemporary issues of Indian Education, Shanti Prakashan, Guwahati

Mapping of COs to Modules

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EDSD404T: EDUCATION FOR SUSTAINABLE DEVELOPMENT
(3 Credits- 45 hours) (L-T-P: 2-0-1)

Objective(s)
The course will familiarize the students with the concept of sustainable development and education for sustainable development along with its pedagogy.
Course Outcomes
CO 1: To create awareness about the concept of Sustainable Development. (Remembering, Understanding, Applying)
CO 2: To create awareness among students about the concept of Education for Sustainable Development and the role of Education in Sustainable Development. (Remembering, Understanding, Applying, Analyzing, Evaluating, Creating)
CO 3: To develop the skill of evaluating the utility and prevalence of sustainable development within self and in the community. (Applying)

Module I: Introduction to Sustainable Development (10 hours)
- Concept of Development
- Concept of Sustainability
- Sustainable Development: Its 5 Ps (People, planet, prosperity, peace, and partnership)
- Sustainable Development Goals

Module II: Curricular Framework for Education for Sustainable Development (20 hours)
- Definition and meaning of Education for Sustainable Development
- Principles
- Key Sustainable Competencies to be developed through ESD: Systems thinking Competencies, Anticipatory Competency, normative competency, Strategic competency, Collaboration Competency, Critical thinking competency, Self-awareness Competency and integrated problem Solving Competency
- Pedagogical approaches in ESD: Whole- institution approach, Learner centered approach, Action oriented learning, Transformative approach
- Teaching techniques for ESD: Simulations, Class discussions, Issue Analysis Techniques, Storytelling.

Module III: Practical Implications of ESD (30 hours) [Any two]
- Sharing their own stories of struggle/ success with the class as well as submit report of self-reflection.
- Visiting neighboring areas to collect community related stories/ activities towards the realization of Sustainable Development Goals.
- Surveying industries and submitting report on its sustainability norms.
- Surveying schools and submitting report on its sustainability norms.

Suggested Readings
4. UNESCO. (2017). Education for Sustainable Development Goals: Learning Objectives. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000247444?utm_sq=g34xbfn94#:~:text=Target%204.7%20of%20the%20SDGs,
peace%20and%20non%20violent%2C%20global

Mapping of COs to Modules

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EDER405T: ELEMENTS OF RESEARCH IN EDUCATION
(2 Credits- 30 hours) (L-T-P: 2-0-0)

Objective(s)
To acquaint the students with the concept and design of educational research

Course Outcomes
CO 1: To make the students well aware of the nature and types of research. (Remembering, Understanding, Applying)
CO 2: To make the students to learn about the steps of research process. (Remembering, Applying, Evaluating)
CO 3: To make the students to learn about research designs and methods. (Remembering, Understanding, Applying)
CO 4: To learn about sampling and sampling and samples. (Remembering, Understanding, Applying)

Module I: Introduction to Research Methodology (20 Hours)
- Meaning and significance of research
- Methods of acquiring knowledge
- Scientific method of research
- Process of research
- Philosophical bases of research
- Types of research and areas of research in education
- Steps of research in education
- Review of related literature and making synopses
- Code of ethics in research

Module II: Designs and Methods in Educational Research (20 Hours)
- Meaning and significance of research design
- Steps for preparation of research design
- Types of research designs: quantitative, qualitative, and mixed research designs
- Research designs and corresponding methods of educational research: survey method, historical method, experimental method, case study method.
- Sample and sampling procedures

Suggested Reading

Mapping of Cos to Modules

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EDES406T: EDUCATIONAL SEMINAR (1-0-2)
(3 Credits- 45 hours) (L-T-P: 1-0-2)

Objectives
To develop the skills and competencies required to prepare academic articles, present seminar and enhance critical thinking

Course Outcomes
CO 1: Recognize the meaning, concept and objectives of educational seminar (Remembering)
CO 2: Enhance higher cognitive abilities to respond to new knowledge, critical thinking, and keen observation of researches conducted (Understanding)
CO 3: Apply the abilities to seek clarification, defend the ideas of others, and present effectively (Applying)
CO 4: Perceive the feeling of tolerance, co-operation, and respect of the ideas and feelings of others (Understanding)

Module I: Introduction to Educational Seminar (10 Hours)
Meaning, Concept, scope and objectives of educational seminar; Types of seminar; Importance of educational seminar

Module II: Practicum (60 Hours)
- Article Writing: Selection of themes and making out sub-themes of the seminar; Concept paper writing, Writing of papers on sub-themes ensuring the coverage of local, national and international scenarios; Review of related literature pertaining to the selected theme and sub-themes
- Preparation of the Proposal for Seminar and presentation
- Organization of the Seminar: Description of the steps of organizing the seminar; Designing/developing the materials (brochures, leaflets, etc.); Writing report and publication of seminar proceeding; applying for ISBN; Collaboration with national/international agencies

Mapping of Cos to Modules
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### SKILL ENHANCEMENT COURSES

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<td>Life Skills Education</td>
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<td>EDD104L</td>
<td>Reflective Journaling- A Technique for Personal and Academic Growth</td>
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<td>S E Course 3</td>
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<td>Psychological Testing</td>
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**EDLS103L: LIFE SKILLS EDUCATION**

(3 credits-45 hours)(L-T-P:1-0-2)

**Course objective:**

_The objective of the course is to essentially inculcate those abilities and skills that help promote mental well-being and competence in young people as they face the realities of life._

**Course outcomes**

- CO 1: Explain the concept of life skills, Social Skills and their importance
- CO 2: Creating awareness about cognitive skills and coping skills
- CO 3: Employ various skills in life such as social skills, cognitive skills, communication skills, coping skills, creative thinking skills, decision making skills etc.
- CO 4: Construct the meaning of self

**Module I: Understanding of Life Skills and Social Skills (15 Hours)**

Skills and life skills; Origin and development of Life skills; Significance of life skills; Introduction to 10 core skills (WHO, 1996)-Self Awareness, Empathy, Critical thinking, Creative thinking, Decision Making, Problem Solving, Effective Communication, Interpersonal relationship, Coping with stress, Coping with emotions

**Module II: Practicum (60 hours)**

**Topics prescribed for activities**

**Understanding Self**
- Discovering Self / My strength and weakness/ Self -esteem and its importance/ Overcoming low self- esteem/ Setting goals for self

**Social Skills**
- Empathy- Stepping into other’s shoes/Treat others respectfully/Let us be caring and compassionate
- Effective Communication- Whispering games/ Brainstorming/ Discussion/ Enhancing verbal –non -verbal communication
- Interpersonal relationship- Ball game/ Discussion/ My relationship web/ I can appreciate

**Thinking Skills**
- Critical thinking- Let us be analytical/ journal writing/ Fact or fiction
- Creative thinking- Thinking out of the box/ Let us be imaginative
- Decision Making- Making informed choices/ team activity
- Problem Solving- Case analysis and presentation

**Emotional Skills**
- Coping with stress- Am I stressed?/ Stress Management
- Coping with emotions- Am I emotional?/ Emotional Collage

**Suggested Readings**


**Mapping of COs**

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ERJD104L: REFLECTIVE JOURNALING - A TECHNIQUE FOR PERSONAL AND ACADEMIC GROWTH

(3 credits-45 hours) (L-T-P: 1-0-2)

Course objective
The objective of Reflective journaling is to inculcate the practice of reflective writing, documenting as well as interpreting of those experiences that were profound or had an impact on our lives.

Course Outcomes:
CO 1: Recall one’s life experiences (Remembering)
CO 2: Explain with clearly and specifically one’s life experiences & Develop the skill of writing (Application)
CO 3: Analyze life experiences at a conscious level and enhance reflective thinking (Analysis)
CO 4: Synthesize one’s thought in an organized manner and create a new piece of writing (Creativity)

Journaling is a strategy for making sense of experiences. The objective of journaling is to develop in students a reflection that can be described as an inner dialogue with oneself whereby a person calls forth his or her own experiences, beliefs, and perceptions about an idea; informing and transforming functions of knowledge; and a conscious and systematic mode of thought. This is to nurture in future educational leaders a sense of reflective practice.

Module I: Introduction to Journaling (10 Hours)

Module II: Journaling as a reflective practice (05 Hours)
Reflective Journals, Types of Reflections, Method of creating Reflective Journals, Reflect and Integrate Formatting a journal article, Personal action plan

Module III: PRACTICUM (60 Hours)
Each student is required to maintain a reflective journal, using the Visible Thinking Routine (Harvard), as a critical structure for guiding their journal writing. The students are to submit the journal every Friday. Journaling has to be done six days of the week. At the end of the semester, the student will be awarded a grade/marks after assessing the learning.

Suggested Readings

Mapping of COs

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<th>Course Outcomes</th>
<th>Module I</th>
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EDPT206L: PSYCHOLOGICAL TESTING

(3 credits-45 hours) (L-T-P: 0-0-3)

Course objective
To help students to gain better understanding of an individual and their behavior.

Course Outcomes
CO 1: Apply the steps and procedures for administering psychological tests correlate it to real life situations (Application)
CO 2: Evaluate the psychological experiments with the help of apparatuses. (Evaluation)
  a. **Psychological Experiment (with apparatus)**
     Any two from the following:
     1. Maze Learning
     2. Bilateral Transfer - Mirror learning
     3. Alexander Pass-Along Test
     4. Reaction Time
  b. **Psychological Laboratory Practical (without apparatus)**
     Any two from the following
     1. Adjustment Inventory by Dr. D.N. Srivastava and Govind Tiwari
     2. Rorschach Ink blot test
     3. Thematic Apperception Test (TAT)
     4. Differential Aptitude Test (DBDA)

**Scheme of Evaluation: (100 Marks)**
Psychological Experiment with apparatus: 15 Marks
Psychological Experiment without apparatus: 15 Marks
Practical book: 10 Marks
Written Examination & Viva Voce: 60 Marks
Total: 100 Marks

Mapping of COs

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**INTERNSHIP/APPRENTICESHIP**

**EDIN105I / EDIN207I: INTERNSHIP (Exit of 1st Year or 2nd Year)**
(4 Credits: 120 Hours)

**EDIN309I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)**
(2 Credits - 60 Hours)

The school internship is to acquaint the students with the total environment and functioning of the school. Students will get the opportunity to observe the administrative and managerial activities. They will develop the skills of organized participating in morning assembly, co-curricular activities, extracurricular activities and plan for teaching work in the classroom. It will help them understand the behaviour of teachers, students, principal, headmaster and other supporting staff. The school internship will prepare them for the real professional field as well as gain insight into their aptitude for teaching. Towards the end of the course, students will have to compile their entire activities in the form of a report and appear for viva voce. The rubric and distribution of marks for evaluation will be decided and prepared at the level of the department.

**Activities to be performed:**

1. Organization/ observation of morning assembly.
2. Classes to be taught during the day by preparing lesson plans.
3. Unplanned classes to be taken during the day if some teachers are on leave.
4. Observing the class of an effective/ good teacher.
5. Participating/ organizing co-curricular activities.
6. Participating/ organizing extracurricular activities.
7. Any other specific events of the day.
# RESEARCH PROJECT / DISSERTATION

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<th>Semester</th>
<th>Category</th>
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<th>Credits</th>
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## BA EDUCATION (Honours)

**EDDI407P: RESEARCH PROJECT PHASE I**  
(6 credits – 180 hours) (L-T-P: 0-0-12)

**EDDI408P: RESEARCH PROJECT PHASE II**  
(6 credits – 180 hours) (L-T-P: 0-0-12)

## BA EDUCATION (Honours) with Research

**EDDI409P: DISSERTATION I**  
(18 Credits -540 Hours) (L-T-P: 0-0-36)

**EDDI410P: DISSERTATION II**  
(20 Credits -600 Hours) (L-T-P: 0-0-40)

The activities under the Research Project/Dissertation will enable the students to develop the skill to write a review of the literature and prepare the research proposal. It will also help the students in applying the skill in the collection of data in the field and develop the ability to analyze the data and ability to write the report in standard academic formats.

Every student shall undertake a research project under the supervision and guidance of a faculty member. The students are expected to complete the literature review and present a research proposal and theoretical framework of the research work selected during the first phase. The dates, mode and components of the evaluation and the weightages attached to them shall be published by the department at the beginning of the semester. The students of the final semester will have to compile their research study in the form of a dissertation. Each dissertation has to be systematically structured following the proper methodology of educational research. To set the dissertations in a standardized pattern the supervisor should ensure that it follows the proper sequence containing the following main aspects:

A. Preliminary section  
B. Main body  
C. Reference section

The supervisor will help students to understand the detailed steps of writing a dissertation. He/ she will ensure that the dissertation is prepared keeping in view of Intellectual Property Rights, maintenance of research ethics and avoidance of plagiarism. Phase I of the course is carried out in the 7th semester where the students will work on research proposal, literature review, theoretical framework and the first part of the data collection. In the 8th semester they will complete data collection, analysis, and preparation of a research report (Phase II). Students are required to make a presentation of the dissertation submitted to the department on the date set in the academic calendar for the same.
PROGRAMME: BACHELOR OF ARTS in ENGLISH (BA)

DEGREE: BA ENGLISH (HONOURS)/ BA ENGLISH (HONOURS) WITH RESEARCH

VISION
To be a centre of excellence in learning, teaching and research in the areas of language and literature by imparting personalized education, inculcating human values and thereby contributing to nation building.

MISSION
- To develop critical thinking, creative writing and interpretive ability
- To foster professionalism to face the competitive world by developing language and communicative skills and by maintaining creative literary activity
- To generate sensitivity to culture and ethical issues
- To develop human potential to its fullest by mentoring and upholding human and spiritual values
- To prepare individual to become responsible citizens of tomorrow

PROGRAMME OUTCOMES (POs)
PO 1: **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organisational and personal) from different perspectives.

PO 2: **Effective communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language and make meaning of the world by connecting people, ideas, books, media and technology.

PO 3: **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in a group setting.

PO 4: **Effective Citizenship**: Demonstrate empathetic social concerns and equity centre, national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 5: **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your actions and accept responsibility for them.

PO 6: **Environment and Sustainability**: Understand the issues of environmental context and sustainable development.

PO 7: **Self-directed and life-long learning**: Acquire the ability to engage in independent and life lessons to find proper channels for utilizing their potential in terms of their future academic work, and also to further their aspirations in their respective careers.

PROGRAMME SPECIFIC OUTCOMES (PSOs)
PSO 1: To inform the students with different schools of thought, writers of English literature across different ages and continents, their theories, perspectives, models and methods.

PSO 2: To be able to demonstrate competence in analyzing scholarly work in the areas of English language teaching, literary and cultural research, translation studies etc.

PSO 3: To create an understanding of literary texts applying interdisciplinary approaches such as psychoanalysis, popular culture, indigenous knowledge studies, digital humanities, environmentalism etc.

BA ENGLISH (HONOURS)/ BA ENGLISH (RESEARCH) list of courses

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<th>European Classical Literature</th>
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Mapping of POs and PSOs: 
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- PO5: Major 5 
- PO6: Major 6 
- PSO1: Major 7 
- PSO2: Major 8 
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## Detailed Syllabus

### Major Courses

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**EGIG100T: Introduction to Literary Genres**

(4 Credit-60 hours (L-T-P: 3-1-0))

**Objective(s)**

The course intends to acquaint the students with an overview of different literary genres from the classical to the modern and postmodern era. This course will also help the students to identify and categorise different genres of English literature.

**Course/Learning Outcomes**

At the end of the course students will be able to:

- **CO 1:** Define various genres of literature. (Remembering)
- **CO 2:** Explain the significance and importance of different genres of literature. (Understanding)
- **CO 3:** Apply the significance of the different genres in understanding literary texts. (Application)

**Module I: Introduction to Literary Genres (20 Hours)**


**Module II: Genres and Subgenres in Literature (40 Hours)**

Poetry: Narrative, Dramatic, Lyric, Verse & Epic.

Novel and Drama: Tragedy, Comedy, Romance, Satire, Tragi-comedy, Rom-comedy, Pastoral, Historical, Mystery & Crime, Horror, Science Fiction.

Non Fiction: Biography, Autobiography, Essay, Travel Writing, Memoir

**Suggested Readings:**

EGIL101T: INTRODUCTION TO ENGLISH LITERATURE
(4 Credits- 60 hours) (L-T-P: 3-1-0)

Objective(s)
The course intends to acquaint the students with the historical overview of English literature from the beginning to contemporary periods. The texts under study will lend a better understanding of the socio-cultural changes in respective periods through the lens of the writers.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the various genres and understand the historical development of English literature from the beginning to contemporary period. (Remembering)
CO 2: Estimate the characteristic features of English literature pertaining to its form and content across various periods (Evaluate)
CO 3: Discuss the representative style and themes of various writers as evident in their works to develop a better understanding of socio-political history of England (Creating)

Module I: Medieval, Renaissance and Elizabethan Period (20 Hours)
Prose: The 'New Learning' of the Renaissance, Francis Bacon
Drama: Mystery, Morality and Miracle Plays, Marlowe, Shakespeare, and the Jacobean playwrights

Module II: The Restoration Age and Augustan Age (10 Hours)
Poetry: John Milton- Paradise Lost, James Thompson: The Seasons
Prose: the periodical essay: Addison and Steele, Defoe and the rise of the Novel – Richardson, Fielding, Smollet and Sterne
Drama: Restoration Drama: tragedy and comedy

Module III: The Romantic and Victorian Age (20 Hours)
Poetry: The shift from sensibility to romanticism in Gray (1716-71), Cowper (1731-1800), Blake (1757- 1827) and Burns (1759-96), William Wordsworth, Samuel Taylor Coleridge, Percy Bysshe Shelley, John Keats, Tennyson, the Brownings, Arnold, D.G. Rossetti and Christina Rossetti, G. M. Hopkins
Prose: The Novel of Manners; Gothic fiction; the Historical Novel, Victorian fiction with reference to the works of Charles Dickens, the Bronte Sisters, George Eliot and Thomas Hardy, Matthew Arnold and John Ruskin

Module IV: The Age of Modernism and Postmodernism (10 Hours)
Drama: The New Theatre: John Osborne, Christopher Fry, Samuel Beckett, John Arden, Arnold Wesker

Suggested Readings:
**EGBR200T: BRITISH LITERATURE: 14\textsuperscript{th} -17\textsuperscript{th} C**

(4 Credits-60 hours) (L-T-P: 3-1-0)

**Objective(s)**

The course intends to acquaint the students with the beginning periods of English Literature and recognise the shifts in the later periods. While looking at various historical and socio-cultural events of the times through the lens of the representative writers, the students will be able to comprehend the shifts in the contexts and prospects of the narratives.

**Course/Learning Outcomes**

At the end of this course students will be able to:

CO 1: Define and identify the role of various genres, themes and styles pertaining to the prescribed periods of English literature. (Remembering)

CO 2: Apply the understanding of historical events, socio-political and literary shifts of the age in the reading of the texts. (Applying)

CO 3: Design an innovative and critical understanding of the texts based on its social and cultural set up. (Creating)

**Module 1: Selected Poetry (30 Hours)**

a. Geoffrey Chaucer: “The Wife of Bath,” “Prologue” from Canterbury Tales

b. Edmund Spenser: Selections from Amoretti: Sonnet 57 ’Sweet warrior...’ Sonnet 75 ‘One day I wrote her name...’


**Module 2: Selected Drama (30 Hours)**

a. Christopher Marlowe: Doctor Faustus

b. William Shakespeare: Twelfth Night

**Suggested Readings**


**Mapping of COs to Modules**

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**EGBL201T: BRITISH LITERATURE: 17\textsuperscript{th} – 18\textsuperscript{th} C**

(4 Credits-60 hours) (L-T-P: 3-1-0)

**Objective(s)**

This course will familiarize students with the historical and literary contexts of the age. With the help of the representative drama, poetry and fiction of the period, the students will be able to comprehend the thoughts, contexts and literary practices of 17th and 18th century England.

**Course/Learning Outcomes**

At the end of this course students will be able to:

CO 1: Apply the understanding of the historical and literary contexts of the period from 1700 to 1800 in the reading of the texts. (Applying)

CO 2: Illustrate the evolution of the existing and emergence of new literary genres. (Analysing)

CO 3: Develop a critical interpretation of the given literary texts. (Creating)

**Module 1: Selected Drama (15 Hours)**

William Congreve: The Way of the World

**Module 2: Selected Poetry (10 Hours)**

b. Samuel Johnson: “London”

Module 3: Selected Fiction (35 Hours)
   a. Jonathan Swift: Gulliver’s Travels (Books III and IV)
   b. Laurence Sterne: The Life and Opinions of Tristram Shandy, Gentleman

Suggested Readings

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EGBT202T: BRITISH LITERATURE: 18th - 19th C
(5 Credits-75 hours) (L-T-P: 4-1-0)

Objective(s)
The paper will acquaint the students with the paradigms of Puritan, Restoration, Neoclassical and Romantic literature. The selected texts will enable the students to understand and trace the changing literary trends of different periods under consideration. It will also focus on the characteristic traits of the age through the prescribed texts.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Illustrate the historical and literary contexts of the eighteenth century and the Romantic age along with the writers. (Understanding)
CO 2: Examine the literary texts as representative of the historical events. (Analysing)
CO 3: Develop an insightful consideration regarding the literary texts and their writing style. (Creating)

Module I: Selected Poetry (35 Hours)
   a. Alexander Pope- “The Rape of the Lock” (Canto 1)
   b. Thomas Gray- “Elegy Written in a Country Churchyard”
   c. Samuel Johnson-“London”
   d. William Blake ‘The Lamb’,
   e. William Wordsworth “Tintern Abbey”
   f. Percy Bysshe Shelley “Ode to the West Wind”
   g. John Keats “To Autumn”

Module II: Selected Drama (15 Hours)
William Congreve- The Way of the World

Module III: Selected Fiction (25 Hours)
   a. Jonathan Swift- Gulliver’s Travels (Books III and IV)
   b. Mary Shelley’s Frankenstein

Suggested Readings:

Mapping of COs to Modules
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EGBE203T: BRITISH LITERATURE: 19th to 21st C
(5 Credits - 75 hours) (L-T-P: 4-1-0)

Objective(s):
This course intends to acquaint the students with the introductory concepts and seminal texts of the nineteenth century, twentieth century and twenty-first century. Along with the text the course also aims to introduce some of the innovative concepts like Colonialism, Modernism and Postmodernism and relate the notions with the prescribed texts.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Describe the historical and literary contexts of the nineteenth century, twentieth and twenty-first century (Remembering)
CO 2: Critically analyse the representation of the historical events in the given literary texts. (Analysing)
CO 3: Develop critical interpretation of the texts alongside the given historical periods. (Creating)

Module I: Introduction (10 Hours)
Historical overview of the Victorian Age (Class relations, Crises of faith, Empire, Gender roles), the Twentieth Century (World Wars, ‘the New Woman’ literature) and the Twenty-First Century (Culture and society, Gender and sexuality)
a. Module II: Selected Fiction (30 Hours)
b. Jane Austen – Pride and Prejudice
c. Charles Dickens – Hard Times
d. Joseph Conrad - Heart of Darkness
e. John Fowles The French Lieutenant’s Woman
f. David Mitchell: Cloud Atlas

Module III: Selected Poetry (20 Hours)
a. Alfred Tennyson: “Ulysses”
b. Robert Browning: “My Last Duchess”
c. W.B. Yeats: ‘The Second Coming’
e. Ted Hughes: ‘Hawk Roosting’
f. Seamus Heaney: ‘Digging’
g. Sean O’ Brien: “Water Gardens”

Suggested Readings
5. The Drowned Book.2007

Mapping of COs to Modules:

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EGIW204T: INDIAN WRITING IN ENGLISH
(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to understand various features of Indian Writing in English, acquaint students with the works of significant Indian writers and to help them summarize and critically appreciate literary works.
Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define the literature produced in India in English (Remembering)
CO 2: Explain and comment on the poems and fictional works produced in India in their various socio-cultural context (Understanding)
CO 3: Apply different critical theories involved in the production of the selected indigenous texts (Applying)

Module I: Selected Novels (25 Hours)
a. R. K. Narayan : *Swami and Friends*
b. Anita Desai : *In Custody*

Module II: Selected Poetry (15 Hours)
a. H.L.V. Derozio : “The Orphan Girl”
b. Kamala Das : “Introduction,” “My Grandmother’s House”
c. Nissim Ezekiel: “Enterprise”
d. Robin S. Ngangom : “The Strange Affair of Robin S. Ngangom”

Module III: Selected Short Fiction and Non Fiction (20 Hours)
b. Rohinton Mistry: ‘Swimming Lesson’
c. Shashi Despande: ‘The Intrusion’

Suggested Readings:

Mapping of COs to Modules

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EGEC300T: EUROPEAN CLASSICAL LITERATURE
(5 Credits-75 hours) (L-T-P: 4-1-0)

Objective(s)
In this course, students shall understand the basics of prevailing trends and origins of Western Literature. They shall also learn in detail about the process of genre division and its origins. This will help them to not only enhance their existing knowledge about prototypes of Western literary traditions, but also clarify a wide range of references to these classical texts which are seen in the English texts of the later eras.

Course/Learning Outcomes
At the end of this course students will be able to:
CO1: Define the concepts of epic, tragedy, comedy, satire, catharsis etc. (Remembering)
CO2: Illustrate the significance and importance of Western Classical Literature (Understanding)
CO3: Utilize the contemporary theories in the critical analysis of various literary texts. (Applying)

Module I: Selected Greek texts (30 Hours)
a. Homer- *Iliad*
b. Sophocles- *Oedipus the King*

Module II: Selected Roman texts (45 Hours)
a. Plautus- *Pot of Gold*
b. Ovid- Selections from *Metamorphoses* ‘Bacchus’, (Book III), ‘Pyramus and Thisbe’ (Book IV)
c. Horace- *Satires* I: 4

Suggested Readings:
1. The prescribed texts

### Mapping of COs to Modules

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### EGAL301T: AMERICAN LITERATURE

(5 Credits - 75 hours) (L-T-P: 4-1-0)

**Objective(s)**

The objective of this course is to introduce students to a body of literature by the writers of literature of the USA. This course will introduce major American writers in the genres of poetry and fiction. This course expects the students to develop writing and analytical skills as these skills relate to developing a broad knowledge of American literature and its representative texts in relation to their historical and socio-cultural contexts.

### Course/Learning Outcomes

At the end of this course students will be able to:

- CO 1: Illustrate the pertinent themes pertaining to the American socio-political conditions. (Understanding)
- CO 2: Examine concepts like American Dream, Social Realism and Transcendentalism in relation to the prescribed texts. (Analyze)
- CO 3: Develop a critical understanding of intersectionality of race, class and gender from the readings of the texts prescribed. (Creating)

#### Module I: Selected Texts (40 Hours)

- a. Tennessee Williams: The Glass Menagerie
- b. Toni Morrison: Beloved
- d. William Faulkner: ‘Dry September’

#### Module II: Selected Poems (35 Hours)

- a. Anne Bradstreet: ‘The Prologue’
- b. Walt Whitman: Selections from *Leaves of Grass*: ‘O Captain, My Captain’, ‘Passage to India’ (lines 1–68)

### Suggested Readings


### Mapping of COs to Modules

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EGDL302T: DIASPORA LITERATURE
(4 Credits- 60 hours) (L-T-P: 3-1-0)

Objective(s)
The scope of the course ranges from a thorough understanding of different connotations related to Diaspora and Diaspora literatures from across the world. The course is expected to create the understanding of phenomena such as home, exile, identity, displacement with the help of the prescribed texts.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Describe Diaspora, its concept, history and its literary association (Understanding)
CO 2: Apply the themes of these texts to further explore the conscientiousness of the relationship between the ‘homeland’ and the ‘diaspora’. (Applying)
CO 3: Discover the ‘home’ country from a different prism through the eyes of writers who have lived in a composite culture. (Analysing)

Module I: Background: (15 Hours)
Diaspora: concept, history, definition, colonial connection, Diasporic identity, Home, Cosmopolitanism, Self; Anxieties of Diaspora-sense of trauma, inbetweenness, dislocation, displacement; Idea of Diaspora Literature

Module II: Selected Fiction (30 Hours)
a. V.S.Naipaul (Carribean-British) : Half a Life (2001)
c. Yasmine Gooneratne (Srilankan-Australian) : “How Barry Changed His Image”
d. Jhumpa Lahiri (American- Indian) : “Unaccustomed Earth”

Module III: Selected Poetry (15 Hours)
a. Imtiaz Dharkar (Pak-British) : “At the Lahore Karhai”
b. Hana Safi (Mideast-American) : “Bad Brown Girl”
c. Meena Alexander (Indian American) : “Muse”

Suggested Reading
2. Literature of the Indian Diaspora. London: Routledge
7. Prescribed texts

Mapping of COs to Modules

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EGPC303T: POSTCOLONIAL LITERATURE
(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s)
This course aims to acquaint the students with the concepts in the area of postcolonial studies in the field of literature. Apart from the historical understanding, they shall be able to connect the various literary references and critical ideas in several such texts. Furthermore, this course will also be relevant to real life situations involving activist concerns.

Course/Learning Outcomes
At the end of this course students will be able to:
CO1: Recall the various critical elements in adherence to the Post-colonial literature. (Remembering)
CO2: Illustrate the historical context of Post-colonial literature and the use of racist and colonial undertones in the texts under study. (Understanding)
CO3: Discuss, summarise and critically appreciate the literary and the thematic aspects of the texts under study. (Creating)
Module I: Introduction to Post-colonial Studies (15 Hours)
Historical background of Post-colonial Studies, concept, Decolonization, Globalization, Hybridization, identity, culture, ‘othering’.

Module II: Selected Critical Writings (15 Hours)
a. Orientalism: Edward Said (Selections)
b. Nation and Narration: Homi K. Bhabha
c. ‘Passive Resistance’ and ‘Education’: Mahatma Gandhi

Module III: Selected Novels (15 Hours)
a. The Shadow Lines: Amitav Ghosh
b. By the Sea: Abdulrazak Gurnah

Module IV: Selected Drama and Poetry (15 Hours)
a. A Dance of the Forests: Wole Soyinka
b. “Vultures”: Chinua Achebe
c. “Phenomenal Woman”: Maya Angelou
d. “Names”: Derek Walcott

Suggested Readings:
1. The prescribed texts

Mapping of COs to Modules

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EGLC304T: LITERARY CRITICISM
(4 Credits-60 lectures) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to introduce and orient students in the major developments in literary criticisms beginning with Plato through to Philip Sidney, the Romantics like William Wordsworth, Victorians like Mathew Arnold, Modernists Virginia Woolf and Twentieth Century critics like T.S.Eliot, I.A. Richards and Maggge Humm so as to facilitate them in using their corresponding critical concepts in interpretation of literature.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define key critical terms and concepts. (Remembering)
CO 2: Distinguish between the various ideas of western literary criticism from the time of Aristotle to the Modern Period. (Understanding)
CO 3: Discuss and summarize the key concepts of the various critical texts. (Creating)

Module I: Plato to Sidney (20 Hours)
b. Horace: Ars Poetica
c. Philip Sidney: “An Apology for Poetry” : Four abuses and their defense

Module II: Romantic to Modern Period (20 Hours)
a. William Wordsworth: “Preface to the Lyrical Ballads (1802)”
c. Virginia Woolf: “Modern Fiction”

Module III: Twentieth Century (20 Hours)
Suggested Readings

5. Prescribed texts

Mapping of COs to Modules

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EGWW305T: WOMEN’S WRITINGS

(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s)

The course aims at helping students to learn about the formal features of women’s writing, including the ways women adopt, adapt, and challenge broader literary traditions. The course explores the conditions under which women wrote and published. It provides opportunities to explore key issues and debates in contemporary scholarship on women’s writing.

Course/Learning Outcomes

At the end of this course students will be able to:

CO 1: Illustrate the various thoughts and theories pertaining to feminist writings and feminism. (Understanding)
CO 2: Analyse the various movements related to gender and the progress in gender and literature. (Analysing)
CO 3: Discuss and summarize the meanings, ideas and thoughts regarding gender and its connection with literature. (Creating)

Module I: Selected Poetry (15 Hours)

a. Emily Dickinson ‘I cannot live with you’, ‘I’m wife; I’ve finished that’
b. Sylvia Plath ‘Daddy’, ‘Lady Lazarus’
c. Eunice De Souza ‘Advice to Women’, ‘Bequest’

Module II: Selected Fiction and Short Fiction (30 Hours)

a. Alice Walker: The Color Purple
c. Katherine Mansfield: “Bliss”
d. Chitra Banerjee Divakaruni: “Palace of Illusions”

Module III: Selected Non-fiction (15 Hours)

c. Helene Cixous “Laugh of Medusa”

Suggested Readings


Mapping of COs to Modules

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EGMP306P: COMMUNITY BASED MINOR PROJECT
(4 Credits-60 hours) (L-T-P: 0-1-3)

Objective(s)
The objective of this course is to develop skills in students to probe into the complex relations between man, society, nature and world for their critical understanding and also to extend classroom learning to the society.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Infer the relation between man, society, nature and world in a particular community/ies (understanding)
CO 2: Analyze the relation between man, society, nature and world in a particular community (Analyzing)
CO 3: Apply the methodology of module 2 in the analysis and report writing (Applying).

Module I: Theory: Background, Ethics, Thrust Area and Methodology (15 Hours)
Background: Meaning, definition and its academic significance
Ethics: Concept of Ethics, being formal, greetings, take consent of respondent, formal introduction, respect respondent’s faith, community, belief, avoid abuses, be impartial, authentic and empirical, be objective
Thrust Areas: Indigenous Communities of Northeast India

Each student has to pick up any TWO of the following areas for project work in a community:
Creation myth: Origin of human being, Gods/Goddesses, Monsters, Demons etc. and how they manifest to each other
Family: concept, matrilineal or patrilineal, role of members of a family-father, mother, son, daughter, uncle, grandmother, grandfather and their maternal counterparts
Marriage: concept, arranged or elopement, marriage process, marriage rituals, roles of families (groom and bride sites, relatives, community)
Village: concept, structure of the village, caste, clans, occupations, inter village relationship, justice system
Festivals: concept, types, time, duration, purpose
Art: music literature, song, drama, musical instruments, paintings, performing art
Philosophy: idea of life, idea of sin, rebirth, salvation, relation between man and plants, man and animals, man and non-living things
Food: community food, kitchen, cooking method, food taking, food preservation
Language: name, vocabularies, idioms, phrases, adages
Folklore: myths, oral literature, folktales, folk theater etc.
Ecology: Relation between human being and nature; how nature manifests to the former

Methodology: The following can be adopted
- Interaction: note respondent’s name and narration in short
- Questionnaire: printed document in which the respondents can answer/tick
- Literature review: folklore, poems, rituals, myth: reading and exploration
- Site visits: forts, religious places etc – their interpretation
- Photographs for documentation
- Report formatting: MLA VIII/IX

Module II: Practical (45 Hours)
Field Work: 20 hrs
Report: 25 hrs

Report Components: templates will be provided
1. Title page with its components: title, logo, name and ID of the students etc
2. Certificate from the teacher supervisor
3. Declaration of originality by the student
4. Field Visit Journal
5. Content page
6. Report:
   a. Introduction
   b. Analysis
   c. Finding
d. Conclusion

e. Reference

7. Length : 40 pages

8. Binding : Spiral

Font/Style:
1. Name : Times New Roman
2. Font Size: 12
3. Line spacing : double
4. Paper size: A4
5. Indenting: Left only
6. Reference method; MLA VIII/IX

Assessment: It is MANDATORY that students get pass marks in all the following parameters.

1. Field Visit Journal Template:

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<tr>
<th>Sl</th>
<th>Date</th>
<th>Duration (to complete 20 hours)</th>
<th>Place/Community</th>
<th>Action</th>
<th>Sign of contact person</th>
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<td>2.</td>
<td>Report : Hard Copy</td>
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<td>3.</td>
<td>Presentation : PPT</td>
<td>30 marks</td>
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</table>

Total : 100 marks

Suggested Reading:
3. “How To Write Project Reports in Microsoft Word and LaTeX.” University of York, 2002-2022, Version 6, https://www-users.york.ac.uk/

Mapping of COs to Modules

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EGLT400T: LITERARY THEORY

(5 Credits- 75 hours) (L-T-P: 4-1-0)

Objective(s)

This course shall be instrumental in building the foundation of the students for the current line of critical thought in today’s world. Students shall have a comprehensive idea of the connections of various philosophies in literary thought, through a postmodern lens. These theories shall also open up the world of interdisciplinary research for them.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Define these modern theories. (Remembering)

CO 2: Explain genesis and growth of the modern critical theories in the context of literary texts. (Understanding)

CO 3: Assess the texts in terms of their political, social, psychoanalytical, feminist and economic implications. (Evaluating)

Module I: Marxism (15 Hours)
- Antonio Gramsci: “Hegemony (Civil Society) and Separation of Powers”
- Louis Althusser: “Ideology and Ideological State Apparatuses”

Module II: Feminism (20 Hours)
- Elaine Showalter: “Twenty Years on: A Literature of Their Own Revisited”
- Luce Irigaray: “When the Goods Get Together” (from This Sex Which is Not One)

Module III: Structuralism and Poststructuralism (20 Hours)
- Roland Barthes: “Myth Today”
- Michel Foucault: “Truth and Power”

Module IV: Postcolonial Studies (20 Hours)
- Edward Said: “Introduction” (from Orientalism)
- Aijaz Ahmad: “Indian Literature: Notes towards the Definition of a Category”

Suggested Reading
2. Peter Barry, Beginning Theory (Manchester: Manchester University Press, 2002).
7. Prescribed texts.

Mapping of COs to Modules

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EGLL401T: LANGUAGE AND LINGUISTICS
(5 Credits-75 hours) (L-T-P: 4-1-0)

Objective(s)
The objective of this course is to introduce students to the background of language, exercise them on its theoretical foundation, phonology and morphology and syntax and semantics.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Define the historical development of languages, language varieties and language change. (Remembering)

CO 2: Explain the theoretical foundations of language. (Understanding)

CO 3: Determine the morpho-phonemic properties of human speech sounds. (Applying)

CO 4: Assess the word relations pertaining to different languages. (Evaluating)

Module I: Background of Language (18 Hours)
Language and communication; language varieties: standard and non-standard language; language change.

Module II: Theoretical Foundations (18 Hours)
Swiss Structuralism, American Structuralism- Its course and development.

Module III: Phonology and Morphology (19 Hours)
Basic concepts: phoneme, allophone, morpheme, allophone, inflectional and derivational morphology, compounding and word formation patterns.

Module IV: Syntax and semantics (20 Hours)
Categories and constituents of phrase structure, IC Analysis; Word relations: synonyms, antonyms, homonyms, metonymy; Interpretations of meanings: denotation, connotation, entailment and presupposition; Maxims of conversation and Speech acts.

**Suggested Readings:**

**Mapping of COs to Modules**

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**EGIC402T: INDIAN CLASSICAL LITERATURE**

*(5 Credits-75 hours) (L-T-P: 4-1-0)*

**Objective(s)**
The objective of this course is to orient students through some selected classical Indian literature, translated into English, to appreciate their aesthetic beauty, their social and cultural interpenetrations and their relevance today.

**Course/Learning Outcomes**
At the end of this course students will be able to
CO 1: Summarize the plot of the prescribed texts. (Understanding)
CO 2: Analyze the recurrent themes adopted by classical Indian writers. (Analyzing)
CO 3: Evaluate the role of characters, plots and themes as portrayed in the prescribed texts. (Evaluate)
CO 4: Formulate a critical understanding based on the reading of the prescribed texts. (Creating)

**Module I: Selected text of Kalidasa and Vyasa (40 Hours)**
b. Vyasa.: ‘The Dicing’
   ‘The Sequel to Dicing’
   ‘The Book of the Assembly Hall’
   ‘The Temptation of Karna’
   ‘The Book of Effort’

**Module II: Selected text of Sudraka and Ilango Adigal (Hours)**

**Suggested Readings**
EGPL403T: POPULAR LITERATURE
(5 Credits-75 hours) (L-T-P: 4-1-0)

Objective(s)
The course intends to acquaint the students with an overview of popular literature as well as popular culture. The texts under study will lend a better understanding of the themes and issues frequently arising in popular literature. The course will also help the students to examine theoretical frameworks for popular literature and its genres.

Course/Learning Outcomes
At the end of this course students will be able to:
CO 1: Define popular literature and its distinct characters (Remembering)
CO 2: Critically interpret and understand the elements of popular literature (Understanding)
CO 3: Apply various interpretative frameworks to their reading of selected works of popular literature (Application)
CO 4: Analyse the themes and motifs in the works under study (Analysis)

Module I: Selected Fiction (45 Hours)
a. Lewis Carroll: Through the Looking Glass
b. Agatha Christie: The Murder of Roger Ackroyd
c. Shyam Selvadurai: Funny Boy

Module II: Selected Biography (30 Hours)
a. Durgabai Vyamand Subhash Vyam: Bhimayana: Experiences of Untouchability
b. Maya Angelou: I Know Why the Caged Bird Sings

Suggested Readings
1. Chelva Kanaganayakam, ‘Dancing in the Rarefied Air: Reading Contemporary Sri Lankan Literature’ (ARIEL, Jan. 1998) rpt,

Mapping of COs to Modules

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MINOR COURSES

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<td>Basic Language Skills</td>
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<td>Minor Course 2</td>
<td>EGBI103T</td>
<td>Basic Linguistics</td>
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<td>Minor Course 3</td>
<td>EGAW205T</td>
<td>Academic Writing and Composition</td>
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<td>EGEL206T</td>
<td>English Language Teaching</td>
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<td>Minor Course 5</td>
<td>EGTS307T</td>
<td>Translation Studies</td>
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<td>Minor Course 6</td>
<td>EGS3308T</td>
<td>Introduction to Gender Studies</td>
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<td>Minor Course 7</td>
<td>EGCS404T</td>
<td>Introduction to Culture Studies</td>
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<td>Research Methodology: Research Paper and Dissertation</td>
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EGBL102T: BASIC LANGUAGE SKILLS
(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to introduce students to language types and contexts, phonetic features and develop reading, comprehension and writing skills.

Course/Learning Outcome
CO1: Define the types of communication and recognize the fundamentals of speaking and writing skills. (Remembering)
CO2: Classify the segmental, supra-segmental and paralinguistic features of speech (Understanding)
CO3: Evaluate the reading and comprehension skills in the English language. (Evaluation)

Module I: Language: Types and Contexts (15 hours)
Verbal and Non-verbal (Spoken and Written); Personal, Social and Business - Barriers and Strategies; Intra Personal, Inter Personal and Group Communication; Monologue, Dialogue, Group Discussion, Effective Communication/ Miss- Communication, Interview, Public Speech.

Module II: Language: Phonetic Features (15 hours)
Segmental features: Organs of speech, vowels and consonants; Supra segmental features: Stress, Rhythm, Intonation; Paralinguistic features: Clarity, pace and pauses, voice modulation

Module III: Reading and Comprehension (15 hours)
Close reading, comprehension, summary paraphrasing, analysis and interpretation, translation (from Indian language to English and vice-versa), literary/knowledge texts.

Module IV: Writing skills (15 hours)
Grammar for writing, vocabulary building, techniques to improve writing skills, letter writing and its types, academic writing vs. journalism, blog writing, editing and revising.

Suggested Readings

Mapping of COs to Modules

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EGBI103T: BASIC LINGUISTICS
(4 Credits- 60 hours) (L-T-P: 3-1-0)

Objective(s)
The objective of this course is to introduce students to Linguistics, exercise them on phonology and morphology, syntax and semantics and eventually equipped them with the idea of sociolinguistics.
Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Define basic concepts in linguistics and find the interconnection between language and society. (Remembering)
CO 2: Outline the phonological and the morphological structure of languages. (Understanding)
CO 3: Identify and explain the different levels of language organisation. (Applying)

Module I: Introduction to Linguistics (15 Hours)
Definition of language; Characteristics of language; Definition and scope of linguistics; Different branches of linguistics; Linguistics and traditional grammar; langue and parole; competence and performance; synchrony and diachrony; syntagmatic and paradigmatic; sign, signifier and signified

Module II: Phonology, Morphology (15 Hours)
Organs of speech; speech mechanism; vowel sounds and consonant sounds; phonemic transcription; phonemes, morphemes, allomorphs and morphs; syllable and word formation processes; word stress and sentence intonation;

Module III: Syntax & Semantics (15 Hours)
Syntactic structure of English language- IC analysis, transformational grammar; layers of meaning at the semantic level of language- deep structure and surface structure; Different aspects of meanings, lexical relations, synonymy, hyponymy, antonymy, homonymy, polysemy, denotation, connotation, collocation, association, prototypes; entailment, presupposition

Module IV: Sociolinguistics (15 Hours)
Language and Society, Dialect and Idiolect, Standard Language, Register and Style, Bilingualism and Multi-lingualism, Code-Switching and Code-Mixing, Language varieties, dialect, idiolect, register, isoglosses, dialect boundaries, diaglossia, pidgin and creole, speech community, speech event, speech situation, speech acts, Language Shift and Language Death

Suggested Readings

Mapping of COs to Modules

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EGAW205T: ACADEMIC WRITING AND COMPOSITION
(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s)
The course intends to acquaint the students with an overview of the process of doing research. This will introduce the students to the basics of academic writing as well as the steps of doing research. The course will also help the students to develop critical thinking as well as the basic research skills.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Define and identify the role of academic writing and its components. (Remembering)
CO 2: Explain the significance of critical thinking. (Understanding)
CO 3: Critically examine the applicability of the techniques of the writing process. (Analysing)

Module I: Introduction to writing (15 Hours)
The Writing Process: Introduction to Academic writing, Dos and don’ts of academic writing, Conventions of Academic Writing

Module II: General Principles of Summarizing (15 Hours)
Writing in one’s own words: Summarizing and Paraphrasing

Module III: Development of Critical thinking (15 Hours)
Critical Thinking: Synthesis, Analyses, and Evaluation

Module IV: Development of Argument, Citation and reviewing (15 Hours)
Structuring an Argument: Introduction, Interjection, and Conclusion Citing Resources; Editing, Book and Media Review
### Suggested Readings


### Mapping of COs to Modules

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### EGET206T: ENGLISH LANGUAGE TEACHING

(4 Credits-60 hours) (L-T-P: 3-1-0)

**Objective(s)**

The objective of this course is to introduce students to teaching of English language, acquaint them with methods and approaches of the teaching, orient them in grammatical and practical language skills and develop skill in learning language through literature.

**Course/Learning Outcomes**

At the end of this course students will be able to:

- **CO 1:** Define the vast body of Language teaching methodologies (Remembering)
- **CO 2:** Demonstrate the different approaches to teaching of English as a second language (Understanding)
- **CO 3:** Design as well as adapt on the syllabuses of second language teaching and constructing lesson plans for dealing with language learners of different linguistic backgrounds (Creating)

**Module I: Introduction to English Language Teaching (10 Hours)**

Introduction, Fundamental concepts of Language Teaching, Historical Perspective of ELT, Language Pedagogy. Elements of the Structure of English Language.

**Module II: Methods and Approaches of Teaching English (20 Hours)**

Theoretical aspects of Language Acquisition and Learning; Language Skills assessment; Psychological approach to language teaching in a bilingual/ multilingual context; Use of Technology in Language Teaching; Educational Technology; Testing and Evaluation.

**Module III: Grammar and Practical Language Skills (20 Hours)**

Parts of Speech; Articles and Prepositions; Degrees of Comparison; Direct and Indirect Speech; Sentence patterns; Letter Writing; Report Writing; Reading Comprehension; Listening and Speaking; English Speech Sounds – Vowels and Consonants, Stress and Intonation patterns; Language Games; Vocabulary Expansion; Telephonic Conversation; Teaching English for Academic and Business Purpose.

**Module IV: Language through Literature (10 Hours)**

Role of Literature in Language Learning; Teaching of Literature; Use of Language Model.

### Suggested Readings


### Mapping of COs to Modules

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### EGT5307T: TRANSLATION STUDIES

(4 Credits-60 hours) (L-T-P: 3-1-0)

**Objective(s)**

The objective of this course is to introduce students to translation studies, general concepts and terms used in translation studies, types/modes of translation and process of translation. At the same time, the course also attempts to give some
practical exercises in translation.

Course/Learning Outcomes
At the end of this course students will be able to:

CO 1: Understand the significance and importance of translation in a multilingual and multicultural society like India (Understanding)

CO 2: Examine critically the basic concepts and terms used in translation studies vis-à-vis their use in the practice of translation (Analyzing)

CO 3: Create and offer a critique of works in translation (Creating)

Module I: Introduction to Translation (10 Hours)
Introducing Translation: a brief history and significance of translation in a multilingual and multicultural society like India.

Module II: Basic Concepts and Terms used in Translation Studies (10 Hours)
Introducing basic concepts and terms used in Translation Studies through relevant tasks, for example: Equivalence, Language Variety, Dialect, Idiolect, Register, Style, Mode, Codemixing/ Switching, SL, TL, ST.

Module III: Types/ modes in Translation (10 Hours)
Semantic/Literal translation Free/sense/literary translation Functional/communicative translation Technical / Official Trans-creation Audio-visual translation

Module IV: The Process of Translation (30 Hours)
Defining the process of translation (analysis, transference, restructuring) through critical examination of standard translated literary/non literary texts and critiquing subtitles of English and Hindi films.

Practice: Translation in Mass Communication/Advertising, subtitling, dubbing. Exercises to comprehend ‘Equivalence in translation’: Structures (equivalence between the source language and target language at the lexical (word) and syntactical (sentence) levels. This will be done through tasks of retranslation and recreation, and making comparative study of cultures and languages.

Practice: Tasks of Translation in Business: Advertising Discussions on issues of ‘Translation and Gender’ by attempting translation for media, films and advertisements from different languages.

Developing skills for Interpreting: understanding its dynamics and challenges. Interpreting: Simultaneous and Consecutive (practical application)

Suggested Readings


Mapping of COs to Modules

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EGGS308T: INTRODUCTION TO GENDER STUDIES
(4 Credits-60 hours) (L-T-P: 3-1-0)

Objective(s):
The course intends to acquaint the students with an overview of gender equality concerns. This course will also help the students to develop an understanding of gender as it intersects with sexuality, race, ethnicity, religion, class and other critical variables.
Course/Learning Outcomes
At the end of this course students will be able to:

CO1: Explain basic concepts relating to gender and provide logical understanding of gender roles. (Understanding)

CO2: Analyse various perspectives of the body and discourse on power relationships. (Analysing)

CO3: Assess the cultural construction of masculinity and femininity and its various consequences. (Evaluating)

Module I: Introduction. (15 Hours)
Sex and Gender, Types of Gender, Gender Roles and Gender Division of Labor, Gender Socialization and Gender Stereotyping, Gender Stratification and Gender Discrimination.

Module II: Gender Perspective of Body. (15 Hours)
Biological, Phenomenological and Socio-Cultural Perspectives of Body, Body as a Site and Articulation of Power Relations, Cultural Meaning of Female Body and Women's Lived Experiences, Gender and Sexual Culture

Module III: Social Construction of Femininity. (15 Hours)
Bio-Social Perspective of Gender, Gender as Attributional Fact, Essentialism in the Construction of Femininity, Challenging Cultural Notions of Femininity, Images of Women in Sports, Arts, Entertainment and Fashion Industry

Module IV: Social Construction of Masculinity. (15 Hours)
Definition and Understanding of Masculinities, Sociology of Masculinity, Social Organization of Masculinity, Politics of Masculinity, Power and Hegemony

Suggested Reading:

Mapping of COs to Modules

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EGCS404T: INTRODUCTION TO CULTURAL STUDIES
(3 Credits- 45 hours) (L-T-P: 2-1-0)

Objective(s)
*To introduce students with the basic concepts of cultural studies, make them aware of some of the most important thinkers and methodologies in the field and help them analyse texts from many different critical perspectives.*

Course/Learning Outcomes

CO 1: Outline culture, cultural identities and politics of production across various human historical conditions. (Understand)

CO 2: Identify the constructed categories of identity, authority and knowledge. (Apply)

CO 3: Examine culture as an asymmetrical entanglement of material and abstract attributes to draw on political theory, psychology and critical theory. (Analyse)

Module I: Introduction and background (20 Hours)

Birth of Cultural Studies-Raymond Williams and Richard Hoggert (Origin, Evolution and Early trends); Birmingham Centre for Contemporary Studies and Stuart Hall

Construction of culture (Socio-political, Religious, Technological)

Representation of culture (Language, Gender, Race, Class, Ethnicity and Kinship);

High and Low culture; Folk Culture; Popular Culture; Mall culture; Media Culture; Consumer Culture; Global Culture

Media and Culture

Culture and Cultural Identities

Module II: Literary Theories and Cultural Studies (15 Hours)

Structuralism; Post Structuralism and Deconstruction; Marxism; Postmodernism; Feminisms and Post-feminisms; Queer Theory; Techno culture; Post humanism
Module III: Understanding culture through literature (10 Hours)
Bell Hooks 'Understanding Patriarchy'
George Orwell 'Shooting an Elephant'

Suggested Readings

Mapping of Cos to Modules

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EGRM405T: RESEARCH METHODOLOGY: RESEARCH PAPER AND DISSERTATION
(2 Credits- 30 hours) (L-T-P: 1-1-0)

Objective(s)
This course aims to equip the student with theoretical and practical knowledge, so that they are introduced into the field of research in English Literature. Not only does this course give the students practical experience of working in a dissertation, it also shows alternative ways of approaching and phrasing their arguments. Finally, it seeks to keep them up to date with the contemporary trends and styles in the same.

Course/Learning Outcomes
CO1: Describe academic writing, research paper/dissertation and its methodology (Understanding)
CO2: Formulate a research argument and develop a research paper/dissertation. (Creating)

Module I: Methodology (15 Hours)
- Introduction to academic/ research writing
- Avoiding Plagiarism in research, Plagiarism checking tools (Ouriginal, Turnitin)
- Selection of a research topic
- Developing an outline of the research
- Choosing an appropriate title for the research
- Writing an abstract
- Review of Literature
- Developing an argument
- Bringing a critical interpretation into writing
- Drawing inferences/ framing a conclusion
- MLA Handbook 8th/9th Edition
- Referencing and Citation, citation tools (Mendeley, Zotero)
- Bibliography
- Research Ethics

Module II: Practical- Writing and editing a Research Work (15 Hours)
- Draft of the abstract
- Draft of all components of Introduction
- First draft of the research work
- Tentative bibliography, annotated bibliography

Suggested Reading

Mapping of COs to Modules:

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EGLA406T: LANGUAGE, LITERATURE AND CULTURE
(3 Credits-45 hours) (L-T-P: 2-1-0)

Objective(s)
The course shall develop the language skills of students by introducing them to the structures of language through a wide variety of literary works. This course will also introduce the students to the general characteristics of the literature of different ages in India. Finally this course will help the students to develop an understanding of culture and its relation with literature.

Course/Learning Outcomes
At the end of this course students will be able to:
CO1: Understand the intrinsic relationship between languages, literature and culture (Understanding)
CO2: Illustrate the structure and function of language and its literary and cultural significance (Application)
CO3: Analyze the recurrent themes and forms of Indian literature through the ages (Analyzing)

Module 1: Language (15 Hours)
Language and Communication: The Definition of Language, the Characteristics of Human language
Why Does Language Matter?
Language and Society: Language and Class, Language and Gender; Language and Ethnicity; Language and Identity
Language Variation: Dialect; Idiolect; Slang ;Pigdin; Creole; Jargon; Standard and Non-Standard Language; Bilingualism, Multilingualism; Code-mixing; Code-switching

Module 2: Indian Literature Through the Ages (20 Hours)
This section of the course will involve a study of significant themes and forms of Indian literature through the ages, with the help of prescribed texts.
Prescribed text: Indian Literature: An Introduction (Delhi: University of Delhi, 2005).
Different Phases of Indian literatures: Ancient, Medieval, and Modern
Chapter 1: Veda Vyasa, The Mahabharata: “The Ekalavya Episode”
Chapter 2: Asadullah Khan Ghalib: “Desires Come by the Thousands”
Chapter 3: Rabindranath Tagore: ‘The Cabuliwallah”
Chapter 4: Ismat Chugtai: “Touch-Me-Not”
Chapter 5: Indira Goswami: “The Journey”
Chapter 6: Shrikant Mahapatra: “Folk Songs”

Module 3: Culture and Society in Contemporary India (10 Hours)
The Idea of culture, Definition of culture, High culture, Popular culture, Culture and media, Indian Society and culture

Suggested Readings

Mapping of COs to Modules

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## SKILL ENHANCEMENT COURSES

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<td>Creative Writing</td>
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<td>Soft Skills</td>
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<td>Editing and Proofreading</td>
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**EGCW104L: CREATIVE WRITING**
(3 Credits-45 hours) (L-T-P: 2-1-0)

**Objective(s)**

To help students understand different types of creative writings, instill creative writing skills and produce clear and coherent writing skills.

**Course/Learning Outcomes**

At the end of this course students will be able to:

- **CO1**: Define the different creative techniques adopted by different writers in their work. (Remembering)
- **CO2**: Apply different tropes and figures of speech to enhance creativity in literary and non-literary texts. (Applying)
- **CO3**: Elaborate and develop literary and non-literary texts as well as performances by adopting different skills and techniques of creative writing. (Creating)

**Module I: Introduction to Creative Writing (7 Hours)**

Introduction; Objectives of Creative writing; History of Creative Writing as an academic pursuit; Scope and Area of Creative Writing

**Module II: The Art and Craft of Writing (7 Hours)**

Origin of Thought and Birth of an Idea: Inspiration, Imagination and Creativity, Incubation, Implementation and Interpretation; Strategies of a Writer

**Module III: Modes of Creative Writing (11 Hours)**

Mechanics of Writing: Cohesion, Coherence, Style, Context, Register, Content; Aesthetic function of Writing; Rules for good writing; Things that must be avoided by a Writer; Literal and Figurative Use of Language; Active and Passive style of writing; Direct and Indirect Speech Styles; Personal and impersonal styles of writing; Formal and informal use of language

**Module IV: Types of Creative Writing (13 Hours)**

Writing a film / book review; Narrative or discursive essay / article; Poetry writing; Short story writing; Dramatic dialogue writing; Writing for the New Media; Poster writing; Advertisement; Newspaper article and editorial; Blogs; Writing for Radio and Television, Memoirs, Pamphlets, Life Writing.

**Module V: Preparing for Publication (7 Hours)**

Cover Letter Writing, Understanding Editorial Preferences and Submission Guidelines

**Suggested Reading**


**Mapping of CoS to Modules**

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**EGSS105L: SOFT SKILLS**
(3 Credits-45 hours) (L-T-P: 2-1-0)

**Objective(s)**

To help students develop effective communication and presentation skills and to enable them mastering interpersonal, team building and leadership skills.

**Course/Learning Outcomes**
At the end of the course students will be able to:

CO1: Outline the importance of soft-skills in personal and professional life. (Understanding)
CO2: Distinguish the different aspects of soft-skills and the do’s and don’ts of grooming and etiquette. (Analysing)
CO3: Integrate the ideas pertaining to teamwork, leadership and adaptability to help in personality building at the workplace. (Applying)

Module I - Personality and Self: (15 Hours)
Introduction to soft skills; Dimensions and Determinants of personality; Positive self image and negative self image; Building self-esteem and confidence; Defining strengths; Personal values; creative thinking, communication skills-writing skills, speaking skills

Module II - Building a Social Image: (13 Hours)
Self-grooming; Body Language; Eye contact; Emotional Intelligence; Adaptability; Leadership; Teamwork; Problem solving, Time and stress management, Motivation and Persuasion

Module III - Communication and Team Building: (17 Hours)
Presentation Skills; Group Discussion; Small talk; Public speaking; Interview Skills; Preparation of CV; Business etiquettes; Corporate etiquette; Telephone etiquette; Social etiquette; Technical correspondence, Negotiation Skills

Suggested Readings

Mapping of COs to Modules

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EGEP207L: EDITING AND PROOFREADING
(3 Credits-45 hours) (L-T-P: 2-1-0)

Objective(s)
This course will introduce the students with the basic skills related to the Editing and Proofreading industries and will train them with practical knowledge of the different components of these skills.

Course/Learning Outcomes
CO1: Understand different facets of the book-publishing industry and its related skills. (Understanding)
CO2: Analyse the essentials of copy editing and proofreading as skills with scopes of employability. (Analysing)
CO3: Develop practical knowledge of different components of copy editing and proofreading skills. (Creating)

Module I: Editing (15 Hours)
Basic idea of Editing and Copy editing; Copy-editing in the process of publishing; Role, responsibility and position of a copy editor; Fundamentals of copy editing; Ethics of copy editing; Liaison with other professionals; Essentials of a good copy-editor; Prospects of copy editing

Module II: Proof-reading (10 Hours)
Basic idea of proofreading; Proofreading in the process of publishing; Role and responsibility of a proofreader; Fundamentals of proofreading; Ethics of proofreading; Essentials of a good proofreader; Prospects of proofreading

Module III: Practical guidance and Style manuals (20 Hours)
Components of a book in print; Idea of style-manuals followed by publishers; Common copy-editing and proofreading symbols; Dos and Don’ts of grammar and punctuation; Idea of page-layout and software usage; Idea of cover designing, illustration and software usages; Idea of appendix making; Blurb-writing

Suggested Reading

Mapping of COs to Modules

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**INTERNERSHIP**

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EGN106I: EDITORIAL, JOURNALISM, COPYWRITING, REPORT WRITING, COMMUNICATION, PUBLISHING, TEACHING ETC.
(4 Credit- 120 hours)

**Objective(s)**
The objective of this internship is to make students acquainted with broader possible areas for employment after graduation, experience them and acquire skills necessary for them

**Course/Learning Outcomes**
CO 1: Understand possibility and availability of a broader area for professional development in corporate sectors like publication houses, coaching institutes, training centres, NGOs, INGOS, private and public offices etc. after graduation and create link with them (understanding)
CO 2: Develop bases for corporate professional skills through the course of the internship in the broader areas as stipulated above (creating)

**Module 1: Theory (5 Hours)**
- Background: meaning, definition of intern and internship
- Significance of internship for a graduate
- Ethics of internship: learning platform, commitment, honesty, objectivity, accountability, discipline, solidarity, competence, respect, responsibility, communication etc.
- Internship Journal Register and assessment parameters

**Module 2: Practical (55 Hours)**
- The students will be given freedom to choose internship places for the areas specified above. In case they cannot, the Department will forge them the places. There will be a faculty Internship In-charge to facilitate the process.
- After allocation, at their place of internship the students will maintain the Internship Journal Register (as a part of assessment) as per the template.

**INTERNSHIP JOURNAL REGISTER**
Name of the Student:
ID:
Department:
Semester:
Place of Internship:

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At the end of the internship, the place of internship will issue a certificate, as per the template; confidential in a sealed envelope. The Internship In-charge will communicate the internship places for it.

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**Performance Certificate**

Certified that ________________________, from the Department of English, Assam Don Bosco University, has taken internship at this institution in ______________________ from ____________________ to ________________.

His/Her performance during the course of the internship is satisfying/moderately satisfying/highly satisfying.

Seal and Signature

**Assessment:** It is mandatory for the students to get pass marks in all the following:

1. Internship Journal Register: 30
2. Performance Certificate:
   - Satisfying: 5
   - Moderately satisfying: 10
   - Highly satisfying: 15
3. Presentation (to a panel): 40
   - Report (hard copy): 20
   - Presentation (PPT): 10
   - Interaction: 10

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Total: 100

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Mapping of COs to Modules

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EGIN208I: EDITORIAL, JOURNALISM, COPYWRITING, REPORT WRITING, COMMUNICATION, PUBLISHING, TEACHING ETC.

(4 Credit-120 hours)

**Objective(s)**

The objective of this internship is to make students acquainted with broader possible areas for employment after graduation, experience them and acquire skills necessary for them

**Course/Learning Outcomes**

CO1: Understand possibility and availability of a broader area for professional development in corporate sectors like publication houses, coaching institutes, training centres, NGOs, INGOS, private and public offices etc. after graduation and create link with them (understanding)

CO2: Develop bases for corporate professional skills through the course of the internship in the broader areas as stipulated above (creating)

**Module 1: Theory (5 Hours)**

- Background: meaning, definition of intern and internship
- Significance of internship for a graduate
- Ethics of internship: learning platform, commitment, honesty, objectivity, accountability, discipline, solidarity, competence, respect, responsibility, communication etc.
• Internship Journal Register and assessment parameters

Module 2: Practical (55 Hours)
• The students will be given freedom to choose internship places for the areas specified above. In case they cannot, the Department will forge them the places. There will be a faculty Internship In-charge to facilitate the process.
• After allocation, at their place of internship the students will maintain the Internship Journal Register (as a part of assessment) as per the template.

INTERNSHIP JOURNAL REGISTER
Name of the Student: ________________________________
ID: ________________________________
Department: ________________________________
Semester: ________________________________
Place of Internship: ________________________________
Date ________________________________
Day ________________________________
Time in ________________________________
Work Description ________________________________
Time out ________________________________
Sign of employer ________________________________

• At the end of the internship, the place of internship will issue a certificate, as per the template; confidential in a sealed envelope. The Internship In-charge will communicate the internship places for it.

Name of the Institution: ________________________________
Ref: ________________________________
Date: ________________________________
Performance Certificate
Certified that ________________________________, from the Department of English, Assam Don Bosco University, has taken internship at this institution in ________________________________ from ________________________________ to ________________________________.
His/Her performance during the course of the internship is satisfying/moderately satisfying/highly satisfying.
Seal and Signature

Assessment: It is mandatory for the students to get pass marks in all the following:
4. Internship Journal Register: 30
5. Performance Certificate: 30
   Satisfying: 5
   Moderately satisfying: 10
   Highly satisfying: 15
6. Presentation (to a panel): 40
   Report (hard copy): 20
   Presentation (PPT): 10
   Interaction: 10

Total: 100

Mapping of COs to Modules

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EGIN309I: EDITORIAL, JOURNALISM, COPYWRITING, REPORT WRITING, COMMUNICATION, PUBLISHING, TEACHING ETC.
(2 Credit- 60 hours)
Objective(s)
The objective of this internship is to make students acquainted with broader possible areas for employment after graduation, experience them and acquire skills necessary for them

Course/Learning Outcomes
CO1: Understand possibility and availability of a broader area for professional development in corporate sectors like publication houses, coaching institutes, training centres, NGOs, INGOS, private and public offices etc. after graduation and create link with them (understanding)
CO2: Develop bases for corporate professional skills through the course of the internship in the broader areas as stipulated above (creating)

Module 1: Theory (5 Hours)
- Background: meaning, definition of intern and internship
- Significance of internship for a graduate
- Ethics of internship: learning platform, commitment, honesty, objectivity, accountability, discipline, solidarity, competence, respect, responsibility, communication etc.
- Internship Journal Register and assessment parameters

Module 2: Practical (25 Hours)
- The students will be given freedom to choose internship places for the areas specified above. In case they cannot, the Department will forge them the places. There will be a faculty Internship In-charge to facilitate the process.
- After allocation, at their place of internship the students will maintain the Internship Journal Register (as a part of assessment) as per the template.

INTERNSHIP JOURNAL REGISTER
Name of the Student: 
ID: 
Department: 
Semester: 
Place of Internship: 

<table>
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<tr>
<th>Date</th>
<th>Day</th>
<th>Time in</th>
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- At the end of the internship, the place of internship will issue a certificate, as per the template; confidential in a sealed envelope. The Internship In-charge will communicate the internship places for it.

Name of the Institution
Ref: 
Performance Certificate
Certified that _______________________________, from the Department of English, Assam Don Bosco University, has taken internship at this institution in ________________________ from___________________ to ________________.
His/Her performance during the course of the internship is satisfying/moderately satisfying/highly satisfying.

Assessment: It is mandatory for the students to get pass marks in all the following:
7. Internship Journal Register : 30
8. Performance Certificate : 30
   Satisfying : 5
   Moderately satisfying : 10
   Highly satisfying : 15
9. Presentation (to a panel) : 40
   Report (hard copy) : 20
   Presentation (PPT) : 10
Mapping of COs to Modules

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RESEARCH PROJECT / DISSERTATION

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BA ENGLISH (Honours)

ENDI407P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)

In this project (Phase I and II), students will write a research paper. This project aims at orienting and training students under a teacher supervisor in the literary research for exploring knowledge yet not discovered or critique the existing knowledge for innovation. This is also an exercise on developing critical faculty of the young minds in organizing, analyzing, applying, objectifying, elucidating and creating novel ideas through enquiry that adds to the body of knowledge around literary studies. Here students are expected to set and qualify for the following components: 1) clear and researchable topic, 2) undergo a literature review with critical rigor, 3) set aims and objectives, 4) problematize the topic, 5) frame research questions, 6) adopt a functional methodology, 7) analyze texts/area under enquiry and 8) draw an innovative objective conclusion so as to make the paper publishable in referred/indexed journals. However, in this phase as Phase I, the students will complete only the first four components. The student will submit a hardcopy to the supervisors and the same will be assessed for qualification on the strength of the four components.

ENDI408P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)

The project phase II begins with the assumption that the students have qualified themselves in the initial phase of the research, the first four components. Under the supervision of a teacher, the students in this phase are expected to complete the other components of the research paper. This phase thus will combine both the phases and the students will complete the research paper with around 15 pages (approx 7000 words) and submit a hard copy to the supervisors in a prescribed template along with a plagiarism report with not more than 10% similarity index. As a part of its assessment, the paper will be judged on the strength of the components and the students have to pass the same for qualification of the degree BA English (Honours).

BA ENGLISH (Honours) with Research

ENDI409P: DISSERTATION I
(18 Credits - 540 Hours) (L-T-P: 0-0-36)

This course aims at orienting and training students under a teacher supervisor in writing a dissertation for exploring knowledge yet not discovered or critique the existing knowledge for innovation. This is also an exercise on developing critical faculty of the young minds in organizing, analyzing, applying, objectifying, elucidating and creating novel ideas through enquiry that adds to the body of knowledge around literary studies. In this phase of the dissertation, students are expected to set clear and researchable topics, aims and objectives, undergo a literature review with critical rigor, problematize the topic, frame research questions, adopt a functional methodology, work on probable chapterization and assume probable outcomes, or in
short attempt a dissertation proposal to be expanded in the Dissertation Phase II. The student will submit a hardcopy in a prescribed template to the supervisors and the same will be assessed for qualification on the above criteria for developing the critical faculty. There will be no viva-voce/interview in this phase as a part of the assessment.

ENDI410P: DISSERTATION II
(20 Credits -600 Hours) (L-T-P: 0-0-40)

The Dissertation II begins with the assumption that the students have qualified themselves in the initial phase, in terms of the proposal. Under the supervisorship of a teacher, the students in this phase are expected to develop the chapters with clearly set aims and objectives, analysis and come out with clear findings in tune with the aims and objectives set in the proposal in the Phase I. This phase thus will combine both the phases and the students will complete the dissertation with around 30 pages and submit the same in hardcopy in a prescribed template along with a plagiarism report not more than 10% similarity index. As a part of its assessment, the students will have to phase a viva-voce from an expert panel and pass the same for qualification of the degree BA English (Honours) with Research.
DEPARTMENT OF MASS COMMUNICATION

PROGRAMME: BACHELOR OF ARTS in MASS COMMUNICATION (BA)
DEGREE: BA MASS COMMUNICATION (HONOURS)/ BA ENGLISH (HONOURS) WITH RESEARCH

VISION:
To be a centre of excellence in teaching, learning and research committed to mould ethical and socially responsible media professionals and entrepreneurs who can deliver professional content for diverse media platforms.

MISSION:
The Department of Mass Communication seeks to:
1. Achieve excellence in teaching, learning and research.
2. Promote critical thinking and problem-solving skills.
3. Equip learners by combining the theoretical aspects with creative innovation and entrepreneurship practices.
4. Mould ethical and socially responsible media professionals and entrepreneurs.
5. Provide knowledge base and consultancy services to the community in the field of media and communication.

PROGRAM OUTCOMES
PO 1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO 3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO 4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO 6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAMME SPECIFIC OUTCOMES
PSO 1: Knowledge of Communication: An ability to define and identify the various fields of mass communication.
PSO 2: Developing Critical Understanding: An ability to understand the theories and practices of communication that prepares learners for future careers in mass media or for further studies.
PSO 3: Developing Technical Skills: An ability to apply media technology skills as well hone written and spoken communication skills essential for various media platforms.
PSO 4: Enhancing Professional Skills: An ability to analyze and assess responsibilities as professionals in the field of media.
PSO 5: Creating Multimedia Content: An ability to create media programmes for varied media audience needs.

MAPPING OF COURSES TO PO/PSOs

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DEPARTMENT OF MASS COMMUNICATION

DETAILED SYLLABUS

MAJOR COURSES

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MCIM100T: INTRODUCTION TO MEDIA AND COMMUNICATION
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective:
The objective of the course is to learn the key concepts in communication and mass communication in order to evaluate communication in its many forms and investigate its relationship to society and culture.

Course Outcomes:
At the end of this course students will be able to:
CO 1: Define the basic terms related to Communication (Remembering)
CO 2: Classify different types and models of communication (Understanding)
CO 3: Analysis effects of media on society (Evaluating)

Module I: Media and Everyday Life (12 hours)
Television, Print, Radio, Advertisement, Digital media, The internet – discussion around media and everyday life, Discussions around mediated and non-mediated communication.

Module II: Communication and Mass Communication (13 hours)
Forms of communication, Levels of communication, Mass communication and its process, Normative theories of the Press, Gatekeeping theory, Media and the public sphere.

Module III: Four Models of Communication (15 hours)
Aristotle’s Model, SMCR Model, Harold Lasswell’s Model, Shannon and Weaver’s Model, David Berlo’s Model

Module IV: Mass Communication and Effects Paradigm (20 hours)
Direct effects – propaganda and mass society theory, Limited effects – individual difference theory and personal influence theory, Cultural effects – agenda setting; spiral of silence; cultivation analysis, Uses and gratification theory, Critique of the effect’s paradigm and emergence of alternative paradigm, Reception theory.

Suggested Readings
6. Mass Communication Theory, McQuail Dennis, Sage Publications
8. Understanding Media Theory, Kevin Williams, 2017, Bloomsbury Academic India

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MCU101T: INTRODUCTION TO JOURNALISM
(4 Credits – 60 hours) (L-T-P: 2-0-2)

Objective:
The primary objective of this course is to offer a comprehensive exploration into the concepts, principles, and practices of journalism, enabling students to gain a profound understanding of the field.

Course Outcomes:
At the end of this course students will be able to:
CO 1: Define the concepts, meanings and functions of journalism (Remembering)
CO 2: Discuss the meaning and functions of news (Understanding)
CO 3: Use the tools and techniques of journalism for writing and producing news stories (Apply).

Module 1: Understanding Journalism (20 hours)
Meaning and Definition of Journalism, Growth of Journalism, Type of Journalism, Functions of journalism, Difference between print, electronic and online journalism, citizen journalism, media role in democracy, public sphere, journalism ethics.

Module 2: Understanding News (20 hours)
Meaning and definition of news, nature, elements of news, sources of news, process: from the event to the reader, Hard news vs. Soft news, basic components of a news story, Attribution, embargo, verification, balance and fairness, brevity, dateline, credit line, by-line.

Module 3: News Structure and Writing Techniques (20 hours)

Suggested Readings
1. An Introduction to Journalism, Carole Flemming and Emma Hemingway, 2006, Vistaar Publications
7. The Journalistic Hand Book, M.V Srivastava, Sterling Publishers

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MCVC200T: VISUAL COMMUNICATION
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective
The main objective of the paper is to make students understand the various means of communication, both oral and visual. It will also make students knowledge about the filed of editing and designing using various fonts, typography and printing. It will also make student knowledge about the importance of sign and symbols, its uses and importance.

Course/Learning Outcomes:
CO 1: Define and analyse the concepts and theories of visual communication (Remembering)
CO 2: Illustrate the fundamentals of design (Understanding)
CO 3: Apply the knowledge of the elements and principles of design to solve real world design problems (Applying)
CO 4: Analyse the various design requirements for various purposes (Analyse)
CO 5: Evaluate how specific visual arts and design convey meaning (Evaluating)
CO 6: Create and compose artistic ideas and works of art with internal and external meaning (Creating)

Module 1: Introduction to Visual Communication (10 Lectures)
Visual communication - Definition; nature and functions, Characteristics and types of visual communication, Advantages and disadvantages, Techniques of visual communication.

Module 2: Design (10 Lectures)
Graphic design, Digital design, Graphic design Vs. Digital design, Typography - Fonts and typefaces, Computer configuration, Scanner, Printer, Paper size - type and quality, Formats and Resolution, Raster vs. Vector images

Module 3: Fundamentals of Design (15 Lectures)
Gestalt theory, Definition, approaches and centrality of design, Elements of Design – symmetry; rhythm; contrast; balance; mass and scale, Perception, Illusions.

Module 4: Principles of Visual Communication (15 Lectures)
Principles of Visual Communication; Colour psychology and theory, Semiotics, Sign and code, Index and symbol, Dyadic and triadic model of sign, Types of code, Branches of semiotics, Denotation, Connotation and Myth.

Suggested Readings
2. Designing for Print, C. Conover, 2011, John Wiley and Sons
5. Lateral Thinking: Creativity Step by Step, Edward De Bono, Harper and Row Publishers

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MCAD201T: ADVERTISING
(4 Credit-60 Hours) (L-T-P: 4-0-0)

Objective(s):
The objective of the course is to learn the concepts of advertising and its classification and functions and trace the evolution of branding and understand the concept and characteristics of brands.

Course Outcomes
CO 1: Define the basic terms related to advertising. (Remembering)
CO 2: Demonstrate the scope, functioning of advertising (Understanding)
CO 3: Apply the knowledge of Branding & Planning. (Applying)

Module I: Introduction to Advertising (15 Hrs)
Advertising – concept; classification and functions, Media of advertising, Advertising as a key element in the promotional mix of marketing, Evolution of advertising – World and India, Difference between advertising and publicity, Marketing communication and propaganda
Module II: Types of Advertisement (15 Hrs)
Geographical Spread, Target Group, Public awareness advertising, Product advertising, Service advertising, Corporate advertising, Public relations advertising, Financial advertising, Global advertising, Political advertising

Module III: Theoretical Aspects of Advertising (15 Hrs)
Stimulus response theory, Starch model, FLIRT model, AIDA, AIDCA, DAGMAR approach, Aspects of Consumer Behaviour - Analysing Human Behaviour; Market Segmentation

Module IV: Brand Management & Strategic Planning (15 Hrs)
Evolution of branding, Concept of a brand, Characteristics of brands, The Importance of brand planning Understanding brand management, Theories and models in brand management, Brand Prism Model, Perceptual Mapping, Brand Name Spectrum, Brand Positioning, Brand Benefits, Consumer Benefits, Brand Matrix and Media Matrix, Introduction to Strategic Planning and Client Servicing

Suggested Readings:
5. Clifton Rita & John Simmons. Brands and Branding, Profile Books Ltd. UK.

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MCIV202T: INTRODUCTION TO VIDEO PRODUCTION
5 Credits: (75 HOURS) (L-T-P: 3-2-0)

Objective
The objective of this paper is to make the students clear and handy in camera shooting and editing, using various softwares and camera equipments. Students will have more knowledge in writing and sound editing. The students will also be aware of various news broadcasting and genres, news elements and various camera shots too. Besides learning the techniques of television production, students will also learn to be proficient in the use of video editing software. At the end of the course, students will prepare a short television production/news reading/PSA etc, which will be submitted as a requirement for the completion of the course.

Course/Learning Outcomes:
CO 1: Define the meaning and concept of broadcast media (Remembering)
CO 2: Understand the principles and techniques of broadcast media (Understanding)
CO 3: Demonstrate competency in shooting and editing video (Applying)
CO 4: Critique the issues and debates in news broadcasting and production (Analysing)
CO 5: Produce content for broadcast media (Creating)

Module 1: Basics of Visual Images (10 Lectures)
What is an image, electronic image, television image - Digital image, Editing images, What is a visual? (Still to moving) - Visual Culture - Changing images if visual - Characteristics of Television as a medium.

Module 2: Basics of Sound (15 Lectures)
Concepts of sound-scape, sound culture - Types of sound-Sync, Non-Sync, Natural sound, Ambience Sound - Sound recording techniques - Introduction to microphones - Characteristics of Radio as a medium – Introduction to Audio Production.

Module 3: Writing and Editing Radio News (10 Lectures)

Module 4: Writing and Editing Television News (15 Lectures)
Module 5: Broadcast News (10 Lectures)

Suggested Readings:
7. Television Production and Broadcast Journalism, Philip L. Harris, 2011

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TELEVISION PRODUCTION
Credits: 2 (0-0-2)
Description
Students will acquire introductory skills and knowledge about the art of television production. They will learn to comfortably handle digital video cameras as well as apply the techniques of camera movements and camera angles. They will also learn pre-production, production and post-production techniques. Besides learning the techniques of television production, students will also learn to be proficient in the use of a video editing software. At the end of the course, students will prepare a short television production which will be submitted as a requirement for the completion of the course.

Suggested Assignments:
Public Service Advertisement (PSA), Commercial Advertisement, Talk shows, News Bytes, Music Video, Television Interviews, Shortfilms and documentaries.

MCPR203T: PUBLIC RELATIONS & CORPORATE COMMUNICATION
(5 credit: 75 Hours) (L-T-P: 5-0-0)

Objective(s):
The objective of the course is to understand the concept and genesis of public relation, corporate communication and learn the techniques for effective public relations & corporate communication.

Course Outcomes:
CO 1: Trace the evolution of Public relations & Corporate Communication (Remembering)
CO 2: Discuss the concept and tools of Public relations & Corporate Communication (Understanding)
CO 3: Apply the concepts, principles and tools of Public relations & Corporate Communication (Applying)

Module 1: Public Relations-Concepts and practices (20 lectures)
Introduction to Public Relations, Growth and development of PR, Importance, Role and Functions of PR, Principles and Tools of Public relations, Organisation of Public relations: In-house department vs consultancy, PR in govt. and Private Sectors, Govt’s Print, Electronic, Publicity, Film and Related Media Organizations.

Module 2: PR-Publics and campaigns (15 lectures)
Research for PR, Managing promotions and functions, PR Campaign-planning, execution, evaluation, Role of PR in Crisis management, Ethical issues in PR-Apex bodies in PR- IPRA code - PRSI, PSPF and their codes.

Module 3: Corporate Communication (20 lectures)
Definitions, concept and genesis, CC and public affairs, Publics in CC-Financial publics, media, opinion makers, government,
elected representatives, Present state of CC, Organising corporate communication activities, Areas of strategic thinking in corporate communication Ethics and laws in corporate communication Lobbying, Sponsorship, Financial communication, Corporate reputation.

Module 4: Corporate Identity & CSR (20 lectures)
Defining corporate identity, integrating corporate identity into communication process, Making of house styles, Case studies in corporate identity, Definition and role of corporate image corporate brand management, Corporate Social Responsibility - its importance, CSR focus areas and practices: environmental conservation, energy conservation, disaster management, workplace health and safety, consumer rights advocacy, community development.

Suggested Readings
3. Public Relation Techniques, Jefkins Frank, 1994, Heinmann Ltd
4. Public Relations Strategies & Tactics, Wilcox, 2009, Pearson Education

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MCML204T: MEDIA LAWS AND ETHICS
Credits: 4 (2-0-2)

Objectives:
By the end of this course on Media Laws and Ethics, students will be able to understand and apply legal and ethical frameworks that govern media practices, ensuring responsible and ethical decision-making in media-related professions.

Course Outcomes:
CO 1: Discuss media laws and ethics in India and global context (Remembering)
CO 2: List the salient features of the Indian Constitution in relation to the media (Understanding)
CO 3: Demonstrate an understanding of the nature of ethics and morality in journalism (Applying)
CO 4: Critique the ethical issues of the media (Analyzing)

Module 1: Introduction to Indian Constitution (10 Lectures)
Preamble-Salient Features, Fundamental Rights and Duties, Features of Article 19 (1A) and 19 (2), Directive Principles of State Policy, Indian Judiciary and Parliamentary System, Press as fourth estate of democracy.

Module 2: Media Laws (15 Lectures)

Module 3: Digital Laws (10 Lectures)

Module 4: Media and Ethical Principles (15 Lectures)
Module 5: Media Organisations (10 Lectures)
International Bodies: International Press Institute, Role of UNESCO, SAFMA, Press Council, TRAI, BRAI, IBF, CBFC, INS, Editors Guild, IFWI, IJA, NUJ, IUI, NBA, BEA, Trade Union Rights in Media.

Suggested Readings:
5. Indian Journalism: Keeping It Clean, Alok Mehta, 2007, Rupa

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MCDC300T: DEVELOPMENT COMMUNICATION
(5 Credits – 75 hours) (L-T-P: 5-0-0)

Objective:
The objective of the course is to learn the theoretical overview of the concept of the development and how it relates to the empirical experience in developing countries. It would further explore development communication theories and approaches with relation to media forms ranging from traditional to new media.

Course Outcomes:
At the end of this course students will be able to:
CO 1: Explain the concepts and theories of development and social change (Understanding)
CO 2: Identify the linkages between development, media, and communication (Applying)
CO 3: Examine the role of the media in fostering social change (Analyse)
CO 4: Plan media programmes for development interventions (Creating)

Module 1: Development: Concept, Concerns, Paradigms (15 hours)
Concept of development, Measurement of development, Development versus growth, Human development, Models of development - Basic Needs Model; Gandhian Model, Panchayati Raj, Developing countries versus developed countries, UN Millennium Development Goals.

Module 2: Development Communication (20 hours)
Concept and approaches, Paradigms of development - dominant paradigm; dependency paradigm; alternative paradigm, Development communication approaches, Alternative development communication approaches, Development support communication, Area woods triangle, Social and Behaviour Change Communication.

Module 3: Role of Media in Development (20 hours)
Mass Media as a tool for development, Performance record of each medium- print; radio; television; traditional media, Role of development agencies and NGOs, Critical appraisal of development communication programmes and government schemes-SITE; Krishi Darshan; Kheda; Jhabua; MNREGA, ICT and development- e-governance; e-chaupal; national knowledge network; Development support communication in India in the areas of agriculture; health & family welfare, population; women empowerment; poverty; unemployment; literacy; consumer awareness, Right to Information.
Module 4: Practicing Development Communication (20 hours)
Strategies for designing messages for print; community radio; television programmes for rural India, New media technologies for development, Development Journalism, Use of traditional media for development, Critical appraisal of mainstream media’s reportage on rural problems and issues.

Suggested Readings:

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**MCDP301T: DIGITAL PHOTOGRAPHY**
(5 Credits – 75 hours) (L-T-P: 2-1-2)

**Objective:**
The objective of the course is to learn the techniques and concepts of photography and enable the students to use the still image as an important tool of communication.

**Course Outcomes:**
At the end of this course students will be able to:
CO 1: Summarize the origin and development of photography. (Understanding)
CO 2: Identify the vital functions of a digital camera. (Applying)
CO 3: Experiment with lighting and composition techniques. (Applying)
CO 4: Develop a photography portfolio and project. (Creating)

**Module I: History of photography (15 hours)**
Origins and development of photography, early technological advancements, Pioneers of photography, Early and modern cameras, Types of photographic modern photographic cameras

**Module II: Digital cameras and photographic lens (15 hours)**
Elements of photography, Essential components of digital camera, Digital camera sensors, Digital image capture and file formats, Components of camera lens, Types of lenses, Focal length, Angle of view, Depth of field, Lens filters, Lens defects.

**Module III: Photographic Lighting (15 hours)**
Exposure triangle, Exposure meter, Writing with light, Types of lights, Lighting situations, Light accessories, White Balance, Histogram.

**Module IV: Photographic Composition (15 hours)**
Elements of photographic design – lines; shape and form; texture; pattern, arranging visual elements in a frame – foreground; background and middle ground; rule of thirds; space, understanding perspective, Framing and formatting, Balance and sense of scale, Rhythm and repetition.

**Module V: Post-production and Presentation (15 Lectures)**
Overview, Organising photographs, saving digital files, basic image editing, getting one’s work noticed, Pictures on the World Wide Web, personal website, getting connected, stock photography.
Suggested Readings:

MCAV302T: INTRODUCTION TO ANIMATION AND VFX
(4 CREDIT- 60 HOURS) (L-T-P:- 1-1-2)

**Objectives:**
The objectives of the course is to learn how to make animation, design give vfx and prepared a practical project with the help of any editing softwares.

**COURSE / Learning OUTCOMES**
CO 1: Identify the tools and techniques for animation and VFX (Remembering)
CO 2: Understand and apply various techniques of animation and VFX (Understanding)
CO 3: Demonstrate progress in basic animation and VFX skills (Evaluating)
CO 4: Design and develop animation and VFX art-work (Creating)

**Module 1: Introduction to a 2D Animation Software (20 hours)**
Getting started, Exploring the software, Exploring the Drawing and Painting Tools, Manipulating Objects, Creating an Animation, Basics of Action Script, creating a New Document, Understanding Objects, creating a Table, Understanding Links, Understanding Text Formatting Options.

**Module 2: Introduction to a VFX Software (25 hours)**
Getting Started, Adobe After Effects Workflow, creating a basic animation using effects and presets, animating text, working with shape layers, animating layers, working with masks, Puppet tools, Roto brush tool, performing colour correction, Rendering and outputting.
As a part of the final project, students will submit any of the following projects. Students are expected to apply the concept, knowledge and skills gained during the course of the study while undertaking this paper. Each student will have to submit at least one of the following projects to complete the course.

**Project Evaluation Criteria**
- To be notified by the department
- Portfolio Submission and Presentation: To be notified by the department

**Suggested Readings:**
3. Basics Animation 03: Drawing for Animation, Paul Wells, Bloomsbury Publishing India Pvt. Ltd.
4. How to Make Animated Films, Tony White, Focal Press

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584|ADBU|Regulations and Syllabus|2023-24
MCFS303T: FILM STUDIES
(L-T-P: 4-0-0)

Objective:
Upon completion of the Introduction to Film Studies course, students will possess the skills to analyze and assess the artistic components, methodologies, and societal implications of films, fostering a well-rounded comprehension of the medium and its cultural significance.

Course Outcomes:
CO 1: Identify the historical background of moving images (Remembering)
CO 2: Discuss the major film movements (Understanding)
CO 3: Interpret the role of cinema in popular culture (Applying)
CO 4: Critique cinema from around the world (Analyzing)

Module 1: Indian Cinema (15 lectures)
Early Cinema and the studio era, 1950s – Cinema and the nation (Guru Dutt, Raj Kapoor and Mehboob), 1970s – The rise of the angry young man, Indian New Wave, Globalisation and India cinema, regional cinema, Cinema in North East India.

Module 2: Film Language (15 lectures)
Visual language – shot; scene; mise-en-scene; deep focus; continuity editing; montage, Sound and colour – diegetic and non-diegetic sound; off-screen sound; sync sound; use of colour as a stylistic element, Early cinema, Genre and the development of classical Hollywood cinema.

Module 3: Film Form and Style (15 lectures)
German Expressionism and Film Noir, Italian Neorealism, French New Wave, Third Cinema and Non-Fiction Cinema, Film Authorship with a special focus on Satyajit Ray/Akira Kurosawa, Introduction to feminist film theory.

Module 4: Film and Censorship (15 lectures)
Melodrama, Stardom, Film Censorship – Impact and Relevance in today’s era, The Central Board of Film Certification (CBFC), Directorate of Film Festivals, National Film Archives of India, National Film Development Corporation of India (NFDC).

Suggested Readings:
1. A Dialectic Approach to Film Form in Film Form: Essays in Film Theory (Edited and Translated by Jay Leyda), Sergei Eisenstein, 1977, Harvest/Harcourt Brace Jovanovich, Publishers
3. Discourses of Nationalism in Guru Dutt’s Pyaasa, Alison Griffiths, 1996, Deep Focus
12. The Actor as Parallel Text in Bombay Cinema in Quarterly Review of Film & Video Vijay Mishra, Peter Jeffery and Brian Shoesmith

Mapping of COs to Syllabus

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MCMS304T: COMMUNITY MEDIA AND SOCIETY
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Objective
The main objective of this paper is to make students aware about the rural scenario life, problems, challenges and lack of communication. It will make students aware about the various communication theory and apply them for the development. It will also help the students to know the various way of showcasing their talent line blogging, documentary etc.

Course/Learning Outcomes:
CO 1: Define the meaning and concept of community and rurality. (Remembering)
CO 2: Trace the history of community media. (Understanding)
CO 3: Apply communication channels for community society. (Applying)

Module 1: Village and Community in India: An interface (9 Lectures)
Introduction, Characteristics of Villages, Conventional Portrayal of Village society, Agricultural Communities, Non-agricultural communities, Changes and continuity in media aspects.

Module 2: Community Media- A Historical Trajectory (9 Lectures)

Module 3: Orality, Community and Society (9 Lectures)
Significance of Oral communication, Formal official communication vs. informal oral communication, Regular interaction between written and oral, Role of Bollywood, Limitations of written.

Module 4: Community Blogging (9 Lectures)
Blogging and Medium of Communication, Blogging and Digital Activism, Blogging for the Need of Community, Blogging and Rural Community, Blogging for development community.

Suggested Readings

MCMS305T: MEDIA, CULTURE AND SOCIETY
(4 Credits: 60 Hours) (L-T-P: 4-0-0)

Objective(s):
The objective of the course is to learn the concepts of culture and explore the relationship between media, culture & technologies.

Course Outcomes
At the end of this course students will be able to:
CO 1: Define the key terms related to media, culture and society (Remembering)
CO 2: Understand the linkage between media, culture and society (Understanding)
CO 3: Analyse the ways in which media, culture and society influence each other (Analysing)

Module 1: Understanding Culture (15 lectures)
Concept of Culture, Mass Culture, Popular Culture, Folk Culture, Media and Culture, Culture and Mediation, Culture & Power, Hybridization.

Module 2: Critical Theories (15 lectures)

Module 3: Representation (5 lectures)
Media as Texts, Signs and Codes in Media, Discourse Analysis, Representation of nation, class, caste and gender issues in Media, Media Representation, Media & Identity, Media & Environment.

Module 4: Audiences (15 lectures)
Audiences, Audience as market, Media Audience, Uses and Gratification Approach, Reception Studies, Active Audiences, Women as Audiences Sub Cultures; Music and the popular, Fandom.

Module 5: Media and Technologies (10 lectures)
Folk Media as a form of Mass Culture, live performance; Audience in live Performance, Media technologies; Medium is the Message; Technological Determinism; New Media and Cultural Forms.

Suggested Readings:
1. Media Studies: An Essential Introduction Edited by Philip Rayner, Peter Wall and Stephen Kruger, Routledge (Covers Module II, III, IV and V)
8. Traditional Folk Media in India, Parmar S, 1975, Geka Books

Mapping of COs to Syllabus

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MCGM400T: GLOBAL MEDIA AND POLITICS
(L-T-P: 5-1-0)

COURSE OBJECTIVES:
By the end of this course on Global Media and Politics, students will be able to critically analyze and understand the intricate relationship between media and politics on a global scale, exploring the role of media in shaping public opinion, political processes, and international relations.

COURSE OUTCOMES (CO's)
CO 1: Identify the inter-relation between local, global, international and intercultural issues and trends (Remembering)
CO 2: Understand the relationship between media and political actors (Understanding)
CO 3: Demonstrate understanding of the role and the position of media institutions in the wider context of socio-political relations and conflict (Applying)
CO 4: Critically evaluate media-related issues to contemporary debates in global politics (Analysing)
CO 5: Produce critical media content on contemporary socio-political issues (Creating)

Module 1: Media and International Communication (15 Lectures)
The advent of popular media, Radio and International Communication, Media propaganda in the inter-war years - World War I and World War II.

Module 2: Media and Super Power Rivalry (15 Lectures)
Media during the Cold War; Vietnam War; Disintegration of USSR, Radio free Europe; Radio Liberty; Voice of America, Communication debates: NWICO; McBride Commission and UNESCO, Unequal development and Third World concerns: North-South; Rich-Poor.

Module 3: Global Conflict and Global Media (15 Lectures)
Module 4: Media and Cultural Globalization (15 Lectures)
Cultural Imperialism, Cultural politics, Media hegemony and Global cultures, Homogenization, the English language Local/Global, Local/Hybrid.

Module 5: Media and the Global Market (15 Lectures)
Discourses of Globalisation: barrier–free economy; multinationals; technological developments; digital divide, Media conglomerates and monopolies: Ted Turner/Rupert Murdoch, Global and regional integrations: Zee TV as a pan-Indian channel, Bollywood Entertainment: Local adaptations of global programmes KBC, Big Boss; Indian Idol etc.

Suggested Readings:
7. Reporting war: Journalism in wartime, Stuart Allan and Barbie Zelizer, 2004, Routledge Publication

MCMM401T: MEDIA MANAGEMENT AND ENTREPRENEURSHIP
(5 Credits: 75 Hours) (L-T-P: 5-0-0)

Objective(s):
The objective of the course is to learn the fundamentals of Media management and different schools of thought. Explore the concept, origin, and growth of media management as a field and understand the concept of media entrepreneurship.

Course Objectives:
CO 1: Identify the various principles of media management (Remembering)
CO 2: Understand the concept of media management and entrepreneurship (Understanding)
CO 3: Apply the knowledge and principles of media management and entrepreneurship (Applying)

Module 1: Media Management: Concept and Perspective (20 Lectures)
Fundamentals of management, Management School of Thought, Concept, origin and growth of Media Management, Media as an industry and a profession, Media Ownership, Ownership patterns of mass media in India: sole proprietorship, partnership, private limited companies, public limited companies, trusts, co-operatives, religious institutions (societies) and franchisees (chains), Media policies.

Module 2: Media Industry: Issues & Challenges (15 Lectures)
Media industry as manufacturers- Manufacturing Consent, news and content management. Market Forces, performance evaluation (TAM, TRP, BARC and HITS) and Market shifts.

Module 3: Entrepreneurship Development (20 Lectures)
Entrepreneurship – concept; definition, need and significance, Entrepreneurship growth process, Barriers, Entrepreneurship education model, Entrepreneur – characteristics; types and role demand, Entrepreneurial Motivation and challenges, Types of enterprises - based on capital; product; location; ownership pattern and process.

Module 4: Media Entrepreneurship (20 Lectures)
Concept of Media Entrepreneurship, Characteristics of Media Entrepreneurs, Case Studies, Government Initiatives, Schemes for Entrepreneurship, Media Entrepreneurial Scenario in Northeast India, Scope; opportunities; problems and issues.

Suggested Readings:
1. Indian Media Business, Vinita Kohli Khandekar, 2008, Sage
7. Political Economy of Communications in India, Pradip Ninan Thomas, 2010, Sage

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**MCMN402T: MEDIA IN NORTHEAST INDIA**

(Credit: 5 – 75 hours) (L-T-P: 5-0-0)

**Objective:**
The main aim of this course will foster a comprehensive understanding of the media landscape in North East India. Students will explore the intricacies and dynamics of the region’s media industry, gaining an in-depth knowledge of its unique characteristics, challenges, and opportunities.

**Course Objectives**
At the end of the course students will be able to:
CO 1: Describe the important socio-political and development realities of Northeast India (Remembering)
CO 2: Trace the growth of media organisations in Northeast India (Understanding)
CO 3: Analyse the emerging trends of the news media industry in the Northeast (Analysing)

**Module 1: Introduction to Northeast India (25 Lectures)**

**Module 2: History of Media in Northeast (25 Lectures)**

**Module 3: Current Status of Media in Northeast (25 Lectures)**
Current media landscape in North-eastern Region, Ownership Pattern and Status of Journalists, Problems and Challenges of the Press in Northeast, New Media in Northeast, Scopes and Prospects of Media Industry in the Region, Film Industry in NE, Production House.

**Suggested Readings**
5. Press in Assam—Origin and Development, S P Baruach, Lawyer’s Book Stall, Guwahati
7. The American Missionaries and North-East India (1836-1900 AD), H.K. Barpujari,1986, Spectrum Publications

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**MCDJ403T: DATA JOURNALISM**

(Credit: 4 – 60 hours) (L-T-P: 2-0-2)

**Objectives:**
The core objective of this course is to provide a thorough knowledge and understanding of the fundamental concepts and principles of data journalism. Students will delve deeply into the intricacies of data-driven reporting and analysis within the context of journalism.
Course Outcomes:
At the end of the course students will be able to:
CO 1: Define the meaning and concept of data journalism (Remembering)
CO 2: Discuss the process and techniques of data journalism (Understanding)
CO 3: Develop infographics for visualisation of stories (Create).

Module 1: Introduction to Data Journalism (20 hours)
Understanding data journalism, visual storytelling, data literacy, types of data, sector-specific data stories, sources of data, alternative data sources, data privacy, challenges of data journalism.

Module 2: Data Gathering (20 hours)
How to find a story in data, planning a data-driven story: hypothesis and questions, web research and data collection, online fact-checking and verification, common data format.

Module 3: Data Interpretation and Visualisation (20 hours)
Purpose of data visualisation, verifying data, Inverted Pyramid of Data Journalism, organising data, scraping and cleaning, analysing facts sheets, data interpretation, statistical tools and methods, open-source data visualisation tools, data design, ethics of data visualisation.

Suggested Readings:
2. Foreman, John 2013, Data Smart: Using Data Science to Transform Information into Insight, Wiley
7. Reilley, Mike and Sunne, Samantha, 2022, Data + Journalism: A Story-driven Approach to Learning Data Reporting, Taylor & Francis Ltd; 1st edition

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MINOR COURSES

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MCPC103T: PROFESSIONAL COMMUNICATION
(4 Credit: 60Hours) (L-T-P: 4-0-0)

Objective(s):
The objective of the course is to develop proficiency in different types of professional writing, and presentation skills.

Course Outcomes:
CO 1: Define the meaning and concept of communication (Remembering)
CO 2: Demonstrate Writing/Presentation skills using a range of materials including text, visual, sounds and technology (Understanding)
CO 3: Develop professional writing skills in business letters, email, press release, articles (Applying)

Module 1: Theories & Language of Communication (5Lectures)
Theory of Communication, Types and modes of Communication, Effective Communication, Mis-Communication, Barriers and Strategies, Verbal and Non-verbal (Spoken and Written), Personal, Social and Business, Intra-personal, Interpersonal and Group communication.

Module 2: Professional writing (15 Lectures)
Principles and elements of professional writing, Types of writing - business letters/correspondences; professional emails; press releases; reports; features/articles, Copy-editing and proof-reading; Digital content curation

Module 3: Professional Presentation Skills (10 Lectures)
Presentation skills, 7P’s of presentation, Use of visual aids in a presentation, Non-verbal communication in a presentation situation

Module 4: Speaking & Listening Skills (20 Lectures)
Strategies for effective oral communication, developing the right speaking skills - one-to-one conversations; interview; group and public speaking; handling criticism, Effective listening skills and interpretation

Module 5: Suggestive projects & Presentation (10 Hours)
Assignment, Presentation, Seminar, Group Presentation on communication model, writing business letter, email, press release, report writing, news feature, article, copy editing, monologue, group discussion, interviewing, public speaking and other allotted topics.

Suggested Readings
1. Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills, Emilia Hardman, 2012, Kindle Edition

Mapping of COs to Syllabus

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MCWM104T: WRITING FOR MEDIA
(4 Credit: 60 hours) (L-T-P: 2-0-2)

Objectives:
This course is carefully crafted to deliver practical training in various writing techniques specifically tailored for different media platforms.

Course Outcome
At the end of this course students will be able to:
CO 1: Define the meaning and concept of journalistic writings (Remembering)
CO 2: Identify and analyse characteristics and styles of various forms of media writing (Understanding)
CO 3: Develop story ideas, write and edit news stories for multimedia platforms (Create).

Module – 1: Introduction to (20 hours)
Concept and principles of Writing, Fundamentals of Writing, Language of writing, Journalistic Writing, Writing Formats, Creative Writing, Interactive Writing, Cinematic Writing, PR Writing, Mass Media Audience, Objectivity and Creativity, Content curation, Digital tools of writing, Ethics in writing.

Module - 2: Techniques of Copy Editing (20 hours)
Concept and meaning of copy editing, tool and techniques of news editing, Headline writing, Types of Headline, News lead, Lead writing, Caption writing, proof reading

Module 3: Practicum (20 Hours)
Planning and developing story ideas, News writing, Feature Writing, Editorial Writing, Column Writing, News Interview, blog writing, letter to editor, Infographic Design.

Suggested Readings
7. Writing Tools: 50 Essential Strategies for every writer, Peter Roy Clark, 2006, Little Brown

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MCHM205T: HISTORY OF THE MEDIA
Credits: 4 (2-0-2)

Objectives:
By the end of this course on the History of the Media, students will be able to analyze and critically evaluate the development, impact, and societal implications of various forms of media throughout history.

Course Outcomes:
CO 1: Discuss the history of print media and its role in Indian freedom movement (Remembering)
CO 2: Understand history and development of television industry (Understanding)
CO 3: Analyse the emerging trends in the media and information industry (Analyzing)
CO 4: Evaluate the development of the media and information industry (Evaluating)

Module 1: History of Print Media (15 lectures)

Module 2: Media in the Post-Independence Era (15 lectures)
Emergency and Post Emergency Era, Changing Readership, Print Cultures, Language Press.
Module 3: Sound Media (15 lectures)
Emergence of radio Technology, the coming of Gramophone, Early history of Radio in India, History of AIR: Evolution of AIR Programming, Penetration of radio in rural India-Case studies, Patterns of State Control; the Demand for Autonomy, FM: Radio Privatization, Music: Cassettes to the Internet.

Module 4: Visual Media (15 lectures)
The early years of Photography, Lithography and Cinema, From Silent Era to the talkies, Cinema in later decades, the coming of Television and the State’s Development Agenda, Commercialization of Programming (1980s) Invasion from the Skies: The Coming of Transnational Television (1990s), Formation of Prasar Bharati.

Suggested Readings
5. Radio Farm Forum as a Tool of Change in Indian Villages, In, Neurath P. Economic Development of Cultural Change, Vol 10, No. 3 (pp 275-283)

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MCNM206T: INTRODUCTION TO NEW MEDIA
Credits: 4 (3-1-0)

Course Objectives:
The objective of this course is to introduce students to the dynamic and evolving field of new media. Through theoretical exploration, practical exercises students will gain a comprehensive understanding of the concepts, theories, and practices that define new media. The course aims to familiarize students with the various forms, platforms, and technologies used in new media, such as social media, content strategy, blogging, online communities, and emerging technologies.

Course Outcomes:
CO 1: Define new media (Remembering)
CO 2: Understanding the concept and meaning of new media (Understanding)
CO 3: Analyse the emerging trends in the new media (Analysing)
CO 4: Apply the principles and techniques of new media for content creation (Applying)

Module 1: Key Concepts and Theory (20 lectures)

Module 2: Understanding Virtual Cultures and Digital Journalism (20 lectures)
Internet and its Beginnings, Remediation and New Media technologies, Online Communities, User Generated Content and Web 2.0, Networked Journalism, Alternative Journalism; social media in Context, Activism and New Media, new media and virtual identity.

Module 3: Digitization of Journalism (15 lectures)

Module 4: Overview of Web Writing and Content Design (20 lectures)
Contextualized Journalism, Writing Techniques, Linking,
Open-Source Overview of Web Writing, Website planning and visual design, Content strategy and Audience Analysis, Brief history of Blogging, Creating and Promoting a Blog Online Communities, New Media and Ethics: Piracy, Copyright.

Suggested Readings:
5. Understanding New Media, Siapera, Eugenia, 2011, Sage Publications

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MCDP307T: DOCUMENTARY PRODUCTION

Credits: 4 (4-0-0)

Objective:
At the conclusion of the Documentary Production course, students will have the capability to effectively strategize, create, and analyze documentary films, showcasing their expertise in storytelling methods, technical proficiencies, and ethical considerations that are unique to the documentary genre.

Course Outcomes:
CO 1: Discuss the types of documentaries and production techniques (Remembering)
CO 2: Understand ethical issues related to documentary production (Understanding)
CO 3: Reflect upon and analyse the documentary form (Analyzing)
CO 4: Critically evaluate documentary forms and production techniques (Evaluating)
CO 5: Produce, direct, film and edit documentary productions (Creating)

Module 1: Documentary Theory (20 lectures)
Understanding the Documentary, Observational and Verite documentary, Introduction to Realism Debate, the performative/fictive in Documentary: Using re-enactment/reconstruction, Ethics and Representation.

Module 2: Pre-Production (20 lectures)
Researching the Documentary, Modes of Research: Library, Archives, location, life stories - Ethnography, writing a concept: telling a story, Script Writing, Treatment, writing a proposal and budgeting, Structure and scripting the documentary.

Module 3: People and Techniques (10 lectures)
The Documentary Crew, Equipment, Scripting, Sound for Documentary.

Module 4: Video Documentary Production (10 Hours)
The Documentary Camera, shooting styles, Production details and logistics, Introduction to Editing styles.

Practicum:
Shooting a short film (5-6 minutes) and editing the same.

Suggested Screenings
- Michael Moore: Roger and Me, Nanook of the North by Robert J Flaherty, Nightmail by Basil Wright, Bombay Our City by Anand Patwardhan, Black Audio Collective, City of Photos by Nishtha Jain, Films by PSBT

Suggested Readings:
1. A New History of Documentary Film, Jack EC Ellis, 2005, Continuum Intl Pub Group,
4. How to Write a Documentary Double Take by PSBT, Trisha Das
5. Indian Film, Erik Barnow and Krishnaswamy, 1980, Oxford University Press
6. The Open Frame Reader: Unreeling the documentary Film Ed. by PSBT, Rajiv Mehrotra, 2006, Rupa Publications
8. The Techniques of Documentary Film Production, W.Hugh Badley, 1969, Focal Press,

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**MCCD308T: COMMUNICATION AND DISASTER MANAGEMENT**

4 Credits – 60 hours) (L-T-P: 2-0-2)

**Objectives:**
This is designed to provide hands-on training in the field of communication for disaster management. Students will gain valuable experience and skills in effectively communicating during times of crisis and learn essential strategies and techniques for efficient disaster communication.

**Course Objectives**
At the end of the course students will be able to:
CO 1: Understand approaches of disaster management (Understanding)
CO 2: Analyse media’s role in disaster management (Analysing)
CO 3: Design and produce disaster communication materials (Applying)

**Module 1: Introduction to Disaster Management (25 hours)**
Meaning, concepts and types of disaster, Economy of Disaster, Politics of Disaster, Disaster Preparedness Plan, Risk Analysis, Crisis and Disaster Management, Response: Rescue, Relief and Rehabilitation, Post Disaster effects and Remedial Measures, National Disaster Management Authority (NDMA).

**Module 2: ICT for Disaster Communication (25 hours)**
Use of ICTs in disaster management/communication, Emergency Response, HAM radio and community radio, Internet, email, mobile, social media, blogging; computer, television, radio, applications like distress communication and deploying bio surveillance, Geo-Informatics Technology, GIS, GPS, Weather forecasting.

**Module 3: Natural Disaster and Role of Media (25 hours)**
Case study on man-made and major natural disasters and role of media, crisis communication, preparing for a crisis, Communication, Participation, and Activation of Emergency Preparedness Plan, Designing crisis communication plans, Audience-specific strategic message development.

**Suggested Readings:**
1. An Introduction to Disaster Management, Natural Disaster and Man-made hazard, S Vaidyanathan, 2020, CBS Publishers and Distributors Pvt. Ltd.
3. Crisis and Disaster Management Turbulence and Aftermath, Asim Kumar Mukhopahyaya, Kumar, 2015, Generic
6. ICTs in Disaster, Aruna Sarangi, 2010, Neha Publishers and Distributors
7. Understanding Disaster Management in Practice with reference to Nepal, Practical Action, Achyut Luite, 2010
9. Voices from Chernobyl: The Oral History of a Nuclear Disaster, Svetlana Alexievich and Gessen Keith, 1997, Picador
Mapping of COs to Syllabus

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MCFM404T: FOLK MEDIA
(3 Credits – 45 hours) (L-T-P: 2-0-1)

Objective:
The objective of the course is to learn the scope and nature of folk media in India along with its role and potential in the contemporary times.

Course Outcomes:
At the end of this course students will be able to:
CO 1: Identify the major forms of folk media in India (Remembering)
CO 2: Explain the nature and scope of folk media (Understanding)
CO 3: Examine the role of folk media in fostering social change (Analyse)
CO 4: Plan and organise folk media performance for varied audiences (Creating)

Module I: Meaning and Nature of Folk Media (7 hours)
Definition, nature and types of folk media, Strengths and Advantages, Current status of folk media in India, Challenges faced by folk media, Few major forms of folk media in India.

Module II: Nature and Scope of Folk Media (8 hours)
Participatory Communication and Folk Media, Folk Media and Its Role in Social Change, UNESCO’s Recognition of Folk Media, Case Studies, Traditional Folk Media as Development Media, Differences Between Folk Media and Electronic Media. Impact on rural development, uses in different fields – DFP, Song and Drama Division, NGOs, Social Action Groups

Module III: Folk Media of Northeast India (7 hours)
Various types of folk Media in Northeast India, Various folk forms of Assam and its significance – Bihu songs, Lokageet, Bhaona, Lullabies, Ojapali, Ainaam, Sattriya, Borgeet

Module IV: Street theater and Puppetry (8 hours)
Influence of folk theater on street theater, Role of street theater in the Indian Freedom struggle, street theater as agitational propaganda and social education, origin of puppets, traditional forms of puppets, contemporary forms of puppet, window on the world puppets, use of puppets – entertainment; education; social education

Module V: Practicum(15 hours)
Traditional media in practice: Students will be trained in various techniques of folk media. At the end of the course, students are expected to perform a street play and/or a puppet performance on specific social issues.

Suggested Readings:

Mapping of COs to Syllabus

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MCIR405T: INTRODUCTION TO RESEARCH
(2-0-0)

Objectives:
Upon completion of the Introduction to Research course, students will acquire basic understanding of the research, types, functions and different methods of communication research. They will also develop an understanding of various techniques of research which will further create interest for studying research.

Course outcomes
CO 1: Define the meaning of communication research (Remembering)  
CO 2: Explain the methods of communication research (Understanding)

Module 1: Introduction to Research (15 Lectures)
Meaning, Definition, Function, Types of Research, Research Approaches, Role of theory in research, Research design, Research question, Hypothesis, Review of Literature.

Module 2: Media and Communication Research (15 Lectures)
Understanding media and communication research, Qualitative-Quantitative Technique, Content Analysis, Survey Method, Observation Methods, Experimental Studies, Case Studies, Historical Research, Ethnography, Netnography.

Suggested Readings:
2. Media Research Methods; Audiences, institutions, Texts, Bertrand, Ina and Hughes, Peter, 2005, Palgrave

Mapping of COs to Syllabus

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MCSB406T: COMMUNICATION FOR SOCIAL AND BEHAVIOUR CHANGE
(3 Credit – 45 hours) (L-T-P: 3-0-0)

Objective:
The purpose of this course is to offer a comprehensive understanding of the concept of communication for social and behaviour change, delving deeply into its principles and methodologies.

Course/learning Outcomes
At the end of the course students will be able to:
CO 1: Define the concept of Social and Behaviour Change (Remembering)  
CO 2: Analyse the discuss various strategic approaches to SBC programing and community intervention (Analyse)  
CO 3: Plan and execute SBC programmes and campaigns (Creating)

Module – 1: Introduction to Social and Behaviour (10 hours)
Understanding Social and Behaviour Change, Social norms, Social and community barriers and enablers, community knowledge, attitude and practice, social influencers, stakeholders in social and behaviour change, SBC priorities, SBC Goals: Advocacy, Social Mobilisation, Social Marketing, Behaviour Change, Capacity Building.

Module – 2: Strategic Approach to Social and Behaviour Change (10 hours)

Module – 3: Communication Strategy for SBC Programming (15 hours)
Communication design, audience segments, priorities and profiles, communication channels, effective messaging, Budgeting and fundraising for SBC programmes, Pre-test, Communication Toolkits, Designing Knowledge Products and IEC materials.
Suggested Readings
1. Esta de Fossard, 2015, Communication for Behaviour Change: Writing and Producing Radio Dramas - Vol.1
5. Richard E. Petty and John T. Caioppo, 2011, Communication and Persuasion: Central and Peripheral Routes to Attitude Change

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SKILL ENHANCEMENT COURSES

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<td>S E Course 1</td>
<td>MCNA105L</td>
<td>News Reading and Anchoring</td>
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<td>S E Course 2</td>
<td>MCRP106L</td>
<td>Radio Production</td>
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<td>S E Course 3</td>
<td>MCGD207L</td>
<td>Graphic Designing</td>
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MCNA105L: NEWS READING AND ANCHORING  
(3 Credits - 90 Hours) (L-T-P: 0-0-3)

Objective
The paper will make the students experience in the field of news reading and anchoring. Module 1 will deal about the news reader, duties, responsibilities and functions. Module 2 will emphasise students about voice over, performance, language skills, presentation skills etc. in the end of the semester students will produce news bulletin where they will edit, give voice over and present news from the studio and from the field.

Course/Learning Outcomes:
CO 1: Identify the various skills necessary to be a professional news anchor (Remembering)  
CO 2: Understand the roles and responsibilities of a news presenter (Understanding)  
CO 3: Apply news reading and anchoring skills to develop programmes for cross-media platforms (Applying)  
CO 4: Articulate the art of anchoring, news reading and reporting (Analysing)  
CO 5: Produce news content for multimedia platforms (Creating)

Module 1: News Reading, Anchoring & Presentation (15 hours)
Duties and responsibilities a news reader, 7Ps in News Presentation: Posture, Projection, Pace, Pitch, Pause, Pronunciation and Personality, Learning Interviewing skills, Anchor’s role in debates and panel discussions inside Studio and outside, On location anchoring/ Reporting facilitator, Relevance of research and keeping updated with current affairs, Knowing personalities and their background, Understanding ground realities and issues, Art of listening, Analysis of news capsule from camera perspective particularly when it is outdoor reporting, Reporting for various beats: Politics, sports, business, crime, legal/court etc.

Module 2: Voice Over, Narration and Commentary (15 hours)
Basics of Voice: pitch/tone/intonation/inflection, Voice Over: Rhythm of speech, Breathing, Resonance, Studio autocue reading, Voice recording. Understanding of Voice Modulation, command over language, Skills of on-air presence: Connect with audience; Express appropriate emotion; Confidence; Conversational skills; Fluency; Ability to improvise; Solid knowledge base, Detailed analysis of styles used by prominent TV anchors and radio presenters.

Suggested Exercise
- TV/Radio News presentation, News documentaries, Programme Anchoring, Talks shows, News Interview, Online Live Streaming, Field reporting.

Suggested Readings
4. Public Speaking, Pembley O’neal Katherine and Stephanie O’shaughnessy, 2005, Prufrock  
6. The ABC of News Anchoring, Richa Karla Karla, 2012, Pearson Education India  

Mapping of COs to Syllabus

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MCRP106L: RADIO PRODUCTION
(3 Credits: 90 HOURS)(L-T-P: 0-0-3)

Objectives
The objective of this paper is to make student more aware the role and uses of radio. Its importance in our day to day live. Students will be made to learn practical work on radio, like documentary, PSA etc. at the end of semester students will prepare a shot production for their final work.

Course Outcomes:
CO 1: Understand the skills and techniques of radio production (Understanding)
CO 2: Identify the radio technologies for audio recording and broadcasting (Applying)
CO 3: Discover the skills required for developing content for radio (Analysing)
CO 4: Produce radio programmes for varied audiences (Creating)

Module 1: Stages of Radio Production (10 hours)
Pre-production - idea; research; radio script, Production- creative use of sound; understanding sound recording; sound recording equipment; single and multitrack recording, post-production - understanding audio editing; introduction to basic audio editing skills using a software program.

Module 2: Radio Broadcast Formats (10 hours)
Radio broadcast formats – Public service advertisements (PSAs); jingles; radio magazine; interview, talk show; discussion; feature; documentary.

Module 3: Radio Production Technology (10 hours)
Basics of sound, Microphone - types and selection of microphones, Audio cables and connectors, Hardware for audio recording, Audio recorders, Headphones, Recording audio in the field, Portable audio mixers, Sound cards, Digital Audio Workstations (DAW).

Suggested Exercise
Produce radio programme format mentioned in module II.

Suggested Readings:

Mapping of COs to Syllabus

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MCRP106L: RADIO PRODUCTION
(3 Credits: 45 HOURS)(L-T-P: 0-0-3)

Objectives
The objective of this paper is to make student more aware the role and uses of radio. Its importance in our day to day live. Students will be made to learn practical work on radio, like documentary, PSA etc. at the end of semester students will prepare a shot production for their final work.

Course Outcomes:
CO 1: Understand the skills and techniques of radio production (Understanding)
CO 2: Identify the radio technologies for audio recording and broadcasting (Applying)
CO 3: Discover the skills required for developing content for radio (Analysing)
CO 4: Produce radio programmes for varied audiences (Creating)
Module 1: Stages of Radio Production (10 hours)
Pre-production - idea; research; radio script, Production- creative use of sound; understanding sound recording; sound recording equipment; single and multitrack recording, post-production - understanding audio editing; introduction to basic audio editing skills using a software program.

Module 2: Radio Broadcast Formats (10 hours)
Radio broadcast formats – Public service advertisements (PSAs); jingles; radio magazine; interview, talk show; discussion; feature; documentary.

Module 3: Radio Production Technology (10 hours)
Basics of sound, Microphone - types and selection of microphones, Audio cables and connectors, Hardware for audio recording, Audio recorders, Headphones, Recording audio in the field, Portable audio mixers, Sound cards, Digital Audio Workstations (DAW).

Suggested Exercise
Produce radio programme format mentioned in module II.

Suggested Readings:

Mapping of COs to Syllabus

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MCGD207L: GRAPHIC DESIGNING
(3 credits: 45 hours) (L-T-P: 2-1-1)

Objective:
The core objective of this course is to provide a thorough knowledge and understanding of image editing software, understanding of tools for image editing. Students will learn the art of designing photoshop etc.

Course/ Learning Outcome:
CO 1: Gain skills in the development of print and on-line publications (Remembering)
CO 2: Demonstrate competency in image editing (Understanding)
CO 3: Engage with the conceptual and technical aspects of design such as logo, banner, brochure, poster-making (Creating)

Module 1: Image Editing Tool (15 Lectures)
Introduction to image editing tool, Getting started with image editing software, Menu Bar, Using the Help, using icons below menu bar, saving documents, Page Setup, Printing of documents, Toolbox, Layers and importance of layers, Filters, Layer Styles, Adjustment Layers, Retouch and Healing Tools, Type Tool, Free Transform Tool, Master Selection Tools, Installing and Managing Brushes and Other Presets, Image editing actions and common effects, Colour correction tools, Print setting

Module 2: Page Layout Tool (15 Lectures)
Introduction to page layout tool, Getting started with Page Layout software, Menu Bar, Using the Help, Using icons below menu bar, Saving documents, Page Setup, Printing of documents, Create; Edit; and Format text and paragraphs, Working with multiple images in a document, Drawing tools, Work with multiple pages; margins and columns, Working with master page, Customizing page layout software, Selecting page size, Working with text, Working with objects and layers, Applying and managing colour, Applying Fills; Strokes; and Effects, Publish work as PDF, Proof-reading, Print setting

Suggested Readings:

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**INTERNSHIPS**

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**MCN107I / MCIN208I: INTERNSHIP (Exit of 1st Year or 2nd Year)**

(4 Credits: 120 Hours)

All students shall undergo an internship involving media related activities after the exit of 1st year and 2nd year. **However this internship is compulsory only for those students who is willing to exit the course at the end of 1st or 2nd year and desires to earn extra credit.** The purpose of the internship is to give the students an opportunity to have a hands-on field experience to effectively put into practice the theoretical and practical learning from the programme in an area of interest. Students may undergo their internship in a media house of their choice. The student shall be required to discuss the choice of media house with the department and obtain its consent. Before going for the internship, a Letter of Consent from the concerned media house, in the prescribed format, shall be submitted by the student to the Department. After returning from the internship each student shall have to submit a detailed report in a prescribed format. Each student shall also make a presentation of the internship experience and learning in the Department and submit a certificate of successful completion of the internship from the designated authority of the concerned media house. The schedule of the conduct, report submission and evaluation of the internship shall be as notified by the Department. The components of evaluation of the Internship and their weightages shall be as notified by the department at the beginning of the semester.

**MCIN309I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)**

(2 Credits-60 Hours)

Students will undertake 4-weeks internships in media and communication organizations during the vacation between fourth and fifth semester. They will discuss the choice of media and communication organization with their respective mentors and obtain the consent of the head of the department. Before going for the internship, an Internship Agreement Contact form from the concerned organization will be submitted by the student to their respective mentors. At the end of the internship students will submit a copy of the Internship Completion Certificate to their mentors from the designated authority of the concerned media and communication organization. Students will submit a report of their internship which will include the following documents:

- **Employer Evaluation**: At the end of the internship the supervising employer will be asked to submit a written evaluation of the student’s performance.
- **Journal**: Each student will keep a daily journal with an entry for each day spent doing work for the internship. This journal should be e-mailed to the mentor at the beginning of each work week. In this journal the student should summarize the activities and assignments on which the student worked. The student should also keep track of the number of hours for each week.
- **Internship Completion Certificate**
- **Work Samples**: Examples of work during the Internship.

The department will issue the following documents to the students for the internship:

- **Internship Application Form**: to be submitted to the mentor prior to internship.
- **Internship Agreement Contract**: to be submitted to the mentor prior to internship.
- **Employer Evaluation of Intern**: to be included in the portfolio

**Last date of Internship**

- To be notified by the department
- **Internship Report Submission and Presentation**: To be notified by the department
### RESEARCH PROJECTS /DISSERTATIONS

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**BA MASS COMMUNICATION (Honours)**

**MCDI407P: RESEARCH PROJECT PHASE I**

(6 credits – 180 hours) (L-T-P: 0-0-12)

In this course, students will gain familiarity with the domains of research and explore various areas related to research writing. The objective is to equip them with the necessary skills to formulate and develop critical ideas into well-structured research papers. Throughout the course, students will be introduced to the essential components of research, including topic selection, literature review, data collection, and referencing. By mastering these elements, they will be empowered to write research papers suitable for publication in prestigious indexed journals. The specific evaluation criteria for the course will be communicated by the department at the beginning of the semester, providing clear guidance on how students’ progress will be assessed.

**MCDI408P: RESEARCH PROJECT PHASE II**

(6 credits – 180 hours) (L-T-P: 0-0-12)

In this course, after students will gain familiarity with the domains of research and explore various areas related to research writing in phase 1. The objective is to equip them with the necessary skills to formulate and develop critical ideas into well-structured research papers. Throughout the course, students will be expected to apply some specific methods of communication research such as: Case studies, Ethnographic Study, Content Analysis.in their research work. By mastering these elements, they will be empowered to write research papers suitable for publication in prestigious journals indexed by Scopus, Web of Science, and UGC Care. The focus of the research papers will revolve around media, film studies, development communication, and related subjects. Students will analyze and address relevant issues within these areas, fostering a deeper understanding of their chosen topics. The specific evaluation criteria for the course will be communicated by the department at the beginning of the semester, providing clear guidance on how students’ progress will be assessed.

**BA MASS COMMUNICATION (Honours) with Research**

**MCDI409P: DISSERTATION I**

(18 Credits -540 Hours) (L-T-P: 0-0-36)

As part of the course students will undertake a research study in the field of media and communication. Students will complete data collection, analysis, and preparation of research reports and submit the final dissertation. The dissertation has to be systematically structured following proper methodology of communication research. Students will have to ensure that the dissertation is prepared keeping in view Intellectual Property Rights, maintenance of research ethics and avoidance of plagiarism. Students are required to make a presentation of the dissertation submitted to the department on the date set by the department.

**The Exercise:**

During this course, students will have to choose a research topic of their choice, conduct a literature review with bibliography, and develop a research proposal which will be submitted in partial fulfilment for the requirement of Bachelor’s degree in Mass Communication. Students will also write and present a research paper.

**MCDI410P: DISSERTATION II**

(20 Credits -600 Hours) (L-T-P: 0-0-40)

During this phase 2 students will complete data collection, analysis, preparation of research report and submit the final dissertation. The dissertation has to be systematically structured following proper methodology of communication research. Phase - I of the course is carried out in the 2nd Semester where students work upon research proposals, literature review and research methodology. Students will have to ensure that the dissertation is prepared keeping in view Intellectual Property Rights, maintenance of research ethics and avoidance of plagiarism. Students are required to make a presentation of the dissertation submitted to the department on the date set by the department.
DEPARTMENT OF PSYCHOLOGY

PROGRAMME: BACHELOR OF ARTS in PSYCHOLOGY (BA)

DEGREE: BA PSYCHOLOGY (HONOURS)/ BA PSYCHOLOGY (HONOURS) WITH RESEARCH

VISION
To be a centre of excellence in teaching, learning, research and in the practice of psychological counselling, thereby promoting community mental health and psychosocial competence in order to foster cohesion in the society.

MISSION
Department of psychology of Assam Don Bosco University seeks to-
1) Achieve excellence in teaching, learning, research, practice and extension activities.
2) To nurture and develop the counselling skills of the students.
3) To prepare competent counsellors who are socially committed and culturally sensitive and are bound by the ethics of the profession.
4) To create an environment committed to promoting the application of science of psychological counselling to real world situation.

Program Outcomes:
PO 1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO 3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO 4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO 6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO 7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes:
PSO 1: Knowledge of Basic Concepts of Psychology: To impart knowledge and understanding of the basic concepts, systems, theories of psychology and psychopathology.

PSO 2: Practical Application Skills: An ability to apply the theoretical principles of Psychology demonstrating an understanding of behavior, thoughts, and feelings of the individual and the individual in group settings

PSO 3: Assessment Skills: Basic professional skills pertaining to psychological testing, assessment and counselling.

PSO 4: Multicultural Competence: To recognize, understand, and respect the complexity of multiculturalism in the practice and application of counseling and psychotherapy.

Mapping of Courses with POs/PSOs

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DEPARTMENT OF PSYCHOLOGY

DETAILED SYLLABUS

MAJOR COURSES

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PCIP101T: INTRODUCTION TO PSYCHOLOGY
(4 Credits: 60 hours) (L-T-P: 4-0-0)

Course Objective
To learn the basic/core concepts and subject matters of psychology.

Course Outcomes
1. Explain the nature and characteristics of psychological research and perspectives. (Understanding)
2. Apply research designs and approaches appropriately. (Applying)
3. Analyse the basic principles and theories of intelligence, learning and memory and motivation. (Analysing)
4. Evaluate modern and Indian perspectives of psychology (Evaluating)

Module 1: Introduction (16 hours)
Nature of Psychology: Definition, Fields of psychology, Schools of modern psychology, History and Modern perspective
Scientific Methodology (with special emphasis on Experimentation),
Biological basis of human behaviour: Structure of neurons, Neurotransmitters, Overview of nervous system (special emphasis on brain)

Module 2: Learning, Memory and perception (16 hours)
Learning: Classical conditioning, instrumental learning, observational learning (socio-cognitive learning)
Memory: Processes of memory, Models of memory: Parallel Distributed Processing, Information processing model (Sensory register, STM, LTM and concept of working memory), Levels of processing model, Forgetting
Perception: Top down and Bottom-Up processes, Size Constancy, Depth Perception

Module 3: Motivation & Emotion (12 hours)
Approaches to understanding motivation and Types of Motives
Elements of Emotions (components), Emotional Intelligence and Gender, Culture & emotions

Module 4: Individual differences: Personality and Intelligence (16 hours)
Personality: Nature and Theories
Intelligence: Nature and Theories

Suggested Readings

Mapping of COs to Syllabus

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PCSP102T: SOCIAL PSYCHOLOGY
(4 credits - 60 hours) (L-T-P: 3-1-0)

Course Objective
To familiarize with the psychological perspective of the human interaction and behaviour in social setting.

COURSE OUTCOMES
1. Illustrate the interpersonal processes (Understanding)
2. Apply the keys aspects of individual processes in the social world (Applying)
3. Examine the individual processes in the social world (Analysing)
4. Explain the concept group, cooperation and conflict. (Evaluating)

Module 1: Understanding Social Psychology (15 hours)
History of social psychology, Scope of social psychology, and to understand the individual in the social world

Module 2: Individual Processes (15 hours)
Person perception, Attention-theories, biases and errors; Attitude: Formation, change and resistance to change

Module 3: Interpersonal processes (10 hours)
Interpersonal attraction, prosocial behavior, aggression

Module 4: Group dynamics (20 hours)
Key aspects of groups, cooperation and conflict, group decision making

Suggested Readings

Mapping of CO’s to Syllabus

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PCPR201T: PSYCHOLOGICAL RESEARCH AND TESTING
(4 credits – 60 hours) (L-T-P: 4-0-0)

Course Objective
To learn the different approaches of research and steps of test construction.

Course Outcomes:
1. Understand the various approaches and research traditions in psychological research. (Understanding)
2. Application of different techniques and tools in psychological research. (Applying)
3. Analyse the effectiveness of various tools used in different types of research designs in psychological research. (Analysing)
4. Evaluate the significance of research in psychology and the advantages and disadvantages of the different orientations and research traditions. (Evaluating)

Module I: Introduction to Psychological Research (10 hours)
Basics of Research in Psychology: What is Psychological Research? The Goals of Psychological Research; Principles of Good Research; Ethics in Psychological Research. Research Traditions: Quantitative and Qualitative; Comparing qualitative and quantitative research traditions.
Module 2: Test Construction (20 hours)
Psychological Testing: Steps of Test Construction, Item Writing, Types of Items, Standardization; Reliability, Validity and Norms of a Psychological Test; applications.

Module 3: Experimental Method (15 hours)

Module 4: Non-Experimental Methods – I (15 hours)
Case Study, Sociometry, Observation, Surveys, Focus Group Discussion, Interviews.

Suggested Readings:

Mapping of COs to Syllabus

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PCDP202T: DEVELOPMENTAL PSYCHOLOGY
(4 Credits-60 Hours) (L-T-P: 3-1-0)

Course Objective
To acquire the knowledge of the stages of life span development, theories and sociocultural factors influencing human development.

Course outcomes:
1. State the concept of and process of human development across the life span. (Remembering)
2. Explain the various domains of human development (Understanding)
3. Utilize the knowledge of different theoretical perspectives, developmental tasks, adjustment process and hazards across the lifespan (Applying)
4. Analyse the sensitivity to socio-cultural context of human development. (Analysing)

Module 1: Understanding Human Development (10 hours)
Define the concept of Human Development. Theories, themes and research designs related to the study of human development

Module 2: Periods of Life Span Development (20 hours)
Prenatal development, Birth and Infancy, Childhood, Adolescence, Adulthood

Module 3: Domains of Human Development (20 hours)
Cognitive development: perspectives of Piaget and Vygotsky; Language development; Physical development; Emotional development; Moral development; Personality development

Module 4: Socio-Cultural Contexts for Human Development (10 hours)
Family, Peers, Media & Schooling, Human Development in the Indian context

Suggested Readings:

Mapping of COs to Syllabus

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PCPR203T: STATISTICS IN PSYCHOLOGICAL RESEARCH
(5 Credits - 75 Hours) (L-T-P: 5-0-0)

Course Objective
To learn about the basics of descriptive statistics and its usages, difference between parametric and non-parametric statistics.

Course Outcomes
1. State the basic concepts of research, identify major research designs and recognize the philosophical foundations of research. (Remembering)
2. To understand the importance of inferential statistics and scales of measurements. (Understanding)
3. To analyse the scope and uses of graphical representation of the quantitative data. (Analysing)
4. To use measures of Central Tendency and Measures of Variability in research. (Applying)

Module 1: Introduction to Statistics (15 Hours)
Statistics: Definition, usages and limitations; Test of Hypothesis, Variables and Constants; Measurement Scales.

Module 2: Organization and Graphic Representation of Data (20 hours)
Organizing of Data: Frequency Distribution, Computation of Percentiles and Percentile Ranks. The Histogram; Frequency Polygon; Bar Diagram; Pie Chart, Cumulative Frequency Graph

Module 3: Measures of Central Tendency (20 hours)
a) Measures of Central Tendency
The Mode, Median and Mean; Properties and Relative Advantages and Disadvantages of the Mode, Median and Mean; Computation of Mean, Median Mode.
b) The Normal Distribution
The Nature and Properties of the Normal Probability Distribution; Standard Scores and the Normal Curve; The Normal Curve as a Model for Sampling Distributions; Divergence from Normality (Skewness and Kurtosis)

Module 4: Correlation (20 hours)
a) Correlation
Meaning of Correlation, Computation of coefficient of correlation as Pearson’s Correlation Coefficient; Spearman’s Rank-Order Correlation Coefficient.
b) Parametric and Non-Parametric Statistics: t-Test, Chi-Square and ANOVA

Suggested Readings
7. Jacob, K.K., Methods and Fields of Social Work in India, Asia Publishing, Bombay, 1996

Mapping of COs to Syllabus

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PCBP204T: BIO-PSYCHOLOGY
(5 Credits - 75 hours) (L-T-P: 5-0-0)

Course Objective
To acquire in-depth knowledge of the biological basis of human behavior.

COURSE OUTCOMES
1. Identifying and define the biological bases of behavior. (Remembering)
2. Associating the role of the nervous system with behavior, hunger and thirst. (Understanding)
3. Examining the impact of bio chemicals in behavior and mental health at a conceptual level. (Applying)
4. Analyze the biological markers of individual difference in sleep and wake cycles. (Analyzing)

Module 1: Introduction to Bio-psychology (15 hours)
History and scope; Major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin. Nature versus Nurture controversy; Sub disciplines and allied fields; Methods in Bio Psychology.

Module 2: Neurons and Genetic bases of behavior (15 hours)
Structure of neuron; Nerve impulse and Synaptic transmission; Neurotransmitters; Types of neurons. Genetic bases of behavior: Structure of a gene, DNA and Chromosomes, Types and Functions of Genes, Genotype and Phenotype.

Module 3: Nervous System (20 hours)
a) Nervous System: Central Nervous System: Brain and Spinal Cord; Peripheral Nervous system: Division; Role of nervous system in controlling behavior.

Module 4: The Endocrine System and behavior (10 hours)
Endocrine glands; Hormones; Role of endocrine system on emotions and behavior.

Module 5: Circadian Rhythms, Sleep and Dreaming (15 hours)
Rhythms of waking and sleeping: Endogenous cycles- Setting and resetting the biological clock- Mechanisms of the biological clock, Sleep and brain mechanisms: Sleep and other interruptions of consciousness, the onset of sleep and hypnagogic hallucinations, stages of sleep. Paradoxical or REM sleep, Brain mechanisms of wakefulness and arousal: Brain functions in REM sleep- Functions of sleep, dreaming: REM sleep and dreaming. Biological perspectives on dreaming.

Suggested Readings
2. Pearson Education.S
PCOP205T: ORGANIZATIONAL BEHAVIOUR
(4 Credits: 60 hours) (L-T-P: 4-0-0)

Course Objective
To learn about the core concepts of organizational behaviour, dynamics of individual and group behaviors in an organizational set up.

Course Outcomes:
1. Identify and state the key concepts of Organizational Behavior. (Remembering)
2. Explain various organizational contexts in the globalized world. (Understanding)
3. Apply knowledge of psychological constructs in modifying the organizational environment. (Applying)
4. List current areas in need of upgrading in the Indian context. (Analyzing)

Module 1: Introduction (10 hours)
Historical antecedents of Organizational Behaviour, Contemporary Trends and Challenges, Organizational Behavior: Challenges in the Indian Setting

Model 2: Individual level processes (20 hours)
Employee attitudes: Job satisfaction, Organizational Commitment, Organizational Citizenship Behaviour Work Motivation: Early theories- Maslow, McClelland, Two-Factor; Contemporary Theories-Goal setting, Equity, Expectancy; Applications: Job Characteristics Model, Job redesign

Module 3: Dynamics of Organizational Behavior (16 hours)
Organizational Culture, Power and Politics: sexual harassment, organizational politics; Positive Organizational Behavior

Module 4: Leadership (14 hours)
Basic approaches: Trait theories, Behavioral theories, Contingency theories; Contemporary Issues: Approaches to leadership, Contemporary leadership roles, Challenges to the leadership construct; Creating Effective Leaders.

Suggested Readings

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PCGP301T: GERIATRIC PSYCHOLOGY
(5 Credits: 75 hours) (L-T-P: 4-0-1)

Course Objective
To learn about the concepts related to geriatric psychology such as ageing cognitive decline, depression and socio-cultural factors influencing aging.

Course Outcomes:
1. Demonstrate an understanding of the psychological, social and cultural factors that influence ageing and the experience of older adults. (Understanding)
2. Apply the knowledge of geriatric psychology to real-world situations such as planning out an intervention programme for older adults to improve the quality of life. (Applying)

3. Critically analyse and examine research on ageing and geriatric psychology including identifying limitations and gaps in existing literature. (Analysing)

4. Assess and evaluate the ethical and social implications of issues related to ageing such as elder abuse and end-of-life decision making. (Evaluating)

Module 1: Introduction (15 hours)
   a) Geriatric Psychology - Definition and multidisciplinary nature
   b) Old Age - Definitions, Myths and Assumptions about Ageism
   c) Theories of Ageing - Modernisation Theory, Disengagement Theory and Activity Theory
   d) Relevance of these theories to working with older adults and cultural considerations

Module 2: Health and Well-Being of Older Adults (25 hours)
   a) Concept of Healthy Ageing - Distinction between typical and pathological patterns of ageing, Factors affecting Healthy Ageing
   b) Psychosocial Aspects of Ageing - Loneliness, Quality of Life, Activities of Daily Living (Recreation and Use of Leisure Time), Self-Concept and Self-Esteem, Coping with grief and bereavement
   c) Elder Abuse: Typology and Consequences of Elder Abuse - Physical, Economic, Psychological; Characteristics of victims based on gender, marital status, health, living arrangements, problem behaviours
   d) Nature of Degeneration and its psychosocial implications: Diabetes, Cardiovascular Disease, Disability related issues - hearing and ophthalmologic impairment, Neuropsychological diseases - Depression, Dementias, Parkinson’s Disease

Module 3: Therapeutic and Preventive Interventions (20 hours)
   a) Physical Interventions: Physiotherapy, Laughter Club, Respite care, Nutrition Care, Education on adoption of healthy Life Style
   b) Psychosocial Interventions: Coping with loss, Building and Maintaining Self-Concept, Active Ageing.
   c) Neuropsychological Intervention: Cognitive Stimulation Therapy for Dementia
   d) Preventive Intervention against Elder Abuse.

Module 4: Application/Practicum (15 hours)
   Design and carry out a preventive intervention against elder abuse
   OR
   Create a Systematic Review/Meta-analysis of the literature on (1) any of the therapeutic/preventive interventions discussed OR (2) any concepts under module 2
   OR
   Execute any one of the therapeutic interventions at an elder care facility (The application/practicum needs to be done under strict supervision)

Suggested Readings

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PCCP302T: COGNITIVE PSYCHOLOGY
(5 Credits: 75 Hours) (L-T-P: 5-0-0)

Course Objective
To acquire the knowledge about the cognitive functioning and the relationship between mind, brain and behaviour.

Course Outcomes
1. Define the basic concepts of cognitive psychology, identify major theoretical foundations and recognize the historical background of cognitive psychology. (Remembering)
2. To analyze the scope and application of cognitive psychology. (Analysing)
3. To use measures of cognitive psychology in research and practice. (Applying)
4. To evaluate different cognitive methods, tools and their appropriate applicability. (Evaluation)

Module 1: Introduction to Cognitive Psychology (15 Hours)
Definition, History of cognitive psychology.
Cognitive Neuroscience: Basic neuroanatomical principles, modern techniques for exploring cognition (EEG, fMRI, PET)
Emotional Intelligence, Artificial Intelligence.

Module 2: Memory Processes (25 Hours)
Processes of Memory, Sensory Memory, Short Term and Long-Term Memory, Working Memory
Semantic and Episodic Memory, Level of Processing, Constructive nature of Memory
Forgetting: Incidental and Motivated Forgetting. Process of forgetting (Interference versus Decay Theory), Memory Distortions

Module 3: Attention & Perception (20 Hours)
Basic Concepts of Attention: Divided Attention, Selective Attention, Visual Attention and Auditory Attention.
Perception: Subliminal Perception; Gestalt Approach of Perceptual Organisation, Time perception
Pattern Recognition: Bottom Up and Top-Down Approach, Perceptual Learning, Depth Perception.

Module 4: Thinking, Problem Solving and Decision Making (15 Hours)
Types of thinking, Components of thinking: images, concepts, creativity.
Decision Making: Complex, Uncertain Decision Making
Human Problem Solving: Strategies and Heuristics.

Suggested Readings

Mapping of COs to Syllabus

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PCHP303T: HEALTH PSYCHOLOGY
(4 credits: 60 hours) (L-T-P: 4-0-0)

Course Objective
To understand the basics of Health Psychology, Disease Models, Health Behaviours and Health Management system.

Course Outcomes
1. Learn the need to study health psychology and the approaches to change in health behavior (Understanding)
2. To understand the relationship between psychological factors and physical health and learn how to enhance well-being. (Applying)
3. Examine the stressors and its impact on the etiology and course of many health-related problems (Analyzing)
4. Estimate the management of various health related disorders (Evaluating)

Module 1: Introduction to Health Psychology (20 hours)
Introduction to Health Psychology; components of health: social, emotional, cognitive and physical aspects; mind-body relationship; goals of health psychology, Bio-psyhosocial model of health.

Module 2: Behavior and health (10 hours)
Characteristics of health behaviour; Barriers to health behaviour; Theories of health behaviour and their implications.

Module 3: Stress (10 hours)
Nature, Sources, Effects of stress on physical and mental health; Coping and stress management.

Module 4: Health Management (20 hours)

Suggested Readings:

Mapping of COs to Syllabus

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PCFP304T: FORENSIC PSYCHOLOGY
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Objective
To acquire comprehensive knowledge about the core concepts of Forensic Psychology, theories of crime and forensic psychological investigation methods.

Course Outcomes
1. Understand the importance of nature of crime. (Understanding)
2. Apply the methods of forensic psychological investigation related with Forensic Psychology. (Applying)
3. Examine the social, psychological theories of crime. (Analyzing)
4. Explain the concept of Juvenile delinquency, sexual offenders and serial offenders. (Evaluating)

Module 1: Introduction to Forensic Psychology (12 hours)
Meaning, nature and definition of Forensic Psychology, Historical background, training of a Forensic psychologist, Work ethic of a forensic Psychologist, Psychology & law, Psychologist as an expert witness, Forensic Psychology in Criminal Proceedings, Competency to stand trial, Criminal responsibility, diminished capacity, risk assessment, Eye-witness testimony

Module 2: Theories of crime (18 hours)
Need for scientific understanding of crime, psychoanalytical conceptualization of crime, eysenck's biosocial theory of crime social learning theory of crime, frustrated induced criminality, Neuropsychological theories of crime, Offender profiling; examination of high-risk offenders,

Module 3: Juvenile offenders and Sexual offenders (18 hours)
Nature and definition of Juvenile offenders and serial offenders, Social risk factors, Psychological risk factors, family background, Intelligence and delinquency,

Module 4: Forensic Psychological Investigation methods (12 hours)
Methods in Forensic Investigation-Polygraph, Brain electrical Oscillations Signature, narcoanalysis, , forensic hypnosis, voice-stress analysis, Theories, techniques, instrumentation, methodology, procedure & critical evaluation, Forensic interviewing,

Suggested readings
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PCCO305T: COUNSELLING PSYCHOLOGY
(4 Credits: 60 Hours) (L-T-P: 4-0-0)

Course Objective
To learn about the foundations of counselling psychology, theoretical perspective and techniques of counselling.

Course outcomes
1. State counselling and state the goals of counselling. (Remembering)
2. Explain the process of establishing client-counselor relationship. (Understanding)
3. Identify counselling techniques as per the current trends. (Applying)
4. Analyze the basic principles and techniques of counseling approaches. (Analysing)

Module 1: Introduction to Counselling Psychology (12 hours)
Definition and goals of Counselling, Counselling as a profession: training, skills and ethics, The effective counsellor: personality and background of the counselor, Counselling relationship

Module 2: Techniques of Counselling (20 hours)
Psychoanalytic approach, Humanistic approaches, Behavioral approach, Cognitive approach

Module 3: Counselling Applications (20 hours)
Child Counselling, Family Counselling, Career Counselling, Crisis intervention: suicide and grief

Module 4: Contemporary Trends (8 hours)
Indian approaches: yoga and meditation, Counselling and technology, Expressive techniques: art, music, dance.

Suggested Readings

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PCAP306T: ABNORMAL PSYCHOLOGY-I
(4 Credits: 60 hours) (L-T-P: 4-0-0)

Course Objective
To learn the causes, etiology, classification and identify the clinical picture and dynamics of different mental disorders.
Course Outcomes
1. Classify and categorize psychological disorders. (Understanding)
2. Apply the diagnostic criteria to categorize Anxiety disorders, Conversion disorders, Dissociative disorders, Developmental disorders, Substance related disorders and eating disorders. (Applying)
3. Analyze the distinction between normality and abnormality. (Analyzing)
4. Explain the causal factors of mental health and illnesses. (Evaluating)

Module 1 – Understanding abnormality (12 Hours)
Definition and criteria of abnormality, Causes of Abnormal Behavior: Necessary, Predisposing, Precipitating and Reinforcing causes, classification (latest edition of DSM & ICD), Clinical Assessment, Diathesis Stress Models

Module 2: Clinical States (20 Hours)
- Anxiety Disorders – Phobias, Obsessive Compulsive Disorder, Generalized Anxiety Disorder (Clinical Picture and Dynamics of anxiety disorders)
- Conversion Disorder (Clinical Picture and Dynamics)
- Dissociative Identity Disorder (Clinical Picture and Dynamics)

Module 3: Developmental Disorders (Clinical Picture and Dynamics) (16 Hours)
Mental Retardation, Autism, ADHD, and Learning Disabilities

Module 4: Substance related Disorders and Eating Disorders (12 Hours)
- Substance-Related Disorder: Alcohol abuse and Drug abuse (clinical picture and causes)
- Eating disorder: Anorexia Nervosa and Bulimia Nervosa

Suggested Readings:

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PCAB401T: ABNORMAL PSYCHOLOGY-II
(5 Credits: 75 Hours) (L-T-P: 5-0-0)

Course Objective
To learn about the mental health and illnesses and categories of mental illness as specified in DSM-V and ICD-10.

Course outcomes:
1. Classify and categorize Schizophrenia, mood disorders, personality and Paraphilia and related disorders, (Understanding)
2. Apply diagnostic criteria of Schizophrenia, mood disorders, personality disorders and paraphilia and its different types to diagnose and select the appropriate psychological intervention for different adult mental health related issues (Apply)
3. Analyze the distinction between normality and abnormality. Distinguish clinical features of different mental illnesses various types. (Analyzing)
4. Evaluate Bio Psycho Social modes and other modes of treatments for Psychological Disorders. (Evaluating)

Module 1: Schizophrenia and related Disorder (20 Hours)
Schizophrenia: Clinical Picture, Types and causal factors
Schizoaffective disorder (Clinical Picture)
Schizotypal disorder (Clinical Picture)
Acute and transient psychotic disorder (Clinical Picture)
Delusional disorder (Clinical Picture)

Module 2: Mood Disorders (15 Hours)
Clinical Picture, subtypes, causal factors and suicide
Module 3: Personality and Sexual Disorders (20 Hours)
Personality Disorders (Clusters of Disorders, Clinical Picture and Dynamics)
Sexual Disorders (Clinical Picture): Gender Identity Disorder, Paraphilia - Paedophilia, Voyeurism, Exhibitionism, Sexual Masochism, Sexual Sadism

Module 4: Prevention and Treatment of Disorders (20 Hours)
a) Perspectives on Prevention - Primary, Secondary and Tertiary Prevention,
b) Biological treatment: Pharmacotherapy and Electroconvulsive therapy
c) Psychological treatment: Psychoanalytic therapy, Behaviour therapy and Cognitive & Behaviour therapy

Suggested Readings

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PCFP402T: FOUNDATIONS OF PSYCHOTHERAPY
(5 credits - 75 Hours) (L-T-P: 5-0-0)

Course Objective
To acquire comprehensive knowledge about assessment and psychotherapeutic intervention techniques.

Course Outcomes
1. Gather the significance and scope of psychological assessment in diagnosis and intervention (Understanding)
2. Apply psychotherapeutic concepts and constructs to diagnose and intervene individuals with mental illnesses. (Applying)
3. Estimate the appropriate assessments for different population as per the diagnoses. (Analyzing)
4. Evaluate the applicability of different types to psychotherapy to mental health and illnesses. (Evaluating)

Module 1: Introduction to Psychotherapy (12 Hours)
Historical background of psychotherapy; Definition, Principles and goals of psychotherapy; Professional training and ethics in clinical practice, Current issues in Psychotherapy

Module 2: Clinical Interviewing (12 Hours)
Nature and purpose of clinical interview, mental status examination; Observing behaviour, clinical judgement; communication strategies, diagnosis and assessment, other approaches to Psychotherapy

Module 3: Major therapeutic models in Psychotherapy (20 Hours)
Therapeutic Models (Behavioural approaches, cognitive therapy and cognitive-behaviour therapy, Psychodynamic therapy, Systemic and group approaches, Eclectic and integrative approaches)

Module 4: Intellectual and Neuropsychological Assessment (15 Hours)
Intelligence, Tests batteries: WAIS, WISC, MISIC, BKT
Approaches to neuropsychological assessment: Halstead-Reitan, Luria-Nebraska, PGI-BBD,
Behavioural assessment, Psychological Assessment: Cognitive and Personality Assessment and Case studies in Psychotherapy.

Module 5: Personality Assessment (16 Hours)
Projective methods of personality assessments: Rorschach, TAT

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Suggested Readings

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PCPA403T: PSYCHOTHERAPEUTIC APPROACHES
(5 Credit - 75 Hours) (L-T-P: 5-0-0)

Course Objective
To learn about different psychotherapeutic approaches and its clinical application.

Course Outcomes
1. Classify and categorise major therapeutic approaches. (Understanding)
2. Apply various approaches of assessment in practice (Applying)
3. Analyse the distinction among different types of psychotherapy. (Analysing)
4. Evaluate the applicability of different types to psychotherapy and related professionals to mental health and illnesses. (Evaluating)

Module 1: Overview of Psychotherapy (12 hours)
Definition of Psychotherapy, Qualities of an effective psychotherapist,
Systematic framework of Psychotherapy, Related professions, other approaches to Psychotherapy-Supportive psychotherapy, Zen Psychology, NLP.

Module 2: Psychodynamic Psychotherapy (12 hours)
Psychoanalysis: Background and basic principles Psychoanalytic theory since Freud
Psychodynamic psychotherapy in contemporary clinical psychology

Module 3: Humanistic, Experiential and Family Therapies (16 hours)
Humanistic psychotherapy
Eclectic treatment combinations Family therapy
Group therapy

Module 4: Cognitive Behavioural Interventions (20 hours)
Behaviour therapy techniques
Cognitive modification procedures
Cognitive behaviour therapy: specific applications in various psychological disordersDialectic Behaviour therapy

Module 5: Relaxation Therapies (15 hours)
Progressive muscular relaxation
Autogenic training
Biofeedback
Eye Movement desensitization and reprocessing

Suggested Readings:

Mapping of COs to Syllabus

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<th>Course Outcome</th>
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PCCP404T: CRIMINAL PSYCHOLOGY
(5 Credits – 75 Hours) (L-T-P: 5-0-0)

Course Objective
To acquire knowledge about the nature and theories of crime, serial offenders and the importance of criminological psychological assessment into practice.

Course Outcomes
1. Understand the importance of nature of crime. (Understanding)
2. Apply the methods of criminal psychological investigation related with criminal psychology. (Applying)
3. Examine the social, psychological theories of crime. (Analyzing)
4. Explain the concept of Juvenile delinquency, sexual offenders and serial offenders. (Evaluating)

Module 1: Crime, Criminal and Criminology (15 hours)

Module 2: Theories of Crime (20 hours)
Need for scientific understanding of crime, psychoanalytical conceptualization of crime, Eysenck’s biosocial theory of crime, social learning theory of crime, frustrated induced criminality, Neuropsychological theories of crime, Offender profiling; examination of high-risk offenders,

Module 3: Psychology and Crime (20 hours)
Meaning, Purpose and scope of criminal Psychology, Criminal profiling, Nature and definition of Juvenile offenders, sexual offenders and serial offenders, Social risk factors, Psychological risk factors, family background, Intelligence and delinquency,

Module 4: Psychological Investigation Methods – Its use in Criminal Behaviour (20 Hours)
Criminal profiling: definition and process of profiling personality, Factors underlining criminal profiling, Merit and demerit of criminal profiling.

Suggested Readings

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# MINOR COURSES

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<td>Minor Course 1</td>
<td>PCHS103T</td>
<td>History and Systems of Psychology</td>
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<td>PCPP104T</td>
<td>Human Resource Management: A Psychological Perspective</td>
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**PCHS103T: HISTORY AND SYSTEM OF PSYCHOLOGY**

(4 Credits: 60 Hours) (L-T-P: 4-0-0)

**Course Objective**

*To acquire comprehensive knowledge about the major concepts, theoretical perspectives, historical trends and empirical findings.*

**Course outcome:**

CO 1: Comparison and Contrast between systems of Psychology and demonstrate fundamental knowledge and comprehension of the major concepts, theoretical perspectives, historical trends and empirical findings (Understanding)

CO 2: Apply Psychology- specific content and effective self-reflection (Applying)

CO 3: Contrast key concepts, principles and overarching themes (Analyzing)

CO 4: Critically evaluate sources of information in the field of Psychology and major psychological systems (Evaluating)

**Module-1: Understanding Psyche: Debates and Issues (10 hours)**

Free will and Determinism.

Empiricism and Rationality.

Yoga and Vedantic view

**Module-2: Schools of Psychology (20 hours)**

Early schools of Psychology: Structuralism and Functionalism (Brief Introduction).

Positivist Orientation: Key contribution of Watson, Tolman, Pavlov and Skinner

Cognitive Revolution: Information Processing Model

**Module-3: Psychoanalytic and Humanistic Orientation (20 hours)**

Freudian Psychoanalysis, Cultural Psychoanalysis (Sudhir Kakar)

The turn towards "social" - Adler, Jung, Fromm

Ego Psychology- Erik Erikson

Humanistic orientation- Carl Rogers, Maslow

**Module-4: Contemporary Developments (10 hours)**

Feminism and Social Constructionism

**Suggested Readings:**

PCPP104T: HUMAN RESOURCE MANAGEMENT: A PSYCHOLOGICAL PERSPECTIVE
(4 Credits: 60 Hours) (L-T-P: 4-0-0)

Course Objective
To learn about the core concepts of Human Resource Management, various practices and professional competencies from psychological perspective.

Course Outcomes:
CO 1: To understand human resource management as a profession, its concepts and meaning (Remembering)
CO 2: Understand the role of human resource management, various practices and evaluation process (Understanding)
CO 3: Equip learners with knowledge, skills, attitude, professional competencies and social sensitivities essential for a successful career in Human resource management (Applying)
CO 4: Analyse skills learned and modifications of failures during training or practical applications (Analysing)

Module 1: Introduction to Human Resource Management (HRM) (10 hours)
Personnel management, HRM and HRD, Context and issues in HRM

Module 2: Human Resource Practices (10 hours)
Job analysis; Recruitment and selection; Training; Performance evaluation

Module 3: International human resource management (IHRM) (20 hours)
The context of Globalization, Dimensions of Cultural difference (Hofstede), Policies and practices in the multinational enterprise, Selection of international assignees; Expatriate failure, Cross-cultural training.

Module 4: Organizational change and development (20 hours)
Organizational change: concepts, models (one model), techniques (one for individual and one for group), organizational development: concepts, models (one model), techniques (one for individual and one for group).

Suggested Readings:

Mapping of COs to Syllabus

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PCEM206T: EMOTIONAL INTELLIGENCE  
(4 Credits – 60 Hours) (L-T-P: 3-0-1)

Course Objective  
To gain comprehensive knowledge about the basic concepts of emotional intelligence in different contexts.

Course Outcomes  
1. Explain different concepts of emotional intelligence. (Understanding)  
2. Apply the theoretical concepts of emotional intelligence into real life settings. (Applying)  
3. Analyse the managing emotions. (Analyzing)  
4. Evaluate Relationships, Conflict Management, And Effective Leadership. (Evaluating)

Module 1: Introduction (15 hours)  
Emotional Intelligence, Models of Emotional Intelligence. EQ competencies: self-awareness, self-regulation, motivation, empathy and interpersonal skills. Importance of Emotional Intelligence

Module 2: Knowing One’s and Others’ Emotions (15 hours)  

Module 3: Managing Emotions (10 hours)  
The relationship between emotions, thought and behaviour. Techniques to manage emotions

Module 4: Applications (20 hours)  

Suggested Readings:  

Mapping of CO's to syllabus

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PCEA207T: EASTERN APPROACHES TO PSYCHOLOGY  
(4 Credits- 60 Hours) (L-T-P: 4-0-0)

Course Objective  
To acquire a comprehensive knowledge about different approaches of Eastern Psychology and their practice.

Course outcomes:  
CO 1: Classify among Indian/Chinese/Japanese approaches to psychology. (Understanding)  
CO 2: Make use of the appropriate Indian/Chinese/Japanese approaches to psychology in applied settings. (Applying)  
CO 3: Examine ancient and contemporary eastern approaches of psychology. (Analyzing)  
CO 4: Recommend the suitable approach in applied/research settings. (Evaluating)

Module 1: Introduction (12 hours)  
Definitions, nature, differentiation of concepts-eastern, indigenous and Indian psychology; relationship between culture and psychology, emergence of non-western and indigenous perspectives to psychology.  
Nature of Indian Psychology, Fundamental assumptions of Indian Psychology, Mind-body complex, Psychology: Eastern and Western Approach, Current areas of research in Indian psychology.

Module 2: Major Schools of Indian Psychology (20 hours)  
Indian approaches to Psychology-Upanishads, Sankhya, Dvaita and Advaita schools; Viewpoints of Upanishads, Bhagavad Gita, Buddhism and Jainism.

Module 3: Major Schools of Eastern Psychology (15 hours)  
Chinese approaches to psychology - Taoism and Confucianism, Japanese approaches to Psychology -Morita and Naikan therapies.
Module 4: Indian Approaches to Health and Wellbeing (13 hours)

Concept of Self and Consciousness, Yoga, Ayurveda, goals of life-concept of Purusharthas, personality development-concept of Ashramas.

Suggested Readings

Mapping of COs to Syllabus

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PCYG308T: YOUTH, GENDER AND IDENTITY

(4 Credits: 60 hours) (L-T-P: 3-0-1)

Course Objective
To learn about the core concepts of psychological, social and cultural factors of gender, identity, sex and sexuality.

Course Outcomes
CO 1: Demonstrate an understanding of the psychological, social and cultural factors that influence construction and perception of gender, identity, sex and sexuality. (Understanding)
CO 2: Apply gender and identity theories to real-world situation such as in clinical work and case studies. (Applying)
CO 3: Critically analyse and examine the impact of gender and identity on interpersonal relationships and communications. (Analysing)
CO 4: Assess and evaluate the societal and cultural norms that perpetuate gender and identity inequalities. (Evaluating)

Module 1: Introduction (15 Hours)
Concepts of Gender: Theoretical Perspectives - Essentialist, Social Constructionist, & Queer Theory, Gender Identity, Gender Performativity, Beyond the Binary.

Module 2: Gender, Sex and Sexuality (20 Hours)
Concept of Sex and Sexuality - Definition, Developmental trajectory, Being Intersex, Nature of sexuality and sexual orientation, Queer Disclosure - Coming out of the closet - Psychological Perspective.
Gender Roles and Stereotypes: The rules of gender - how we learn them and how they limit us all.
Psychology, Gender and Sexuality - A Contentious Relationship - Historical perspective

Module 3: Issues in our cultural context (15 Hours)
Inclusion, Exclusion, Discrimination: Caste, Class, Ethnicity,
Gender, Sex, and Sexuality in North-East India

Module 4: Application / Practical (10 Hours)
Design and carry out an intervention to promote gender equity and inclusion in diverse social contexts.

OR
Create a Systematic Review/Meta-analysis of the literature on any one of the topics that have been covered in the course.

**Suggested Readings**

**Mapping of CO’s to Syllabus**

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**PCCM405T: COMMUNITY PSYCHOLOGY**
(3 Credits- 45 Hours) (L-T-P: 2-0-1)

**Course Objective**
To understand the psychological perspective of the concepts, approaches, models and strategies of community development.

**Course Outcome**
1. Comprehend and discuss the concepts, approaches, models and strategies of community development (Understanding)
2. Ability to apply knowledge and skills acquired in community psychology to address issues of human diversity, social justice, inclusion and community mental health (Applying)
3. Ability to assess various concerns in a community and apply models and approaches for community development (Evaluating)
4. Designing an intervention plan for community development and empowerment. (Creating)

**Module 1: Introduction to Community Psychology (10 hours)**
Definition of community psychology; types of communities; models.

**Module 2: Core values (12 hours)**
Individual and family wellness; sense of community; respect for human diversity; social justice; empowerment and citizen participation; collaboration and community strengths.

**Module 3: Health promotion (11 hours)**
Process of community organization for health promotion, importance. Community program for: child and maternal health, physical challenged and old age in the Indian context.

**Module 4: Interventions (12 hours)**
Community development and empowerment; case studies in Indian context.

**Suggested Readings:**

**Mapping of CO’s to Syllabus**
PCPW406T: PSYCHOLOGY FOR HEALTH AND WELLBEING
(3 Credits: 45 Hours) (L-T-P: 2-1-0)

Course Objective
To gain knowledge about the variety of health enhancing, health protective, and health compromising behavior and their application in illness management and wellbeing.

Course Outcomes:
1. Identifying stressors in one’s life and how to manage them. (Remembering)
2. Learn the importance of inner strength and human values which could help in maintenance of holistic health and gain insights into positive aspects of work. (Understanding)
3. Make use of psychological principles to enhance health management not only in their own lives but in community as well. (Applying)
4. Examine the stress response and its impact on the etiology and course of many health-related problems. (Analyzing)

Module 1: Illness, Health and Wellbeing (8 hours)
Continuum and Models of health and illness- Bio-Medical, Biopsychosocial, holistic health; health and wellbeing

Module 2: Stress and Coping (7 hours)
Nature and sources of stress; Effects of stress on physical and mental health; Coping and stress management

Module 3: Health Management (8 hours)
Health-enhancing behaviours; Health compromising behaviours; Health Protective behaviours; Illness Management

Module 4: Promoting Human strengths and life enhancement (15 hours)
Classification of human strengths and virtues; cultivating inner strengths: Hope and optimism; Gainful Employment and Me/We Balance

Module 5: Tutorials (7 Hours)
Objective: The aim is to understand the applicability of principles learnt and solidify the understanding so as to develop the ability to design ways of better health management for the community.

Suggested Readings

**Mapping of CO’s to Syllabus**

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**PCAR407T: ADVANCED RESEARCH METHODOLOGY AND STATISTICS**

(2 Credits-30 Hours) (L-T-P: 1-0-1)

**Course Objective**

To learn about the basic concepts of research design, sampling techniques and their appropriate applicability.

**Course Outcome**

1. To understand the importance of research design, sampling techniques. (Understanding)
2. To use the measures of variability and regression prediction in research. (Applying)
3. To analyse the scope and uses of research design, sampling techniques. (Analysing)
4. To evaluate different types of research design, sampling techniques and their appropriate applicability. (Evaluating)

**Module 1: Research Design (7 Hours)**

Meaning, purpose, types of research design-experimental, non-experimental and quasi-experimental design, steps in experimentation.

**Module 2: Types of Sampling Techniques (8 Hours)**

Meaning, types, advantages and disadvantages, probability and non-probability sampling method, requisites of a good sampling method, sampling error, calculation of sample size.

**Module 3: Data Analysis (15 hours)**

Measures of Variability and Standard (z) Scores: The Range; The Interquartile and the Semi-Interquartile Range; The Variance; The Standard Deviation; Calculation of Standard Deviation; Properties and Comparison of Measures of Variability; Standard Scores (z-score); Properties of z-scores.

Regression Prediction: Meaning, types, Computation of Regression (SPSS); Mediation and Moderation Analysis; Introduction to SPSS: Getting Started with SPSS; Uses of SPSS in Statistics and Research.

**Suggested Reading:**


**Mapping of COs to Syllabus**

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**PCCI408T: CULTURAL AND INDIGENOUS PSYCHOLOGY**

(3 Credits: 45 Hours) (L-T-P: 3-0-0)

**Course Objective**
To acquire a comprehensive knowledge about the Culture and Psychology, Cultural Processes, Self-Concept, Intercultural perspective and Indian Psychological perspective and related practices.

**Course Outcomes**
1. To understand the role of culture in understanding behavior. (Understanding)
2. Analyse the psychological insights in the Indian thought traditions. (Analysing)
3. To evaluate the psychological benefits and costs of cultural competence, migration, globalization and cultural diversity. (Evaluating)
4. Discuss models of the family, self-construal and developmental pathways. (Creating)

**Module 1: Introduction to Cultural Processes (7 hours)**
Culture: Meaning, types, psychic unity and Cultural Relativity
Cultural Differences, methods and Importance of studying cultural psychology.

**Module 2: Culture and Self (15 hours)**
Self: Meaning and Definition and its relation with culture, self and identity
Culture and architecture: The Making and Remaking of Cultures: A Developmental Perspective
Concept of family and children, models of the family, self-construal and developmental pathways.

**Module 3: Intercultural Contacts (13 hours)**
Nature, psychological benefits and costs of cultural competence; Migration, globalization and cultural diversity; Management of multicultural identities.

**Module 4: Indigenous Psychology (10 hours)**
Indian Psychology – Implications and applications; Indian perspective on emotions; indigenization of psychology in India.

**Suggested Readings**

**Mapping of CO’s to Syllabus**

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SKILL ENHANCEMENT COURSES

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<tr>
<td>1</td>
<td>S E Course 1</td>
<td>PCBM105L</td>
<td>Techniques of Behaviour Modification</td>
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<td>PCPR208L</td>
<td>Peer Counselling</td>
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PCBM105L: TECHNIQUES OF BEHAVIOUR MODIFICATION
(3 Credits- 45 Hours) (L-T-P: 3-0-0)

Course Objective
To learn about the core concepts of behaviourism, theory and historical overview and various behaviour management techniques in reducing/eliminating problem behaviours.

Course Outcomes:
CO 1: Classification and categorization of various behavioural conditions. (Understanding)
CO 2: Application of behavioural assessments to identify behavioural issues among children. (Applying)
CO 3: Distinguish between problem and skilled behaviour and respective skill enhancement techniques. (Analysing)
CO 4: To explain and learn various behaviour management techniques in reducing/eliminating problem behaviours. (Evaluating)

Module 1: Introduction (10 hours)
Introduction to Behaviorism, historical overview, major theories and experiments in the field of behaviourism. Modalities of behavior – Skilled behaviour, problem behaviour.

Module 2: Behavioural Disorders (10 hours)
Understanding behavioural issues, types, nature and prevalence of behavioural issues among children and adolescence, causes of behavioural issues

Module 3- Behavioural Assessment (12 hours)
Behavioural assessment, importance of behavioural assessment, Functional analysis of problem behaviour, Behavioural Assessment Scale for Indian Children with Mental Retardation (BASIC-MR) and other assessment tools for children with behavioural issues

Module 4- Techniques of Behaviour Modification (13 hours)
Practical applications of behaviour management techniques- Reinforcement, punishment, time-out, response cost, token economy, self-management techniques.

Suggested Readings

Mapping of CO’s to Syllabus

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PCDP106L: SPORTS PSYCHOLOGY
(3 Credits: 45 Hours) (L-T-P: 3-0-0)

Course Objective
To acquire a comprehensive knowledge about the concepts of sports psychology, understanding athlete’s psychological state of mind, the anxiety and arousal management strategies and its practical implication.
Course Outcomes:
CO 1: To understand the importance and need of sports psychology.(Understanding)
CO 2: To analyse the scope and uses of the concepts of sports psychology. (Analysing)
CO 3: To use the basic concepts of sports psychology in understanding athlete’s psychological state of mind. (Applicability)
CO 4: To evaluate different types of credulous vs sceptical arguments of sports psychology from a scientific view point. (Evaluation)

Module 1: Introduction to Sports Psychology (10 hours)
Introduction to sport psychology, history of sports psychology, ethics in sports psychology - personality and the athlete, Neurophysiology of arousal - autonomic nervous system, relationship between arousal and athletic performance - inverted U theory - drive theory - alternatives to inverted U theory.

Module 2: Personality and Sports psychology (12 hours)
The credulous vs sceptical argument: Personality and sports performance - athletes versus non athletes - developmental effects of athletic participation upon personality - personality sport type - Player position and personality profile - personality profiles of athletes differing in skill level - the female athlete - the interactional model - trait- state approach - psychological profile of the elite athlete - psychological profile of the elite disabled athlete - personality typing techniques and tests in sports psychology.

Module 3: Attention and Motivation in Sports Psychology (13 hours)
a) Attention in sport - Information processing - Memory systems - measuring information - selective attention - Limited information processing capacity - attention narrowing - measuring attentional focus - attention focused training - types of attentional focus - thought stopping and centering - associative vs dissociative attentional strategies Anxiety and arousal in sport.
b) Motivation and self-confidence in sport: Achievement motivation - models of self-confidence - gender and self-confidence - effects of external rewards on intrinsic motivation - developing self-confidence and intrinsic motivation in youth sport participants - individual athlete - the coach or teacher - the parent.

Module 4: Anxiety and Arousal Adjustment Strategies (10 hours)
b) Arousal adjustment strategies - the Relaxation procedures - autogenic training - Progressive relaxation - meditation - biofeedback - hypnotis - arousal energising strategies - goal setting - pep talk - bulletin boards - publicity and news coverage - fan support - self activation - coach athlete and parent interaction - pre-competition workout, Cognitive behavioural intervention in sport.

Suggested Reading:

Mapping of COs to Syllabus

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<tr>
<th>Course Outcomes</th>
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PCPR208L: PEER COUNSELLING
(3 Credits- 45 Hours) (L-T-P: 2-0-1)

Course Objective
To Understand the basic concepts of peer counselling, role of a peer counsellor and their responsibilities.

Course Outcomes:
CO 1: Comprehend basic counselling skills, such as active listening, empathy, and problem-solving (Understanding)
CO 2: Learn the application of ethical considerations in counselling and maintaining confidentiality (Applying)
CO 3: Learn strategies for building trust and rapport with clients. (Analysing)
CO 4: To prepare students for providing effective peer counselling to their peers in various situations. (Evaluating)

Module 1: Introduction to Peer Counselling (10 hours)
Define peer counselling, role of a peer counsellor, importance of peer counselling, communication skills and its importance in counseling, ethical consideration in counselling

Module 2: Basic Counselling Skills (10 hours)
Building rapport with clients, Counselling skills- active listening, empathy and non-verbal communication, strategies for building trust, addressing client’s resistance for counselling

Module 3: Goal setting and facilitating positive change (12 hours)
Identifying client’s goals, problem solving strategies, reframing negative self-talk, developing action plans for various issues, coping strategies, closing counselling relationship and feedback

Module 4: Practical Applications (13 hours)
Group activity/Case study and presentation/Role play

Suggested Readings

Mapping of COs to Syllabus

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PROJECT

PCMP307P: MINOR PROJECT/FIELD STUDY
(4 Credits: 120 Hours) (L-T-P: 0-0-4)

Course Objective
To learn about the practical application clinical skills and therapies in the real-world setting.
Or
To learn about the practical implications of research methodologies and statistics.

Course Outcome:
1. Understand the practical application of the theoretical constructs. (Understanding)
2. Apply the theoretical concepts into practice. (Applying)
3. Choose the use of an approach(es) to suit the needs of a client/research study. (Evaluating)
4. Build an understanding regarding the meaning and goals of Counselling/research. (Creating)

Minor Project:
A minor project is an opportunity to the student for practical application of the research traditions, research designs, different research methods, data analysis and discussing the result from a scientific perspective.

Field Study:
The summer internship is a compulsory program which the students undertake after the final examinations of B.A. 6th Semester under the supervision and guidance of the site supervisors and the faculty members of the department. The programme is intended to be for a duration 15 days for which the students would be evaluated at the end of the third semester. The students are expected to gain learning experience in the following areas:
1. Observation of individual/group counselling sessions
2. Conducting mental status examinations
3. Exposure to various psychological assessment tools
4. Formulation of case reports

Module I: Introduction
Three detailed case studies to be conducted and documented. Documentation will consist of the following: beginning, first evaluation, definition of counselling goal, reason for counselling, protocols of counselling sessions, conclusion and further suggestions.

Module II: Documentation & Evaluation
Findings from the case studies are to be presented to the faculty members and students of the department. The presentation will be followed by a viva voce examination. Details of the components of evaluation and weightage attached to them are to be determined by the department and inform the students at the beginning of the semester.

Mapping of COs to Syllabus

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# INTERNSHIPS

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**PCIN107I / EDIN209I: INTERNSHIP (Exit of 1st Year or 2nd Year)**  
(4 Credits: 120 Hours)

**Course Objective**  
*To learn the application of the theoretical understanding into the clinical/counselling/industrial setting.*

**Course outcomes**
1. Classify and identify the psychological disturbance (Understanding)  
2. Apply the symptom checklist to identify the symptoms of mental illnesses. (Applying)  
3. Select appropriate psychological referral for different childhood, adolescent and adult mental health related issues. (Analysing)  
4. Evaluate the different models of mental health and illness. (Evaluating)

**Internship for Exit after completion of first year or second year**
An internship in psychology gives an opportunity to apply theories and principles one has learnt in psychology courses to the “real world” of social service agencies, medical institution, the criminal justice system, business, and industries. During an internship, one can explore career, interest, develop professional skills, observe functioning of community organizations, expand one’s clinical and interpersonal skills, and, in many cases, help others. An internship is a great opportunity to enrich one’s academic experience while making a valuable contribution to the community by making an optimal utilization of their skills.

The students have to complete an internship program under supervised guidance of the field supervisor and the faculty members for a period of 30 days for exit at the end of first or second year of graduation program. The students are required to submit an internship report including the attendance log sheet duly signed by the field supervisor, completion certificate, daily case reports (30 days) along with two case histories. During the internship program, the students are expected to gain learning experience in the following areas:

1. Observation of individual/group counselling sessions  
2. Exposure to various psychological assessment tools  
3. Formulation of case reports  
4. Recording daily activities

**Module I: Introduction**
The students will be placed in the field for a minimum of thirty days. The fieldwork setting shall be NGO’s, hospitals, clinics, schools, industrial organizations. The students are expected to apply all the psychological skills whenever applicable depending upon the organization and their service. The students should be involved in the activities of the institution and fulfill the responsibilities as requested by the agency supervisor.

**Module II: Record and Documentation**
Students shall prepare a daily report (along with 2 case/detailed psychological activity reports) of the fieldwork activities and submit it to the concerned faculty supervisor. The faculty supervisor shall provide the necessary feedback and guidance to the students.

At the end of the internship the students shall submit a summary report of the cases taken and activities done during their placement.

**Mapping of COs to Syllabus**

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<th>Course Outcomes</th>
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PCIN310I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits: 60 Hours) (L-T-P: 0-0-3)

Course Objective
To learn the application of the theoretical understanding into the clinical/counselling/industrial setting.

Course outcomes
1. Classify and categories the psychological disorders as coded in DSM and ICD (Understanding)
2. Apply diagnostic criteria to diagnose individuals with mental illnesses. (Applying)
3. Select appropriate psychological intervention for different childhood, adolescent and adult mental health related issues. (Analysing)
4. Evaluate the different models of mental health and illness. (Evaluating)

An internship in psychology gives an opportunity to apply theories and principles one has learnt in psychology courses to the “real world” of social service agencies, medical institution, the criminal justice system, business, and industries. During an internship, one can explore career, interest, develop professional skills, observe functioning of community organizations, expand one’s clinical and interpersonal skills, and, in many cases, help others. An internship is a great opportunity to enrich one’s academic experience while making a valuable contribution to the community by making an optimal utilization of their skills. The students have to complete an internship program under supervised guidance of the field supervisor and the faculty members for a period of 15 days for exit at the end of first or second year of graduation program. The students are required to submit an internship report including the attendance log sheet duly signed by the field supervisor, completion certificate, daily case reports (15 days) along with two case histories. During the internship program, the students are expected to gain learning experience in the following areas:
1. Observation of individual/group counselling sessions
2. Exposure to various psychological assessment tools
3. Formulation of case reports
4. Recording daily activities

Module I: Introduction
The students will be placed in the field for a minimum of thirty days. The fieldwork setting shall be NGO’s, hospitals, clinics, schools, industrial organizations. The students are expected to apply all the psychological skills whenever applicable depending upon the organization and their service. The students should be involved in the activities of the institution and fulfil the responsibilities as requested by the agency supervisor.

Module II: Record and Documentation
Students shall prepare a daily report (along with 2 case/detailed psychological activity reports) of the fieldwork activities and submit it to the concerned faculty supervisor. The faculty supervisor shall provide the necessary feedback and guidance to the students.
At the end of the internship the students shall submit a summary report of the cases taken and activities done during their placement.

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RESEARCH PROJECT /DISSERTATION

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<td>Research Project Phase I</td>
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<th>BA PSYCHOLOGY (Honours) with Research</th>
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BA PSYCHOLOGY (Honours)

PCDI409P: RESEARCH PROJECT PHASE I
(6 credits – 180 hours) (L-T-P: 0-0-12)

The Research Project is an extended essay that represents a question or statement for analysis and interpretation of the results based on existing literature. A research project enables the students to represent their own innovative ideas and critical analysis to represent the existing gaps of literature. Research Project Phase I includes presentation of Title of the Project, Literature Review, Objective, Research Questions, and Methodology of the Study. The evaluation includes presentation of the research work followed by Viva Voce examination (100 Marks).

PCDI410P: RESEARCH PROJECT PHASE II
(6 credits – 180 hours) (L-T-P: 0-0-12)

The Research Project is an extended essay that represents a question or statement for analysis and interpretation of the results based on existing literature. A research project enables the students to represent their own innovative ideas and critical analysis to represent the existing gaps of literature. Research Project Phase II includes complete presentation of the research work including data analysis, interpretation, conclusion, limitation and future directions. The evaluation includes presentation of the research work followed by Viva Voce examination (100 Marks).

BA PSYCHOLOGY (Honours) with Research

PCDI411P: DISSERTATION I
(18 Credits -540 Hours) (L-T-P: 0-0-36)

Every student shall undertake a research project work under the supervision and guidance of a faculty member. The student may choose the topic of research and start the preliminary work by the end of the second semester. The students are expected to complete the Literature Review followed by a Literature Review presentation and the Proposal presentation during the Phase I. Students are expected to complete the data collection. The report of the Phase-I is to be submitted to the department before the date notified. The mode and components of evaluation of Phase I and Phase II of the research project and the weightages (Full Marks: 100) attached to them shall be published by the Department at the beginning of the semester. There shall be a power point presentation along followed by viva voce examination on the research work.

PCDI412P: DISSERTATION II
(20 Credits -600 Hours) (L-T-P: 0-0-40)

Every student shall undertake a research project work under the supervision and guidance of a faculty member. The student may choose the topic of research and start the preliminary work by the end of the 7th semester. The students are expected to complete the Literature Review followed by a Literature Review presentation and the Proposal presentation during the Phase I. Students are expected to complete the data collection by the end of 7th semester. Phase II of the Dissertation should ideally be undertaken during 8th semester. The thesis is to be submitted to the department before the date notified. The mode and components of evaluation of Phase I (Full Marks: 100) and Phase II (Full Marks: 100) of the research project and the weightages attached to them shall be published by the Department at the beginning of the semester. There shall be a power point presentation followed by the viva voce examination on the research project.
DEPARTMENT OF PUBLIC ADMINISTRATION

PROGRAMME: BA PUBLIC ADMINISTRATION (HONOURS)/BA PUBLIC ADMINISTRATION (RESEARCH)

VISION:
Our unwavering commitment is to emerge as a distinguished centre of excellence in the domain of Public Administration, embodying unparalleled standards in learning, teaching, and research. Through the provision of bespoke experiences, we strive to instill profound human values, ultimately fostering nation-building.

MISSION:
- Strive for academic excellence by delivering high-quality education, research, and practical training in Public Administration, fostering a deep understanding of theoretical frameworks and practical applications.
- Cultivate and nurture visionary leaders with the skills to navigate complex public sector challenges, promoting effective governance and upholding the highest standards of ethical conduct in public service roles.
- Encourage cutting-edge research initiatives that address contemporary societal issues, while fostering strong ties with the community and relevant stakeholders to drive positive societal development.
- Provide a personalized learning environment, catering to individual needs and aspirations, maximizing student potential for growth, success, and lifelong learning in the field.
- Enhance global awareness and prepare students to contribute effectively in an interconnected world, while dedicating efforts to contribute significantly to nation-building through competent and socially responsible public administrators driving positive change and sustainable development.

PROGRAM OUTCOMES (POs)
PO 1: Knowledge Acquisition: Ability to demonstrate a deep understanding of the principles, theories, and practices in Public Administration, acquired through rigorous academic training, research, and practical experiences.
PO 2: Ethical Decision-making: Ability to exhibit ethical leadership qualities and the ability to make principled decisions while navigating complex public sector challenges, demonstrating a commitment to upholding ethical standards and social responsibility.
PO 3: Practical Application: Equipped with the skills and competencies to apply the theoretical knowledge effectively in real-world scenarios, through internships, projects, and experiential learning opportunities.
PO 4: Interdisciplinary Perspective: Development of a holistic perspective of Public Administration by integrating knowledge from various disciplines, enabling them to analyze public governance issues from a broader societal context.
PO 5: Effective Communication: Ability to demonstrate proficiency in oral and written communication, enabling them to convey complex ideas, policies, and recommendations clearly to diverse stakeholders.
PO 6: Problem-solving and Analytical Skills: The ability to be adept at critical thinking, problem-solving, and data analysis enables them to identify and address public administration challenges with innovative and evidence-based solutions.
PO 7: Community Engagement and Impact: The ability to actively engage with local and global communities, demonstrating a commitment to community welfare through participation in service projects, research initiatives, and collaborations with public organizations to effect positive change and contribute to nation-building efforts.

PROGRAMME SPECIFIC OUTCOMES (PSOs)
PSO 1: To exhibit an in-depth understanding of advanced principles, theories, and contemporary practices in Public Administration, acquired through specialized academic training and extensive research exposure.
PSO 2: To demonstrate a high level of ethical leadership and decision-making skills, exemplifying their ability to navigate intricate challenges within the public sector while upholding moral standards and social responsibility.
PSO 3: To demonstrate exceptional proficiency in applying theoretical knowledge to real-world scenarios, effectively utilizing their skills and competencies gained through internships, projects, and experiential learning opportunities.
PSO 4: To develop a comprehensive and integrated analytical perspective in Public Administration, synthesizing knowledge from diverse disciplines to address public governance issues from a multidimensional societal context effectively.

LIST OF COURSES

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### Skill Enhancement Courses

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DETAILED SYLLABUS

MAJOR COURSES

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PAIP100T: INTRODUCTION TO PUBLIC ADMINISTRATION

(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students will be able to:
CO1: Recall the various aspects and significance of Public Administration as a theoretical discipline (Remembering).
CO2: Explain various growth and trends in Public Administration (Understanding).
CO3: Identify the various forms and principles of Organizations (Applying).
CO4: Examine the Role and functions of the chief Executive, Line, staff, auxiliary agencies and the relationship that exist among them (Evaluating).

Module I: Public Administration as a Discipline (15 hours)
Meaning, Nature, Scope, Dimensions and Significance of the discipline and its relations with social sciences, Public and Private Administration, Evolution of Public Administration

Module II: Growth and Trends in Public Administration (15 hours)
New Public Administration (NPA), New Public Management (NPM), Globalization and Public Administration, Paradigm Shift from Government to Governance, New Public Service (NPS)

Module III: Organization and its Principles (15 hours)

Module IV: Chief Executive, Leadership and Accountability (15 hours)
Chief Executive: Meaning, Types, Functions and Role; Line, Staff and Auxiliary Agencies; Headquarter and Field relationships; Decision Making; Communication; Leadership; Accountability

Suggested Readings

Mapping of COs to Syllabus

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PAAT101T: ADMINISTRATIVE THEORY
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students will be able to:
CO1: Recall various administrative theories (Remembering).
CO2: Illustrate the different phases in the development of the theoretical constructs of Public Administration (Understanding).
CO3: Identify the philosophy and principles of Public Administration as expounded by various thinkers (Applying).
CO4: Compare and contrast the classical theories with the modern/contemporary theories of Public Administration (Analysing).

Module I (20 hours)
Indian and Classical Theories: Kautilya; Scientific management (Taylor and his associates); Bureaucratic theory of organization (Weber); Administrative management theory (Henry Fayol, Luther Gulick and others).

Module II (20 Hours)
Human Relations and Behavioural Theories: Human Relations theory (Elton Mayo and his Colleagues); Behavioral theory (Chester Barnard and Herbert Simon).

Module III (20 Hours)
Administrative Behaviour Theories: Leadership; Communication; and Motivation (Maslow and Herzberg), Modern Administrative Theories: Minnowbrook Perspectives; New Public Service

Suggested Readings

Mapping of COs to Syllabus

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PAIA200T: INDIAN ADMINISTRATION
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the significant stages in the evolution of the Indian Administration (Remembering).
CO2: Explain the Roles and Functions of Constitutional Institutions (Understanding).
CO3: Identify the relationship existing between the various organs of Administration (Applying).
CO4: Examine the constitutional provisions and dynamics of the union-state relationship (Analysing)
Module I (20 hours)
Evolution & Constitutional Framework: Evolution of Indian Administration during Ancient, Medieval and British period; Constitutional Framework of Indian Administration; and Salient Features of Indian Administration

Module II (15 hours)
Union Government: President; Prime Minister & Council of Ministers; Central Secretariat, Cabinet Secretariat, Cabinet Committees, Prime Minister Office; Ministry of Home Affairs and Finance Ministry.

Module III (20 hours)
Constitutional Institutions, Union State Relations & Control over Administration: Election Commission of India; Union Public Service Commission; Union State Relations (Legislative, Executive and Financial); Parliamentary, Executive and Judicial Control over Administration

Module IV (20 hours)
Citizen and State Interface: Citizens’ Grievances Redressal Institutions and Mechanisms; Institutional Mechanism for Prevention of Corruption: Central Vigilance Commission; Lok Pal and Lok Ayukta; Politician and Civil Servant relationship.

Suggested Readings

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PAPP201T: PUBLIC POLICY AND GOVERNANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course, students are able to:
CO1: Recall significance and scope, Public Policy Approaches and Models (Remembering).
CO2: Explain various concepts and theories of Governance (Understanding).
CO3: Identify the Role of various stakeholders in Public Policy Formulation (Applying).
CO4: Examine the various aspects of Policy Implementation, Policy Education and Policy Evaluation. (Analyzing)

Module I: Introduction (15 hours)
Public Policy: Concept, Significance and Scope; Public Policy Approaches and Models with special reference to the Incrementalist and Rationalist Paradigms. Policy Cycle, Constraints in the policy process

Module II: Concepts and Theories of Governance (15 hours)
Governance as per the World Bank, UNDP and others; Public Choice Theory, Public Value Theory; Governance as Theory, Governance and Public Governance; Role of State, Market and Civil Society in Governance.

Module III: Role of Various stakeholders in Public Policy formulation (15 hours)
Role of Legislature, Executive, Judiciary, Planning Machinery at the Central, State and local levels

Module IV: Public Policy Implementation, Education and Evaluation (15 hours)

Suggested Readings

Mapping of COs to Syllabus

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PADA202T: DEVELOPMENT ADMINISTRATION
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Show a basic intellectual understanding of development, its approaches and sustainable development (Understanding)
CO2: Recall the concepts of Development Administration including the ecological and post-globalization contexts (Remembering)
CO3: Identify the various issues in Development Administration (Applying)
CO4: Classify the various perspectives on Public Private Partnership, Corporate Social Responsibility, Inclusive Development, and Sustainable Development Goals (Analysing)

Module I: Introduction (15 hours)
Development and its dimensions; Development and Modernization; Approaches to Development; Ecology of Development Administration; Sustainable Development and Anti-Development

Module II: Conceptual Constructs (15 hours)
Development Administration – concept, nature, scope and objectives; Features and Significance of Development Administration; Contribution of Ralph Braibanti, Edward Weidner, Fred W. Riggs and Dwight Waldo.

Module III: Issues in Development Administration (15 hours)
Globalization and Development Administration; Emergence of Non-State Actors in Development Administration; Gender Parity in Development; Role of Bureaucracy in Development

Module IV: New Perspectives of Development (15 hours)
Public Private Partnership; Corporate Social Responsibility; Inclusive Development; Sustainable Development Goals (SDGs); Human Development Indicators and Social Audit

Suggested Readings

Mapping of COs to Syllabus

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PACP203T: COMPARATIVE PUBLIC ADMINISTRATION
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall meaning, scope, and salient features of comparative Public Administration. (Remembering)
CO2: Explain the relevance of Comparative Public Administration in the context of Liberalization,Privatization and Globalization. (Understanding)
CO3: Identify the various approaches in the Study of Comparative Public Administration (Applying)
CO 4: Compare and contrast the grievance redressal mechanisms in UK, USA and Japan

Module I (25 Hours)
Introduction: Comparative Public Administration: Meaning, Nature, Scope and Significance. Relevance of Comparative Public Administration in the era of Liberalization, Privatization and Globalization, Salient Features of Administration in Developed & Developing Countries: UK, USA, Japan and India.

Module II (10 Hours)
Approaches: Structural-Functional M Approach; and Ecological Approach

Module III (25 hours)
Administrative Systems & Accountability: Grievance Redressal Mechanism of UK, USA, Japan, Local government of UK, USA, Japan.

Suggested Readings

Mapping of COs to Syllabus

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PAAE204T: ADMINISTRATIVE ETHICS IN GOVERNANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the concepts of Dharma, Freedom, Equality and Fraternity (Remembering)
CO2: Explain the practices of Satyagraha and truth in the present context (Understanding)
CO3: Identify the ethical principles used in addressing issues of inequalities (Applying)
CO4: Examine the functioning of the institutions like Lokpal and Lokayuktah through case studies (Analyzing)

Module I (20 Hours)
Module II (20 Hours)
Applied Ethics: Issues of Inequality, Abortion, Foeticide, Suicide, Environment Degradation, Capital Punishment; Significance of Ethical and Moral Values in Governance, Nature of Moral Dilemmas

Module III (20 hours)

Suggested Readings

Mapping of COs to Syllabus

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PAAL300T: ADMINISTRATIVE LAW
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the principles of natural justice, rule of law, administrative legislation, and adjudication (Remembering)
CO2: Explain the constitutional law, administrative law and droit administratif (Understanding)
CO3: Identify the merits and demerits of administrative tribunals and especially Central Administrative Tribunals (Applying)
CO4: Examine the evolution, growth and concept of ombudsman, lokpal and lokayukta and central vigilance commission (Analyzing)

Module I (20 Hours)

Module II (25 Hours)

Module III (30 hours)

Suggested Readings

Mapping of COs to Syllabus

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PAEG301T: ENVIRONMENTAL GOVERNANCE
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course, students are able to:
CO1: Recall the key concepts of environment, natural resources, biodiversity and Conservation and Management of waste. (Remembering)
CO2: Explain the environmental policies, Environmental Impact Assessment, Impact Prediction, Evaluation and Mitigation. (Understanding)
CO3: Identify the Structure, Functions and Role of Central Pollution Control Board, State Pollution Control Board and National Green Tribunal. (Applying)
CO4: Examine the Global Environment Issues, Role of UNEP and Sustainable Development Goals and Environment. (Analyzing)

Module I: Conceptual constructs (20 hours)

Module II: Environment Policies and Evaluation (10 hours)
National Environment Policy, 2006; Environmental Impact Assessment; and Impact Prediction, Evaluation and Mitigation

Module III: Environmental Administration (15 hours)
Ministry of Environment; Central Pollution Control Board – Structure, Functions and Role; State Pollution Control Board – Structure, Functions and Role; National Green Tribunal

Module IV: International Perspective (30 hours)

Suggested Readings

Mapping of COs to Syllabus

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PAGO302T: E-GOVERNANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the concepts, Scope and Significance of governance. (Remembering)
CO2: Explain the various perspectives and theories of Governance. (Understanding)
CO3: Identify the various e-governance initiatives undertaken to deliver Public services to the stakeholders. (Applying)
CO4: Developing necessary skills to use and operate e-governance or digital service delivery. (Applying)

CO5: Examine the legal frame works, Issues & Challenges for e-Governance in India. (Analyzing)

Module I: E-Governance (15 hours)
Concepts and Initiatives: Meaning, Definitions, Scope (Including stages and types of interactions in e-Governance) and Significance of e-Governance

Module II: Perspectives and Theories (15 hours)
Theories of e-Governance (Six perspectives and six theories), Models of e-Governance (The General Information Dissemination Model, the Critical Information Dissemination Model, the Advocacy Model, the Interactive Model)

Module III: Growth of E-Governance (15 hours)
Growth of e-Governance initiatives in India, Pre-National e-Governance Plan and Post NeGP (NeGP 2006), e-Governance Initiatives in the area of Government to Citizens (G2C), Government to Business (G2B) and Government to Government (G2G).

Module IV: Legal Framework, Issues & Challenges for e-Governance (15 hours)
IT Act – 2000 (ICT Act and important features of the Act); Information and Cyber Security. e-Readiness; Digital Divide (Gender, Geographic, Economic, Social and Political); Challenges; Resistance to Change, Capacity Building, Adaptation of Technology and Administrative Reforms.

Suggested Readings
4. Bouwman, Harry; Hooff, Bart van den; Vingaert, Lidwien van de; and Dijk, Jan van (2005)
5. Information and Communication Technology in Organizations: Adoption, Implementation, Uses and Effects, Sage Publications: New Delhi

Mapping of COs to Syllabus

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PARL303T: RURAL LOCAL GOVERNANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the meaning and significance of Rural Local Governance and the Community Development Programs. (Remembering)

CO2: Explain the evolution and growth of rural local governance with special reference to Panchayati raj institutions in India. (Understanding)

CO3: Identify the composition, functions and role of Gram Panchayat, Panchayat Samiti and Zila Parishad. (Applying)

CO4: Appraise the role and relationships of rural local democratic decentralized institutions (PRIs) with other institutions. (Evaluating)

Module I (20 Hours)
Introduction: Rural local governance- meaning and significance; Community development programs and committees and commissions on Panchayati Raj constituted by the Government of India.

Module II (20 Hours)
Panchayati Raj Institutions: 73rd Constitutional Amendment Act, 1992; Gram Sabha – composition, functions and role; Gram Panchayat – composition, functions and role; Panchayat Samiti – composition, functions and role; and Zila Parishad – composition, functions and role.
Module III (20 Hours)
Institutional Framework for PRIs: District Rural Development Agency; District Planning Committee; State Election Commission; State Finance Commission. Panchayati Raj Finance; Devolution of powers, functions (shifted from Module IV)

Suggested Readings

Mapping of COs to Syllabus

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PAUL304T: URBAN LOCAL GOVERNANCE
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Show the evolution and growth of urban local bodies in India. (Remembering)
CO2: Explain the composition, role, functions and resources of urban local governance. (Understanding)
CO3: Examine the relevance of relevance of the various Urban Development Programs and Governance. (Analyse)
CO4: Identify the various issue areas in Urban Governance. (Applying)

Module I: Introduction (15 hours)
Evolution of Local Governance in India, Urbanization: Concept; Trends; Challenges; Rural-Urban relationship.

Module II: Organizational Framework for Urban Governance (15 hours)
74th Constitutional Amendment Act; Structure, Composition and Functions of Metropolitan Committees, Municipal Corporations, Municipal Councils and Nagar Panchayats; State Finance Commission; State Election Commission

Module III: Urban Development Programmes and Urban Governance (15 hours)
Urban Development Programmes like AMRUT, NUHM etc.; SMART cities and other recent trends;

Module IV: Issue Areas in Urban Governance (15 hours)
Sources of Finance of Urban Local Government; Personnel Administration; Bureaucracy and Local Governance, State-Local relations; Globalization and urban governance; Administrative Reforms in Local Governance

Suggested Readings

Mapping of COs to Syllabus

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PASW305T: SOCIAL AND WELFARE ADMINISTRATION
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall Key concepts of Social Administration and its significance in India (Remembering)
CO2: Explain the various scopes, principles and Organisations under Social Welfare Administration. (Understanding)
CO3: Identify the Role, Importance of social welfare, Personnel Administration in the states in India. (Applying)
CO4: Examine the various Issues and Problems in Social Administration in India (Analysing)

Module I: Social Administration: An Introduction (10 Hours)

Module II: Social Welfare Administration (20 Hours)

Module III: Directorate of Social Welfare in states (20 Hours)
Role, Importance of social welfare, Personnel Administration: Manpower planning, Induction, Training, Supervision, Staff Welfare, Service Condition and Staff Morale, Problems faced by social work organisation, Laws related to Personnel Management

Module IV: Issues and Problems in Social Administration (10 Hours)
Social Administration and the Role of Civil Society, Globalization and Role of International Agencies, Role of administrators in Social Administration, Emerging Challenges to Social Administration in India: Administrative inefficiency and demotivation.

Suggested Readings

Mapping of COs to Syllabus

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PARW306P: FIELD BASED LEARNING / MINOR PROJECT: Excursion/ A survey in Urban/Rural areas and report writing (4 Credits - 120 Hours) (L-T-P: 0-0-4)

PAFA400T: PUBLIC FINANCIAL ADMINISTRATION
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Understand the various aspects of Public Financial Administration in general and in the Indian context in particular (Understanding)
CO2: Explain the public budgeting and financial resource mobilization strategies in the Indian context (Understanding)
CO3: Identify the functions and relations of financial institutions. (Applying)
CO4: Examine the role of the Comptroller and Auditor General and Legislative Control over finances in Public Financial Administration. (Analyzing)
Module I: Introduction (15 hours)
Meaning and Significance of Public Finance and Public Financial Administration, Budget: Concept, Principles and Budget as an Instrument of Financial Administration,

Module II: Budgetary systems, Concept and Types of Budgets (20 hours)
Traditional Budgeting; Performance Budgeting; and Zero-Base Budgeting, Budget Preparation, Authorization and Execution with special reference to India

Module III: Financial Institutions and Union–State Financial relations (20 hours)

Module IV: Resource Mobilization, Tax Administration and Financial Control (20 hours)

Suggested Readings

Mapping of COs to Syllabus

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PAPA401T: PUBLIC PERSONNEL ADMINISTRATION
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Understand Key concepts and knowledge relating to Public Personnel Administration. (Understanding)
CO2: Explain the concepts and types of Career Systems, Classifications, Recruitment and Training. (Understanding)
CO3: Identify the Constitutional Provisions and the working of the recruitment agencies at Union and state levels. (Applying)
CO4: Examine various mechanisms and their role in Public Personnel Administration and the role of Employee associations and other adjudications institutions (Analysing)

Module I: Introduction: Public Personnel Administration (10 hours)

Module II: Civil Service System: Career Systems (10 hours)
Concepts and types; Classification – Concepts and types; Recruitment; Training; Salary; Code of Conduct

Module III: Public Personnel system in India-I (20 hours)
Constitutional Provisions; Recruitment agencies at the Union and State levels; Recruitment, training, career advancement; position classification, discipline, performance appraisal, promotion, pay and service conditions.

Module IV: Human Resources and Personnel Management (20 hours)
Importance of Human resource development, Significance of Personnel Management, Advantages and Disadvantages of Bureaucratic System, Merit system and Spoils System, Hindrances to career development.
Module V: Personnel Mechanism (15 hours)
Employer-Employees Relations, Grievance, Redressal mechanism, Right to Form Associations, Joint-Consultative Council; Central Administrative Tribunal; Recent Civil Service Reforms.

Suggested Readings
2. Sharma M. K., Personnel Administration, Anmol Publications Pvt Ltd

Mapping of COs to Syllabus

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PAEP402T: ENGAGED POLICY AND GOVERNANCE
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

Course Outcomes
At the end of this course students are able to:
CO1: Understand key concepts of Participatory Governance; and Relations between Participatory Governance and Deepening of Democracy (Understanding)
CO2: Explain the Pitfalls in Participatory Governance and the debate on democracy versus development (Understanding)
CO3: Identify issues related to Community engagement at the Grassroots Level (Applying)
CO4: Examine issues of local Engagement and Participation (Analysing)

Module I: Participatory Governance: An Overview (15 hours)
The Rationale of Participation: Concepts and Challenges; New Governance Paradigm: The Emerging Partnerships/Engagement Initiatives; Relations between Participatory Governance and Deepening of Democracy

Module II: Democracy, Social Inclusion and Development (20 hours)
Democracy and Development; Cross-country analysis of democracy and development between India and China; Political Regimes, Political Participation and Social Inclusion; Innovations and Pitfalls in Participatory Governance

Module III: Engaged Governance (15 hours)
Government Transparency in Policy Decisions; Engaging the Community at Grassroots Level; Electronic Platforms for Receiving and Implementing Public Input

Module IV: Participatory Local Governance (25 hours)
Participatory Governance Toolkits; Measuring Engagement or Participation; Issues in Engagement and Participation; Case Studies a) Kudumbashree in Kerala, India b) Grameen Bank in Bangladesh c) Participatory Budgeting, Brazil d) Watershed Development Programme in Ralegansiddhi, India

Suggested Readings

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**PAGA403T: GOVERNANCE & ADMINISTRATION IN SOUTH EAST ASIA**
(5 Credits – 75 Hours) (L-T-P: 4-1-0)

**Course Outcomes**
At the end of this course students are able to:
CO1: Show the historical background of South East Asia, Its geo-political status, Nature of Governance and Administration (Understanding)
CO2: Explain the Political structures and forms of Southeast Asian countries (Understanding)
CO3: Identify Contemporary issues in Southeast Asia (Applying)
CO4: Appraise the importance of South-East Asia in International Politics and relations (Evaluating)

**Module I: Introduction to Southeast Asia (15 hours)**
Southeast Asia and its formation; Historical background; Southeast Asia’s geo-political status; nature of governance and administration of Southeast Asia; Case studies

**Module II: Governance and administration of Southeast Asian Countries (20 hours)**
Political structures and forms of Southeast Asian countries; Government Systems; Administrative Governance; Political governance; Economic governance; Debate on Southeast Asia as a model of governance and administration for the rest of the World; Case studies

**Module III: Contemporary issues in Southeast Asia (20 hours)**
Democracy vs Dictatorship; Religion and politics of divide; Terrorism; Population Explosion; Environmental Problem; Aggression and Territorial Disputes; Poverty and underdevelopment; Case studies

**Module IV: Importance of Southeast Asia in international politics and relations (20 hours)**
Economic Influence; Political Changes and impacts; Master Plan on ASEAN connectivity and achievements; International responses and reactions to Southeast Asia; Case studies

**Suggested Readings**
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## MINOR COURSES
(HUMAN RIGHTS – HR/INTERNATIONAL RELATIONS - IR/PUBLIC POLICY-PP/ HISTORY-HI)

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## MINOR COURSES IN HUMAN RIGHTS

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## MINOR COURSES IN PUBLIC POLICY

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MINOR COURSES IN HISTORY

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MINOR COURSES IN HUMAN RIGHTS

PAHR102T: INTRODUCTION TO HUMAN RIGHTS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
CO1: Recall the concepts of human rights and International efforts to develop Human Rights norms. (Remembering)
CO2: Explain the nature and significance of UDHR, and the role of non-governmental organisations on human rights (Understanding)
CO3: Identify the nature and types of rights provided by the International Covenant on Civil and Political Rights, and the procedure to file complaints (Applying)
CO4: Compare and Contrast the state’s obligations for implementing ICESCR and the Economic, Social and Cultural Rights provided under the Indian Constitution. (Analysing)

Module I: Understanding Human Rights (15 hours)
Meaning of Human Rights; Kinds and Nature of Human Rights; International efforts to develop Human Rights norms

Module II: UDHR (15 hours)
Objectives, Nature, and importance of UDHR; Worldwide Influence of UDHR; NGOs on Human Rights

Module III: ICCPR (15 hours)
Nature of International Covenant on Civil and Political Rights (ICCPR); types of Rights provided by the ICCPR; The procedure to file complaints

Module IV: ICESCR (15 hours)
International Covenant on Economic, Social and Cultural Rights (ICESCR); The Nature of obligations under ICESCR; Economic, Social and Cultural Rights under the Indian Constitution

Suggested Readings

Mapping of COs to Syllabus

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PAPA104T: ENVIRONMENTAL POLICY AND ADMINISTRATION
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course, students would be able to:
CO1: Recall major Environmental Policy and legislations in India (Remembering)
CO2: Show the environmental issues in India (Understanding)
CO3: Identify the impact of urbanization on the Environment (Applying)
CO4: Appraise the level of Environmental Protection in India (Evaluating)

Module I: Environmental issues in India (15 hours)
Nature of Environmental Problems in India; Environmental policy and Legislation in India; Implementation of Laws relating to Environmental Protection

Module II: Development and Environment (15 hours)
Development – Environment Discourse; Global Environmental Governance

Module III: Urbanization (15 hours)
Urban Environmental administration and politics in India; Impact of urbanization on Environment and Public Health

Module IV: Urban Environmental administration (15 hours)
Environmental Protection and People’s rights and duties; Steps taken by the government for environmental protection in recent years; case studies on environmental degradation

Suggested Readings

Mapping of COs to Syllabus

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PARI205T: HUMAN RIGHTS IN INDIA
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course, students are able to:
CO1: Understand the historical context of human rights in India (remembering/ understanding)
CO2: Analyse how Indian tradition and the Constitution promote human rights (analysis/ evaluation)
CO3: Analyse the mechanism for human rights mechanism in India (analysis/ evaluation)
CO4: Analyse the threats to Human Rights from state and Social Institutions (analysis/ evaluation)

Module I: Human Rights in Historical Context (15 hours)
Right to Set Determination; Colonialism and Human Rights; National Movement and Human Rights

Module II: Human Rights - India’s Heritage (15 hours)
Human rights in Indian tradition; Human rights in the Constitution of India

Module III: Mechanisms for Human Rights Protection (15 hours)
Human Rights and the Law; Special Institutions to Protect Human Rights

Module IV: Threats to Human Rights (15 hours)
Human Rights and The State; Threats to Human Rights from Social Institutions; Case studies on the violation of human rights

Suggested Readings

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### MINOR COURSES IN INTERNATIONAL RELATIONS

**PAII103T: INTRODUCTION TO INTERNATIONAL RELATIONS**  
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

**Course Outcomes**

CO1: Recall the various concepts related to International Relations. (Remembering)

CO2: Explain the various issues related to International Relations (Understanding)

CO3: Identify the roles, functions and areas of influence of various regional and International Organisations (Applying)

CO4: Examine the various Power Shifts in International Relations and Emergence of India in the Post Covid 19 Scenario. (Analysis)

**Module I: Introduction and Basic concepts of IR (20 hours)**

a) Introduction: Definition of IR; Characteristics/nature of IR; Why study IR – Development of IR as discipline, Impact of Globalisation on IR- Global South and IR

b) Actors and processes in IR: States and Non-State Actors (IGO’s, NGO’s, MNC’s and terrorist groups).


d) National Interest and Foreign Policy – Determinants of FP – Foreign Policy Making – India, USA and China

e) Balance of Power – Bi-Polar/Unipolar/Multi-Polar and Non-Polarity- Soft balancing.

**Module II: Issues in Contemporary IR (15 hours)**

International Terrorism, Nuclear Proliferation, Human Security, Climate Change and Environmental Security, Energy Security, Natural resource scarcity, Pandemic and Disaster Management; IR In Covid and Post Covid

**Module III: Regional and International Organizations (10 hours)**

UN Reform – EU -SAARC – BIMSTEC-SCO- BRICS-RCEP

**Module IV: Global Power Shift and IR (15 hours)**


### Suggested Readings

1. Michel, Torsten (2023): *The Rhetoric of Inquiry in International Relations: A Hermeneutic Investigation into the Forms of Argumentation in International Relations Meta-Theory: Routledge*


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PAET206T: EMERGING TRENDS IN INTERNATIONAL RELATIONS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course, students are able to:
CO 1: Explain the origins and consequences of the Cold War and changing pattern of world order (Understanding)
CO 2: Identify the differences between Regionalism and Globalization and understand the crisis in the global economy (Applying)
CO 3: Examine the major contemporary issues in IR (Analyzing)
CO 4: Appraise the challenges to Regional Peace and Security (Evaluating)

Module I: Changing Patterns of World Order (15 hours)
Globalisation and the Crisis of the Unipolar World, Shift from the Balance of Power to Bipolarity, Multipolarity and Polycentrism, Democratisation and the World Order

Module II: New Thrust on International Cooperation and Emergence of IGOS (International Governmental Organizations):
(15 hours)
UNO’s changing role, EEC (European Economic Community), SAARC, OIC (Organisation of Islamic Cooperation), BRICS, G20,... Shanghai

Module III: Major Contemporary Issues (15 hours)
Multilateralism and polarity, Democracy, global regression and resistance Protracted Brexit, Iran: scope and consequences of the sanctions

Module IV: Contemporary Challenges to Regional Peace and Security (15 hours)
Flexibility and Fluidity of Regional Politics, Arms Modernization and Nuclear Proliferation, Territorial Disputes, Rapid Economic Development and Regional Peace and Security, New Challenges to Peace and Security, China way of Globalisation, - China, Sri Lanka, Pakistan – BRI of China -one road policy, India way of Globalisation

Suggested Readings
1. Imtiaz, Mughiza Imtiaz (2018): Emerging Trends in International Relations: Unipolarity to Multi-polarity

Mapping of COs to Syllabus

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PARC207T: REFUGEES AND INTERNATIONAL CONFLICTS
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the history, scope and significance of refugee studies (Remembering)
CO2: Explain the trends and status of refugees in Asia and Africa (Understanding)
CO3: Identify the impact of Refugee crisis in the host states (Applying)
CO4: Examine the Responses to Refugee situations and strategies of Negotiations (Analyzing)

Module I: Refugee Crises: Conceptual analysis & Contemporary Dimensions (15 Hours)
Definition, history and overview, global scale, scope and significance of refugee studies, spatial mobility in social theory,
international law and conventions for refugees

Module II: Refugee Crises: Case Studies (10 Hours)
Causes, trends and status of refugees in Asia and Africa: Palestinian, Afghan, Rohingya, Libyan and Syrian refugees, Status of refugees in host states

Module III: Impact of Refugee Crises (10 Hours)
Attitude of host states, Impact on society, politics and economy of host states, case studies: Europe and West Asia

Module IV: Response to Refugee Situations: Role of Humanitarian Actors (20 Hours)
National, Regional and International Actors: UNHCR, UNRWA, Red Cross, Red Crescent, NGOs, achievements, failure and challenges

Module V: Strategies of Negotiations and Solutions (15 Hours)
Issue of citizenship and identity in a globalized world, questions of repatriation, rehabilitation and resettlement, Urgent needs

Suggested Readings

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PAFP307T: FOREIGN POLICY OF INDIA
(4 Credits - 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Recall the principles and Phases of Indian Foreign Policy. (Remembering)
CO2: Explain India’s engagement with Super Powers and International Institutions. (Understanding)
CO3: Identify the various determinants of India’s Policy towards its Neighbours. (Applying)
CO4: Examine the role of India in relation to Major International Issues. (Analyzing)

Module I: Foreign policy of India: An Overview (15 hours)
Legacies- Strategic Thinkers- Determinants- Principles- Structure and Process- Phases of Indian Foreign Policy

Module II: India’s engagement with Superpowers and International Institutions (15 hours)
USA- Russia- China- EU- UN- SAARC- ASEAN- G-77- G- 20- BRICS- BIMSTEC
Module III: India and its Neighbours (15 hours)
Policy towards Immediate and Extended Neighbours- Defence- Energy Security- Trade; cyber security

Module IV: India and major International Issues (15 hours)
UNSC Reform- Terrorism- Maritime Security- International Migration- Palestine Problem-Environmental Governance- Military Intervention- Nuclear Issue

Suggested Readings

Mapping of COs to Syllabus

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PACG406T: CHINA AND GLOBAL SYSTEM
(3 Credits - 45Hours) (L-T-P: 3-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Explain China’s foreign policy and world view. (Understanding)
CO2: Identify Salient aspects of China’s relations with US, Russia, EU and Japan. (Applying)
CO3: Examine issues of China’s engagement with regions. (Applying)
CO4: Appraise the Rise of China in relation to Global. (Evaluating)

Module I: Rise of China and the debate on Asian Century (10 Hours)
a) Theoretical Explanations
b) China’s Foreign policy and World view- Peaceful Rise and State power
c) China’s perspectives on Asian Century

Module II: China and Global powers (10 Hours)
a) US- China relations
b) Russia- China relations
c) EU-China relations
d) Japan – China

Module III: China’s engagement with the regions (15 Hours)
a) OBOR
b) Neighbourhood policy – South Asia- East Asia and South East Asia
c) Territorial disputes: Maritime disputes; South China Sea Boundary dispute; India China border dispute

Module IV: Rise of China and Global Governance (10 Hours)
a) United Nations
b) Climate Change negotiations
c) BRICS- SCO
d) Global Commons

Suggested Readings

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MINOR COURSES IN PUBLIC POLICY

PASP105T: POLICY MAKING – STRUCTURES AND PROCESSES
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course, students would be able to:
CO1: Recall the basic concepts of Public Policy. (Remembering)
CO2: Explain the role of different institutions involved in policy making in India. (Understanding)
CO3: Identify various techniques and approaches of policy formulation. (Applying)
CO4: Examine the impact of globalization in policy making. (Analyzing)

Module I: Introduction to Public Policy (15 Hours)
Meaning, Nature, Scope and Significance; Public Policy and Public Administration, Policy Cycle

Module II: Policy Making Structures (15 Hours)
Inter-Governmental Relations; Role of Legislature; Role of Executive; Role of Judiciary; Role of Bureaucracy; Challenges in Policy Making

Module III: Policy Making Strategies (15 Hours)
Techniques of Policy Formulation; Approaches/Models of Policy Making; Agencies involved in Policy Making; Informal Channels of Policy Making.

Module IV: Public Policy and Globalization: (15 Hours)
Impact of Globalization on Public Policy Making Process; Public Policy and LPG, International Organizations influencing Policy Making; Role of Private Sector in Public Policy Making

Suggested Readings
4. Haridwar Shukla,Public Policy and Administration in India, Mahaveer Publications, 2021

Mapping of COs to Syllabus

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PAIC208T: PUBLIC POLICY IMPLEMENTATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course the students are able to:

CO1: Explain the Concept and processes of policy implementation. (Understanding)
CO2: Identify the role played by different agencies in implementing policies. (Applying)
CO3: Examine the role played by stakeholders in policy implementation. (Analyzing)
CO4: Appraise Policy Implementation through case studies. (Evaluating)

Module I: Policy Implementation System (15 Hours)
The Concept of Policy Implementation; Approaches/ Models of Policy Implementation; Constraints of Policy Implementation

Module II: Agencies in Policy Implementation (15 Hours)
Policy Implementors; Political Executives in Policy Implementation; Permanent Executives in Policy Implementation; Relationship between Political and Permanent Executives in Policy Implementation Process

Module III: Stakeholders of Policy Implementation (15 Hours)
Role of Citizens; Role of Civil Societies; Role of Media and other relevant interest groups and actors

Module IV: Case Studies in Policy Implementation (15 Hours)
Suggested areas- Education, Health, Tribal Development, Weaker Sections. Evaluation and Feedback: Monitoring and Social Audit

Suggested Readings

Mapping of COs to Syllabus

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PAIE308T: POLICY EDUCATION, IMPACT AND EVALUATION
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:

CO1: Recall the basics of policy education. (Remembering)
CO2: Explain the use of the tools and techniques of policy monitoring and evaluation. (Understanding)
CO3: Identify the role of different institutions in policy evaluation. (Applying)
CO4: Examine the policy impact through case studies. (Analyzing)

Module I: Introduction to Policy Education (15 Hours)
Policy Education as an emerging discipline; Importance of Policy Education; Policy Education for Policy Implementation; Public Policy and Experiential Learning.

Module II: Monitoring, Evaluation and Review (15 Hours)
Methods and Approaches of Evaluation; Evaluation standards and Ethics; Approaches to Policy Monitoring; Policy Monitoring and Policy Outcomes; Importance of Policy Review, Strategies for Policy Review.
Module III: Policy Evaluation Institutions (15 Hours)
NITI Aayog, DMEO, Comptroller and Auditor General of India, Social Audit

Module IV: Policy Impact: Case Studies (15 Hours)
Poverty reduction, empowerment of women, environmental protection, educational development, Tribal Development

Suggested Readings

Mapping of COs to Syllabus

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PASP309T: STATISTICS FOR PUBLIC ADMINISTRATION RESEARCH
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Explain the significance of Statistics and Measures of Central Tendency along with measures of dispersion.
CO2: Illustrate the Bivariate Relationship in Correlational analysis.
CO3: Discuss the elements of Probability Theory.
CO4: Examine and illustrate the Test of Hypothesis in the statistical analysis through Parametric and Non-Parametric Testing Techniques.

Module I: Introduction to Statistics (15 Hours)
Concept, nature, significance and scope of statistics; General field of statistics: descriptive and inferential statistics;
Measure of central tendency: mean, weighted mean, median and mode
Measure of dispersion: variance, standard deviation and coefficient of variation

Module II: Determining the Bivariate Relationship (10 Hours)
Correlation analysis: Karl Pearson and Spearman’s Rank correlation methods; Regression analysis: simple linear regression

Module III: Probability Theory (15 Hours)
Basic terminologies: combination, event and its type; sample space; Approach to probability: classical, relative frequency and subjective approaches; Laws of probability: additional rule, multiplication rule, conditional probability; Theoretical probability distribution: binomial, and normal distribution.

Module IV: Test of Hypothesis (20 Hours)
Introduction to the test of the hypothesis; concept and significance; Basic terminologies: null and alternative hypothesis, one-tailed and two-tailed test, type-I and type-II errors; Steps in the test of hypothesis; Test of significance of large sample: mean (single and double sample), population proportion (single and double sample); Test of significance of small Sample: mean (independent and dependent), sample correlation coefficient, the test of significance of two sample variances, Parametric and non-parametric test, chi-square test (goodness of fits and test of independence attribute); Kruskal Wallis Test: the test of significance of more than two sample means.

Suggested Readings

Mapping of COs to Syllabus

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PAPP310T: PUBLIC POLICY IN INDIA
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
CO1: To develop the understanding of public policy through its meaning, nature and significance. (Understanding)
CO2: To gain knowledge about various approaches of public policy. (Remembering)
CO3: To analyze the role of various policies for protecting women and children. (Analysing)
CO4: To evaluate the role of social policy and planning through various institutions in India. (Evaluating)

Module I: Introduction to Public Policy (15 Hours)
Meaning, Nature and Scope of Public Policy; Significance of Public Policy; Types of Policy; Public Policy and Public Administration; Policy Cycle

Module II: Approaches to Public Policy (15 Hours)
The Process Approach; The Logical Positivist Approach; The Phenomenological Approach; The Participatory Approach; The Normative Approach.

Module III: Social Policies in India (15 Hours)
Children’s Policy in India for juvenile justice, child labour restraint and child marriage prevention; Critical Review of Governmental & Non-Governmental Efforts, Social Legislations and Women’s Rights in India: Marriage Acts; Divorce Acts; Prevention of Domestic Violence; Prevention of Sexual Harassment at Workplace.

Module IV: Social Policy and Planning (15 Hours)
Role of Media Advocacy, Accountable Governance, Corporate Social Responsibility in India; Role of Important Institutional Machineries - NITI Aayog, National Commissions for Women, SCs, STs, Backward Classes, Evaluation of Social Policy in India.

Suggested Readings
12. Haridwar Shukla, Public Policy and Administration in India, Mahaveer Publications, 2021

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PAIC407T: INSTITUTIONS & COMPLEXITIES IN PUBLIC POLICY PROCESS
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Explain the role of different institutions in policy making process. (Understanding)
CO2: Identify the issues involved in policy design. (Applying)
CO3: Examine the factors behind complexities in policy implementation. (Analysing)
CO4: Appraise the impact of conditions in policy evaluation and analysis. (Evaluating)
Module I: Institutions in Public Policy Process (15 hours)
Inter-governmental relations; The role of the legislature; The role of political and permanent executives; the role of judiciary; planning machinery at the central, state, and local levels.

Module II: Complexities in policy formulation (15 hours)
Identifying issues in agenda-setting; Faulty policy design- reasons and effects; inadequate collaborative policymaking

Module III: Complexities in policy implementation (15 hours)
Key factors behind policy failure; Policy failure and the policy-implementation gap; local contextual realities

Module IV: Complexities in Policy evaluation and analysis (15 hours)
Changing conditions and needs; Issues of cost-benefit analysis; Complexities in the analysis of outcomes of public policy

Suggested Readings

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PAHT404T: HUMAN TRAFFICKING IN INDIA
(3 Credits – 45 Hours) (L-T-P: 3-0-0)

Course Outcomes
At the end of this course, students would be able to:
CO1: Understand various forms, types and indicators of human trafficking. (Understanding)
CO2: Demonstrate understanding of the theoretical perspectives of human trafficking. (Understanding)
CO3: Identify the anti-human trafficking efforts in India. (Applying)
CO4: Examine the national and international anti-human trafficking frameworks in policy intervention. (Analysing)

Module I: Introduction (10 hours)
History, Nature, and magnitude of human trafficking in India; Forms and types of human trafficking; Indicators of Human Trafficking; Vulnerability in Human Trafficking; Human trafficking and Sex work

Module II: Theoretical Perspectives of Human Trafficking (10 hours)
Inter-disciplinary Approach; Feminist Approach; Stigma, exclusion and push-pull theory from Sociological Approach; Neo-liberal Approach

Module III: Anti-Human Trafficking efforts in India (10 hours)
Anti-Human Trafficking Units; Rescue, Re-integration, and Repatriation of the Trafficked survivors; Modus operandi and low conviction rate of the traffickers; Shelter homes for the trafficked survivors

Module IV: National and International Policies on Human Trafficking (15 hours)
Constitution of India and Human Trafficking; Legal provisions in India; International Legal provisions; Palermo protocol of the UN; Critique of the policies; Case studies

Suggested Readings

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PARM405T: RESEARCH METHODOLOGY
(2 Credits – 30 Hours) (L-T-P: 2-0-0)

Course Outcomes
At the end of this course students are able to:
CO1: Explain the key concepts in research methods, Research Process and Research Design. (Understanding)
CO2: Identification and mastery of the necessary skills to use research tools to undertake research study (Applying)
CO3: Evaluate governmental policy or programme/projects on the basis of primary and secondary data (Evaluating)

Module I: Foundations of Public Administration Research (15 Hours)
Key concepts in research methods; Meaning and types of research; Research process – Defining research problem, steps of research and application of research methods in Public Administration; Hypothesis; Research Design: Concept and importance; Types of research designs

Module II: Scientific Method, Measurement and Sampling Techniques (15 Hours)
Concept of scientific method; Basics of sampling and types of sampling, Data Collection, Processing and Analysis, Data analysis and Report writing

Suggested Readings

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MINOR COURSES IN HISTORY

PAH108T: HISTORIOGRAPHY, EARLY CIVILIZATIONS, ANCIENT TO MEDIEVAL INDIAN HISTORY
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
CO1: Recall the various Sources for understanding pre-history, proto history and megalithic Cultures (Remembering)
CO2: Show the economic conditions of society, contribution of Educational institutions, art and literature and major political thinkers in Post Mauryan Period. (Understanding)
CO3: Identify the major Political Developments in North India, Agriculture and Urban Economy, religious movement and Philosophies in Late 8th – 13th Century (Applying)
CO4: Identify the emergence of regional kingdoms in the late 17th and 18th centuries. (Applying)

Module I: An Over-view of Sources and Pre-history up to Impact of Iranian and Macedonian invasions (15 Hours)
a) Archaeological Sources, Literary Sources, Indigenous sources and Foreign Accounts
b) Pre-history and Proto-history, Megalithic Cultures,
c) Expansion of Aryans in India, Period of Mahajanapadas and Iranian and Macedonian invasions and their impact
Module II: Post Mauryan Period, Vakatakas and Vardhanas and Regional states (15 hours)
  a) Early State and Society in Eastern India, Deccan and South India, Polity and administration, Economic conditions, Contribution of educational institutions, Literature, scientific literature, art and architecture, Growth of Vaishnava and Saiva religions.
  b) Institutions of temple and temple architecture; Arab conquest of Sind; Alberuni, Local Government; Growth of art and architecture, religious sects, Institution of temple and Mathas, Agraharas, education and literature, economy and society.
  c) Themes in Early Indian Cultural History: Languages and texts, major stages in the evolution of art and architecture, major philosophical thinkers and schools, ideas in Science and Mathematics.

Module III: India from Late 8th – 13th Century (15 hours)
  a) Major political developments in Northern India and the Peninsula and Cultural Traditions in India, 750-1200: Village economy and society, Agriculture and urban economy, the status of the Brahman and the new social order, Condition of women, Indian science and technology, Skankaracharya and Vedanta, Ramanuja and Vishishtadvaita, Madhva and Brahma-Mimansa, Literature in Sanskrit and in the newly developing languages, Kalhan’s Rajtarangini, Alberuni’s India and Khalji Revolution.
  c) The Fifteenth to early seventeenth Century – Society and Culture: Regional cultural specificities, Literary traditions, Provincial architecture, Society, culture, literature and the arts in Vijayanagara Empire; Establishment of Jagir and Mansab systems under Akbar, Rapuput Policy, Evolution of religious and social outlook, theory of Sulh-i-kul and religious policy, Religious policies of Jahangir, Shahjahan and Aurangzeb

Module IV: Late 17th Century Crisis and Revolts to 18th Century (15 Hours)
Late 17th Century Crisis and Revolts , The Ahom Kingdom, Shivaji and the early Maratha Kingdom, Factors for the decline of the Mughal Empire, The regional principalities: Nizam’s Deccan, Bengal, Awadh, Maratha ascendance under the Peshwas, Emergence of Afghan Power, Battle of Panipat 1761, State of politics, culture and economy on the eve of the British conquest

Suggested Readings
4. India Through the Ages, Jadunath Sarkar, Life Span Publishers and Distributors (2020)
5. India’s Ancient Past, R. S. Sharma, Oxford University Press (2006)

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PAMH210T: MODERN INDIAN HISTORY
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
CO1: Recall the important events leading establishment of British Colonial Rule. (Remembering)
CO2: Show the Economic, Social, religious and Cultural impact of British Colonial Rule. (Understanding)
CO3: Identify the various responses to the British Rule in India. (Applying)
CO4: Identify the impact of Politics of Separatism, Consolidation as a Nation and Economic & Political Changes. (Applying)

Module I: European Penetration into India (15 Hours)
  a) The Early European Settlements; The Portuguese and the Dutch; The English and the French East India Companies; Their struggle for supremacy; Carnatic Wars; Bengal - The conflict between the English and the Nawabs of Bengal; Siraj and the English; The Battle of Plassey; Significance of Plassey.
  b) British Expansion in India: Bengal – Mir Jafar and Mir Kasim; The Battle of Buxar; Mysore; The Marathas; The three Anglo-Maratha Wars; The Punjab, Annexation & Consolidation of the Lushai Hills.
c) Early Structure of the British Raj: The early administrative structure; From diarchy to direct control; The Regulating Act (1773); The Pitt’s India Act (1784); The Charter Act (1833); The voice of free trade and the changing character of British colonial rule; The English utilitarian and India.

Module II: Impact of British Colonial Rule (15 Hours)

a) Economic Impact of British Colonial Rule: (a) Land revenue settlements in British India; The Permanent Settlement; Ryotwari Settlement; Mahalwari Settlement; Economic impact of the revenue arrangements; Commercialization of agriculture; Rise of landless agrarian labourers; Impoverishment of the rural society. (b) Dislocation of traditional trade and commerce; De-industrialisation; Decline of traditional crafts; Drain of wealth; Economic transformation of India; Railroad and communication network including telegraph and postal services; Famine and poverty in the rural interior; European business enterprise and its limitations.

b) Social and Cultural Developments: The state of indigenous education, its dislocation; Orientalist-Anglicist controversy; The introduction of western education in India; The rise of press, literature and public opinion; The rise of modern vernacular literature; Progress of science; Christian missionary activities in India.

c) Social and Religious Reform movements in Bengal and Other Areas: Ram Mohan Roy, The Brahmo Movement; Devendranath Tagore; Iswarchandra Vidyasagar; The Young Bengal Movement; Dayanada Saraswati; The social reform movements in India including Saty, widow remarriage, child marriage etc.; The contribution of Indian renaissance to the growth of modern India; Islamic revivalism – the Feraizi and Wahabi Movements.

Module III: Indian Response to British Rule (15 Hours)

a) Various Peasant Movements and Tribal Uprisings leading to the birth of Indian nationalism: Peasant movements and tribal uprisings in the 18th and 19th centuries including the Rangpur Dhing (1783), the Kol Rebellion (1832), the Mopla Rebellion in Malabar (1841-1920), the Santal Hul (1855), Indigo Rebellion (1859-60), Deccan Uprising (1875) and the Munda Ulgulan (1899-1900); The Great Revolt of 1857 - Origin, character, causes of failure, the consequences; The shift in the character of peasant uprisings in the post-1857 period; the peasant movements of the 1920s and 1930s.

b) Factors leading to the birth of Indian Nationalism; Politics of Association; The Foundation of the Indian National Congress; The Safety-valve thesis relating to the birth of the Congress; Programme and objectives of Early Congress; the social composition of early Congress leadership; the Moderates and Extremists; The Partition of Bengal (1905); The Swadeshi Movement in Bengal; the economic and political aspects of Swadeshi Movement; The beginning of revolutionary extremism in India.

c) Rise of Gandhi; Character of Gandhian nationalism; Gandhi’s popular appeal; Rowlett Satyagraha; the Khilafat Movement; the Non-cooperation Movement; National politics from the end of the Non-cooperation movement to the beginning of the Civil Disobedience movement; the two phases of the Civil Disobedience Movement; Simon Commission; The Nehru Report; the Round Table Conferences; Nationalism and the Peasant Movements; Nationalism and Working class movements; Women and Indian youth and students in Indian politics (1885-1947); the election of 1937 and the formation of ministries; Cripps Mission; the Quit India Movement; the Wavell Plan; The Cabinet Mission.

d) Constitutional Developments in the Colonial India between 1858 and 1935 and Other strands in the National Movement

  i. The Revolutionaries: Bengal, the Punjab, Maharashtra, U.P, the Madras Presidency, Outside India.

  ii. The Left; The Left within the Congress: Jawaharlal Nehru, Subhas Chandra Bose, the Congress Socialist Party; the Communist Party of India, other left parties.

Module IV: Politics of Separatism, Consolidation as a Nation and Economic Development & Political Change (15 Hours)

a) Politics of Separatism; the Muslim League; the Hindu Mahasabha; Communalism and the politics of partition; Transfer of power; Independence.

b) Consolidation as a Nation; Nehru’s Foreign Policy; India and her neighbours (1947-1964); The linguistic reorganisation of States (1935-1947); Regionalism and regional inequality; Integration of Princely States; Princes in electoral politics; the Question of National Language.

c) Caste and Ethnicity after 1947; Backward castes and tribes in post-colonial electoral politics; Dalit movements.

d) Economic development and political change; Land reforms; the politics of planning and rural reconstruction; Ecology and environmental policy in post-colonial India; Progress of science.

Suggested Readings
1. History of Modern India, Bipan Chandra, Orient Blackswan Private Limited (2020)
2. Modern Indian History, V.D. Mahajan, S. Chand Publishing (2020)
3. From Plassey to Partition and After, Sekhar Bandopadhay, Orient Blackswan Private Limited (2014)
5. India: What can it Teach Us? (A Course of Lectures Delivered Before the University of Cambridge), F. Max Muller, General Press (2022)

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PAWH211T: WORLD HISTORY
(4 Credits – 60 Hours) (L-T-P: 4-0-0)

Course Outcomes
CO1: Recall the important ideas and events brought about enlightenment, modern Politics and Industrialisation (Remembering)
CO2: Show the rise of Nationalism, Imperialism, colonialism, Revolution and Counter Revolution (Understanding)
CO3: Identify the various causes and consequences of World Wars, Power Blocs, Non-alignment and End of Colonial Rule (Applying)
CO4: Identify the factors constraining Development, unification of Europe, disintegration of Soviet Union and rise of unipolar world. (Applying)

Module I: Enlightenment, Origins of Modern Politics and Industrialization (15 Hours)

a) Enlightenment and Modern ideas: Major ideas of Enlightenment: Kant, Rousseau; Spread of Enlightenment in the colonies; Rise of socialist ideas (up to Marx); spread of Marxian Socialism.
b) Origins of Modern Politics: European States System; American Revolution and the Constitution; French revolution and aftermath, 1789-1815; American Civil War with reference to Abraham Lincoln and the abolition of slavery; British Democratic Politics, 1815-1850; Parliamentary Reformers, Free Traders, Chartists.
c) Industrialization: English Industrial Revolution: Causes and Impact on Society; Industrialization in other countries: USA, Germany, Russia, Japan; Industrialization and Globalization.

Module II: Nation-State System, Imperialism and Colonialism and Revolution & Counter-Revolution (15 Hours)

a) Nation-State System: Rise of Nationalism in 19th century; Nationalism: state-building in Germany and Italy; Disintegration of Empires in the face of the emergence of nationalities across the world.
b) Imperialism and Colonialism: South and South-East Asia; Latin America and South Africa; Australia; Imperialism and free trade; Rise of neo-imperialism.
c) Revolution and Counter-Revolution: 19th Century European revolutions; The Russian Revolution of 1917-1921; Fascist Counter-Revolution, Italy and Germany; The Chinese Revolution of 1949

Module III: World Wars; Post World War II & Liberation from Colonial Rule (15 Hours)

a) World Wars: 1st and 2nd World Wars as Total Wars: Societal implications; World War I: Causes and consequences; World War II: Causes and consequence
b) The World after World War II: Emergence of two power blocs; Emergence of Third World and non-alignment; UNO and the global disputes.
c) Liberation from Colonial Rule: Latin America-Bolivar; Arab World-Egypt; Africa-Apartheid to Democracy; South-East Asia-Vietnam

Module IV: Factors Constraining Development, Unification of Europe, Disintegration of Soviet Union and Rise of Unipolar World (15 Hours)

a) Factors constraining development: Latin America, Africa
b) Unification of Europe: Post War Foundations: NATO and European Community; Consolidation and Expansion of European Community; European Union.

Suggested Readings
4. History of the Modern World, Dr. Hukam Chand Jain, Jain Prakashan Mandir (2022)

<table>
<thead>
<tr>
<th>Module 1</th>
<th>Module 2</th>
<th>Module 3</th>
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### SKILL ENHANCEMENT COURSES

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<td>PAOH106L</td>
<td>Office, Home Management and Secretarial practice</td>
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<td>2</td>
<td>S E Course 2</td>
<td>PACO107L</td>
<td>Corporate Communication</td>
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<td>3</td>
<td>S E Course 3</td>
<td>PAES209L</td>
<td>Ethics &amp; Self Awareness</td>
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#### PAOH106L: OFFICE, HOME MANAGEMENT AND SECRETARIAL PRACTICE

(3 Credits – 15+60 Hours) (L-T-P: 1-0-2)

##### Course Outcomes

At the end of the Course, students will be able:

- CO1: To demonstrate the functioning of the office management, filing and indexing systems, secretarial practices, and meeting procedures. (Understanding)
- CO2: To acquire proficiency in using tools and techniques in office management, filing, and indexing systems and secretarial practices. (Applying)

##### Module I: Theory (15 Hours)

Modern managerial tools for office management; Modern office record management; Modern filling and indexing systems; Modern Secretarial practices and meeting procedures.

##### Module II: Practical (60 hours)

The practice of modern managerial tools for office management; The practice of modern office record management; The Practice of modern filling and indexing systems; Practicing Data Entry Operations and Typing; Organising mock organisational meetings: preparation of notices and correspondences, agendas, Resolutions, Minutes, and confirmation of the Minutes and holding meetings.

#### Suggested Readings


#### Mapping of COs to Syllabus

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#### PACO107L: CORPORATE COMMUNICATION

(3 Credits – 15+60 Hours) (L-T-P: 1-0-2)

##### Course Outcomes

At the end of the Course, students will be able:

- CO1: To demonstrate skills in modern corporate communication. (Understanding)
- CO2: To acquire proficiency in using modern tools and techniques in corporate communication (Applying)

##### Module I: Modern corporate Communication tools: (15 Hours)

Social intranet, all-in-one employee communication tools, Task/ project management software and tools, Instant messaging, Newsletters, Voice & video conferencing tools (like Cisco Webex Meetings, Go To Meeting, ZOOM; SKYPE, Google Meet, and Microsoft Teams), Document collaboration tools (like Google Workspace), ERP, Knowledge centre tools, File sharing tools, Employee directory software, Internal blogs, videos & updates, Analytics, Discussion forums, Email management tools, Communication tools for social media content (like Buffer or Hootsuite).

##### Module II: Practical (30 Hours)

Practising Modern Corporate Communication tools
Suggested Readings

Mapping of COs to Syllabus

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PAES209L: ETHICS AND SELF AWARENESS
(3 Credits – 15+60 Hours) (L-T-P: 1-0-2)

Course Outcomes:
At the end of the Course, students will be able:
CO1: To demonstrate knowledge of Ethics and Self Awareness. (Understanding)
CO2: To Make Use of Skills and values in the practice of Ethics and Self Awareness. (Applying)

Module I: Introduction - Ethics and Self-Awareness (15 Hours)
Ethical theories; Moral principles and strategies for weighing competing values and interests; Essence, determinants, and consequences of ethics in-human actions; Self-awareness – techniques

Module II: Practical (60 Hours)
Ethics Tournaments; Signing Honor Codes; Self-awareness – activities

Suggested Readings

Mapping of COs to Syllabus

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INTERNERSHIPS

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<td>PAIN311I</td>
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PAIN109I/PAIN212I: INTERNSHIP (Exit of 1st Year or 2nd Year)
(4 Credits: 120 Hours)

The student will carry out a field Internship as per the need of the Organization with a specific Objective since he or she will exit after 1st year or 2nd Year of UG Programme. The Internship will be of 1 month duration with follow up of the supervisors allotted as per as specialization. The student will need to sort out the Organisation with due permissions of the Department/University authorities and submit a preliminary plan for approval. The plan of activities undertaken during the Internships would be areas related to Public Administration, Public Policies, Rural Development, Urban Development etc with specific objectives and Mission and Vision of the Organisation. The student will submit a final report of the Internships with supportive documents and signature of the Organization where he/she has undertaken the Internships within 10 days after the Internship is over.

Time duration: 1 Month/30 days
Final Report: Within 10 days after the Internship is over (Hard Copy in Hard/Spiral Bound), 30-40 Pages
Marks: 100

PAIN311I: INTERNSHIP (At the end of 4th Semester and evaluated in 5th Semester)
(2 Credits-60 Hours)

The student will carry out a field Internship as per the need of the Organization with a specific Objective at the end of 4th Semester and Evaluated in the 5th Semester of UG Programme. The Internship will be of 1 month duration with follow up of the supervisors allotted as per as specialization. The student will need to sort out the Organization with due permissions of the Department/University authorities and submit a preliminary plan for approval. The plan of activities undertaken during the Internships would be areas related to Public Administration, Public Policies, Rural Development, Urban Development etc with specific objectives and Mission and Vision of the Organisation. The student will submit a final report of the Internships with supportive documents and signature of the Organization where he/she has undertaken the Internships within 10 days after the Internship is over.

Time duration: 1 Month/30 days
Final Report: Within 10 days after the Internship is over (Hard Copy in Hard/Spiral Bound), 30-40 Pages
Marks: 100
RESEARCH PROJECT / DISSERTATION

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<th>Semester</th>
<th>Category</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<td>7</td>
<td>Research Project/Dissertation</td>
<td>PCDI409P</td>
<td>Research Project Phase I</td>
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<td>8</td>
<td>Research Project/Dissertation</td>
<td>PCDI410P</td>
<td>Research Project Phase II</td>
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<th>Credits</th>
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<td>Research Project/Dissertation</td>
<td>PCDI412P</td>
<td>Dissertation II</td>
<td>20</td>
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BA PUBLIC ADMINISTRATION (Honours)

PADI408P: Research Project Phase I  
(6 credits – 180 hours) (L-T-P: 0-0-12)

The Research project is divided into two phases, taking place during Semester VII and Semester VIII, known as Research Project Phase-I and Research Project Phase-II, respectively. The primary objective of this course is to enhance students’ independent critical thinking abilities and improve their oral and written communication skills by incorporating a research project alongside a strong academic foundation. The research project aims to achieve valuable learning outcomes with long-term impacts, preparing undergraduates for their future professional endeavours.

During the first phase of the research project, students are required to select a suitable study topic within their area of specialization. They must effectively articulate and formulate a research question related to their chosen topic. Additionally, students need to gather relevant literature pertaining to their research topic and, if applicable, develop research hypotheses. Proper planning of the research design is essential, including considerations for sampling, observational, statistical, and operational designs.

PADI409P: Research Project Phase II  
(6 credits – 180 hours) (L-T-P: 0-0-12)

The Research project spans across two semesters, Semester VII and Semester VIII, referred to as Research Project Phase-I and Research Project Phase-II, respectively. In Phase-I, students select a research topic and begin their work. Phase-II serves as a continuation of Phase-I, where students refine their research project and prepare it for presentation.

During Phase-II, students are required to compile relevant data, analyze and interpret it, and, if applicable, test any hypotheses. By analyzing and interpreting the collected data, the student (researcher) will draw logical conclusions and propose appropriate recommendations for the research problem. The final outcome should be a well-structured project report that the students will defend in front of a panel of examiners.

BA PUBLIC ADMINISTRATION (Honours) with Research

PADI410P: DISSERTATION I  
(18 Credits -540 Hours) (L-T-P: 0-0-36)

The students will have to submit a dissertation, which will be assessed by External Examiners appointed by the University. The dissertation work will be spread over two semesters, namely Semester VII and Semester VIII, referred to as Dissertation Phase-I and Dissertation Phase-II, respectively. The total dissertation carries 38 credits, with 18 credits assigned to Semester VII and 20 credits to Semester VIII.

The main objectives of the course are to enhance students’ presentation skills and develop their academic writing abilities. Additionally, the course aims to enable students to apply the statistical research training they have received during the taught portion of the program. This application will involve designing an appropriate research strategy and methodology to conduct their research.

During Dissertation Phase-I, students are expected to come up with a research idea independently. By the end of Semester VII, they must defend a research proposal based on this idea, presenting it as a Synopsis.
Structure of Dissertation Phase-I

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<tr>
<th>Sl. No.</th>
<th>Tentative Stages to be completed</th>
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<tbody>
<tr>
<td>1.</td>
<td>Research idea or concept note, i.e., Statement of the Problem</td>
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<td>2.</td>
<td>Review of Literature</td>
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<td>3.</td>
<td>Research Methodology&lt;br&gt;Sampling, Sample size determination, Selection of sample, Analytical tools to be used, Questionnaire preparation, Preliminary exploration of data i.e. Pilot Survey</td>
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<td>4.</td>
<td>a) Synopsis Presentation&lt;br&gt;b) Submission of Modified Synopsis to the Department</td>
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<td>5.</td>
<td>Students have to collect all the required data during the semester</td>
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PADI411P: DISSERTATION II<br>(20 Credits -600 Hours) (L-T-P: 0-0-40)

The students need to submit a dissertation, which will be evaluated by External Examiners chosen by the University. The dissertation work will be divided into two phases: Dissertation Phase-I in Semester VII and Dissertation Phase-II in Semester VIII. These phases account for a total of 38 credits, with 18 credits in Semester VII and 20 credits in Semester VIII.

The primary objective of the course is to refine the students' dissertations during Phase-I, while also teaching them how to apply statistical and scientific tools to their research. They will also learn research ethics. In Dissertation Phase-II, the students will conduct data analysis, write the dissertation, and defend it before the end of the semester.

The dissertation must encompass original research questions (if any), a critical review of relevant literature, use of analytical tools to address the research questions, data analysis, and interpretation. Following all guidelines provided by the University, the students must submit the completed dissertation. Throughout this process, the students will receive guidance from a designated supervisor from the department.

Structure of Dissertation Phase-II

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<th>Sl. No.</th>
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<tr>
<td>1.</td>
<td>Validation of data, data entry and preliminary analysis of data (drawing graphs, trend lines, making tables etc.)</td>
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<tr>
<td>2.</td>
<td>Main data analysis and interpretation</td>
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<td>3.</td>
<td>Dissertation writing, Proof reading, and Plagiarism checking</td>
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<td>4.</td>
<td>Submission and Viva Voce</td>
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</table>
DEPARTMENT OF PHILOSOPHY

PROGRAMME: BACHELOR OF ARTS in PHILOSOPHY (BA)
Degree: BA PHILOSOPHY (HONOURS) MINORS IN ENGLISH AND PSYCHOLOGY

VISION:
To be a centre of excellence in teaching, learning, and research that is committed to moulding ethically and socially responsible graduates with deeper knowledge about God, the world, and the human person in his or her social setting, which is religiously, culturally, economically, linguistically, and ethnically diverse.

MISSION:
The Department of Philosophy seeks to:
• Promote critical thinking by training students to analyse, evaluate, and interpret societal events, which aims at the integral development of students.
• Search for and find true values and meanings with a coherent and cogent exposition of one’s philosophical convictions.
• Provide the students with a worldview that ensures a holistic vision of reality by engaging them with the multi-cultural and multi-linguistic traditions of northeast India and its people.
• Inculcate among the students true human values that promote and appreciate each other’s differences.

PROGRAMME OUTCOMES (PO)
PO 1: Critical Thinking: Choose informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organisational, and personal) from different perspectives.
PO 2: Effective Communication: Speak, read, write, and listen clearly in English and one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.
PO 3: Social Interaction: Discuss the views of others, mediate disagreements, and help reach conclusions in group settings.
PO 4: Effective Citizenship: Demonstrate empathetic social concern and equity-centred national development, as well as the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO 5: Ethics: Analyse different value systems, including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO 6: Environment and Sustainability: Assess the issues of environmental context and sustainable development.
PO 7: Self-directed and Life-long Learning: Develop the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.
PO 8: Enhancing Abilities and Skills: To acquire hands-on competence in skills and abilities that will enhance the learning process.

PROGRAMME SPECIFIC OUTCOMES (PSO)
PSO 1: Demonstrating Comprehensive Acquaintance with the Subjects: To explain and analyse with alacrity the various issues in philosophy, English, and psychology.
PSO 2: Developing Philosophical Thinking: To assess the thoughts and writings of different philosophers, psychologists, and literary writers, both Western and Indian, analytically
PSO 3: Building a Multi-disciplinary Worldview: To develop familiarity with knowledge of concepts and notions regarding disciplines other than philosophy, English, and psychology.
PSO 4: Creating Social and Cultural Sensibilities: To appraise and estimate the complexities of the social and cultural sensibilities of people by engaging in a variety of philosophical discourses.

Mapping of Courses to PO/PSO

<table>
<thead>
<tr>
<th>SL.</th>
<th>Name of Course</th>
<th>PO1</th>
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DETAILED SYLLABUS

MAJOR COURSES

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PYAM100T: ANCIENT AND MEDIEVAL WESTERN PHILOSOPHY
(4 Credits – 60 Hours)

Course Objectives
The course intends to expand the discursive and reasoning skills of the students. It assists the students in their development of problem-solving experience in at least one of the main areas of philosophy. Ancient Greek Philosophy arose in the 6th century BCE and its influence is noticed in the later part of continental philosophy. Alfred North Whitehead would say that the philosophy after Plato is only a footnote to Plato’s philosophy. Ancient thinkers have dealt with philosophy, ethics, metaphysics, ontology, biology, logic, rhetoric and aesthetics. Medieval Christian thinkers made use of Greek philosophy to interpret Christian theology and arrive at a coherent Christian philosophy.

Course Outcomes
CO 1: Outlines the basic philosophies of different schools of Greek and Medieval Philosophy (understanding)
CO 2: Analyses the various issues that the Ancient Greek and Medieval thinkers were grappling with (analysing)
CO 3: Develops the techniques for solving problems in at least one of the main areas of philosophy (applying)
CO 4: Improves critical thinking and analytical skills (creating)

Module 1: The Origin and Development of Early Greek Thought (10 hours)
The problem of substance: Thales, Anaximander, Anaximenes, Pythagoras
The Problem of Change: permanence and change – Heraclitus and Eleatic School
The Theory of Atomism: Democritus - metaphysics and cosmology, psychology, theory of knowledge, theology and ethics

Module 2: Problems of Knowledge and Conduct (8 hours)
The Age of the Sophists Socrates and Socratic School

Module 3: The Age of Greek Systems (15 hours)
Plato: dialectic and theory of knowledge, the doctrine of Ideas, philosophy of nature, the doctrine of immortality, ethics and politics
Aristotle: philosophy and sciences, logic, metaphysics, the four causes, theology, psychology, ethics and politics

Module 4: The Ethical Period (12 hours)
Epicureanism stoicism scepticism Neoplatonism

Module 5: The Rise of Medieval Philosophy (15 hours)
The Patristic Period: Early Fathers of the Church, St Augustine
Scholasticism: meaning, characteristics, faith and reason, John Scotus Erigena, St Anselm, Peter Abelard The Golden Age of Scholasticism: St Thomas Aquinas and John Duns Scotus; Nominalism: William of Occam and Roger Bacon
DEPARTMENT OF PHILOSOPHY

Suggested Readings

Mapping of COs to Syllabus

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PYUU103T: VEDIC AND UPANISHADIC PHILOSOPHY
(4 Credits – 60 Hours)

Course Objectives
The course intends to offer the students basic knowledge of the culture, religion, and philosophy of ancient India so that they can have a genuine appreciation of India’s rich heritage and be legitimately proud of being Indians. Hence, the course makes a survey of the origin and development of Indian culture, religion, and philosophy from the Indus Valley civilization to the Upanishadic period. The earliest available texts of religion and philosophy in India are the Vedas. These texts are studied from such different angles as religion, philosophy, scripture and religious experience. A short survey of the principal characteristics of the Brahmanas and Aranyakas introduces an integrated approach to the Upanishads.

Course Outcomes
CO 1: Explains in detail the ancient Indian Scriptures particularly the Vedas and the Upanishads (understanding)
CO 2: Builds a brief survey of the developments of the religion and philosophy of Ancient India (applying)
CO 3: Outlines the Indian traditions, value systems, social life and belief systems (understanding)
CO4: Appraises the philosophy impeded in the Sruti literature (evaluating)

Module 1: Fundamental Beliefs of Hinduism (10 hours)
- Cosmic Order (Rta)
- The Theory of Dharma
- The Theory of Karma
- The Theory of Rebirth (Punarjanma)
- The Theory of Liberation (Mukti)

Module 2: Purusharthas, Varnasramas, Asramadharma (10 hours)
- Purusharthas: artha, kama, dharma and moksha
- Varnasramas: Brahmins, Kshatriyas, Vyasyas and Sudras
- Asramadharma: brahmacarya, grahastha, vanaprastha and sanyasa

Module 3: The Historical Development of the Hindu Philosophy (10 hours)
- The Indus Valley civilization
- The Vedic Age: the Four Vedas
- The Brahmanic period, the Aranyaka period and the Upanishadic period

Module 4: Philosophy and Religion of Vedas (10 hours)
- The origin and development of the idea of the divine in the Vedas and Upanishads: nature worship, polytheism, henotheism/kathanotheism, monotheism, monism and absolutism
- The creation theories in Vedas: Purushasukta (Rig Veda 10. 90), Nasadiyasukta (Rig Veda 10.129), Hiranayagarbhasukta (Rig Veda 10. 121) and Visvakarmasukta (Rig Veda 10. 82)
- The Theory of Law and Sacrifice (yajna)

Module 5: The Philosophy of the Upanishads (20 hours)
- The Principal Upanishads Sreyas and Preyas
- The Atman Brahman Identity
- Mahavakyas: Tattvamasi, Ahambramahamsmi, Ayamatmabrahama, Sarvamkhalvidam Brahma
- The Pancikarana/Trivrittikarana
- The Concept of the Human Person
- The Concept of Transmigration and Liberation
- Four Levels of the Existence of Atman (jagrata, svapana, sushupti and turiya)

Suggested Readings

Mapping of COs to Syllabus

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PYSI200T: SYSTEMS OF INDIAN PHILOSOPHY
(4 Credits – 60 Hours)

Course Objectives
This paper aims at an in-depth study of the orthodox systems in Indian philosophy, which, on the one hand, provided a philosophical and scientific foundation to the Vedic teachings, and, on the other, developed into independent schools of philosophy. They began to philosophize using human reason as well as revelation to address the perennial questions that confronted them. This was a departure from the traditional exegetical type of doing philosophy.

Course Objectives
CO 1: Outlines the salient features of Indian Classical Philosophy (understanding)
CO 2: Illustrates the philosophies of Nyaya, Vaiseshika, Samkhya, Yoga and Purva Mimamsa (understanding)
CO 3: Appraises the contributions of Classical Indian Philosophy to later thinking in India (evaluating)
CO 4: Develops a genuine appreciation for the various philosophical issues Indian Schools (creating)

Module 1: General Characteristics of Indian Philosophy (10 hours)
The unity of moral and spiritual outlook among the systems
Philosophy springs from Spiritual disquiet at the existing order of things Belief in an eternal moral order in the universe
The universe as a moral stage
Ignorance as the reason for bondage and knowledge as means to liberation Sadhanas for liberation

Module 2: The Philosophy of Vaiseshika System (10 hours)
Vaiseshika as a system of pluralism, atomism and realism
The Padartha: substance, quality, action, universal, particular, inherence and negation
The theory of atomism
The creation and destruction of the universe

Module 3: The Philosophy of Nyaya System (10 hours)
The Theory of Perception: definition of perception, modes of perception, types of perception, types of contact
The Theory of Reasoning: terms of inference, limbs of syllogism, types of inference, fallacies
Comparison Verbal Testimony: types of verbal testimony, conditions of meaningful sentence
The theory of causality (Asatkaryavada)
Proofs for the existence of God

Module 4: The Philosophy of Samkhya (10 hours)
The Theory of Causality (Satkaryavada) The Concept of Prakriti
The Concept of Purusha The Concept of Gunas
The Evolution of Prakriti The Concept of Liberation

Module 5: The Yoga Philosophy (10 hours)
Definition and Importance of Yoga The Levels of the Mind (cittabhumī) The Eight Limbs of Yoga; The Yoga Categories

Module 6: The Philosophy of Early Mimamsa (10 hours)
The Purva Mimamsa: a way of interpreting scriptural texts
The Philosophy of Kumarila Bhatta: theory of cognizedeness, theory of anuaplabdhi, theories of svathapramana and partathahaparmana, theory of vivaritakhyati
The Philosophy of Prabhakara: theory of triputi, theory of svathapramana and svatahapramana, theory of akhyati

Suggested Readings
DEPARTMENT OF PHILOSOPHY

Mapping of COs to Syllabus

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PYMW201T: MODERN WESTERN PHILOSOPHY
(4 Credits – 60 Hours)

Course Objectives
The main objective of this course is to acquaint the students with knowledge about modern Western philosophy, which is marked by the revolt against authority, love for humanism, emphasis on the awakening of the reflective spirit, and demand for freedom of thought, feeling, and action. The students will study the thinkers of this period who refused to accept blindly the dictates of religion and tradition but searched for certain foundations of life and realities. Philosophy is thus based on human reasoning rather than on faith.

Course Outcomes
CO 1: Outlines the salient features of Modern Western Philosophy (understanding)
CO 2: Illustrates the philosophies of Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant and Hegel (understanding)
CO 3: Appraises the contributions of Modern Western Philosophy to Contemporary Western Thought (evaluating)
CO 4: Develops a genuine appreciation for the various philosophical issues raised in the modern period (creating)

Module 1: Beginnings of Modern Philosophy (5 hours)
Francis Bacon: reform of science, inductive method, the programme of philosophy, philosophy of man, metaphysics, theology; Salient Features of Modern Philosophy

Module 2: Continental Rationalism (15 hours)
Rene Descartes: Cartesian method, classification of sciences, the criterion of knowledge, proofs for the existence of God, the existence of the external world, body-mind relation and the theory of innate ideas
Benedict Spinoza: rationalism, method, the universal substance, attributes of god, the doctrine of modes, the human mind, ethics and politics; Blaise Pascal: wager argument

Module 3: The British Empiricism (10 hours)
John Locke: origin of knowledge, nature and validity of knowledge, limits of knowledge, metaphysics, ethics, freewill and political philosophy
George Berkeley: the rejection of abstract ideas, esse est percipi, the world of spirits, knowledge of ideas, spirits, and relations, refutation of dualism, atheism and scepticism
David Hume: the origin of human knowledge, the relation of cause and effect, the validity of knowledge, knowledge of the external world, denial of soul-substance

Module 4: Rationalism in Germany (5 hours)
G W. Leibniz: the doctrine of force, the doctrine of monads, theology, ethics, logic and theory of knowledge Christian Wolff: Mysticism and Romanticism

Module 5: Critical Philosophy of Immanuel Kant (15 hours)
Kant’s problem, the problem of knowledge, the transcendental method, the theory of sense perception, the theory of understanding, the validity of the judgement, unity of self-consciousness, knowledge of thing-in-itself, the impossibility of metaphysics, practical reason, moral theology and ethics

Module 6: German Idealism (10 hours)
Johann Gottlieb Fichte Friedrich Wilhelm Schelling
Georg Wilhelm Hegel: the problem of philosophy, dialectical method, thought and being, logic and metaphysics, philosophy of nature, philosophy of mind, religion and philosophy

Suggested Readings

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**PYCS202T: CLASSICAL AND SYMBOLIC LOGIC**

(Credits: 5 – 75 Hours)

**Course Objectives**

This course introduces students to the fundamentals of deductive, inductive, and symbolic logic. Students will learn basic logical concepts and common argumentative forms, which help them to know the merits of good arguments, recognise their presence or absence in argumentative discourse, and exhibit them in their writing and speech.

**Course Outcomes**

CO 1: Shows the various modes of arguments both deductive and inductive (remembering)
CO 2: Contrasts the valid and the invalid reasoning in Indian and Western Logic (understanding)
CO 3: Constructs truth tables using symbols (applying)
CO 4: Changes the ordinary language into symbolic language by using the quantification theory (creating)

**Module 1: Logic and Language (5 hours)**

Introduction – the subject matter of Logic - deduction and induction, function and uses of language - language makes things possible - various functions of language

**Module 2: Propositions and Terms (10 hours)**

Terms: types of terms, distribution of terms, denotation and connotation of terms, contradictory terms
Propositions: traditional classification of propositions and modern classification of propositions
Aristotelian Square of Opposition
Immediate Inference: Conversion, Obversion, Contraposition and Inversion

**Module 3: Syllogisms (10 hours)**

The Three Laws of Thought
Structure of Syllogism - Figures and Moods of Syllogism
General Rules of Syllogism - Deductive Fallacy
Types of Syllogisms Determination of Valid Moods.

**Module 4: Nyāya Logic (5 hours)**

Elements of Indian Inference – Terms – Fallacy - Conclusion

**Module 5: Methods of Induction (10 hours)**

Analogical reasoning, causal reasoning, science and hypothesis, probability, types of induction

**Module 6: Introducing Symbolic Logic (10 hours)**

What is Symbolic Logic?
Truth Functions: negation, conjunction, alternation (or disjunction), conditional (or material implication), biconditional (or material equivalence), Sheffer’s Stroke function.
Interdefinability of different truth functions.

**Module 7: Truth Tables (10 hours)**

Truth trees method. Alternational (or disjunctional) and conjunctional normal forms as decision procedures. Use of these methods for (a) deciding consistency (contingency), inconsistency (contradiction), and validity (tautology) of propositions. (b) showing implication and equivalence between propositions and (c) showing validity/invalidity of truth-functional argument.

**Module 8: Quantification Theory (5 hours)**

Syllogistic and the method of antilogism.
Translating Ordinary Language into the Language of Quantification.

**Suggested Readings**


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**PYWP203T: CONTEMPORARY WESTERN PHILOSOPHY**

(Credits: 5 – 75 Hours)

**Course Objectives**

The course provides the students with basic knowledge in the main areas of contemporary philosophy, which were developed in the 19th and 20th centuries in the West. Several traditions of philosophizing sprang up during this period. Without entering into postmodernism, this course familiarizes the students with the thoughts of contemporary Western thinkers.

**Course Outcomes**

CO 1: Explains the main areas of contemporary philosophy (understanding)
CO 2: Summaries the life and thought of different philosophers of this period (Understanding)
CO 3: Appraises the human situations of freedom, anxiety, dread and death in the quest for authenticity (evaluating).
CO 4: Improves students’ critical thinking and analytical skills (creating)

**Module 1: Introduction (10 hours)**

Contemporary Western Philosophy
Anglo-American Traditions and Continental Traditions
Characteristics of Existentialism

**Module 2: Analytic Tradition (10 hours)**

Gottlob Frege Bertrand Russell Ludwig Wittgenstein
Logical Positivism: Moritz Schlick, A. J. Ayer

**Module 3: Phenomenology (10 hours)**

Edmund Husserl Merleau-Ponty
Process Philosophy: Alfred Whitehead

**Module 4: Existentialism (15 hours)**

Soren Kierkegaard Martin Heidegger Jean-Paul Sartre

**Module 5: Pragmatic Tradition (10 hours)**

C. S. Peirce William James, John Dewey
W. V. O. Quine

**Module 6: Hermeneutic Tradition (10 hours)**

Hans Georg Gadamer Paul Ricoeur

**Module 7: Structuralism and Post-structuralism (10 hours)**

Ferdinand de Saussure Levi Strauss

**Suggested Readings**


Mapping of COs to Syllabus

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PYPB204T: PHILOSOPHY OF BEING
(Credits: 4 – 60 Hours)

Course Objectives
Among the different branches of philosophy, metaphysics helps students discover the core of philosophical knowledge that influences all other branches. Metaphysics, as the summit of human knowledge in the natural order, plays the role of guiding human knowledge and activity in the light of its basic principles, and the knowledge of the natural order paves the way for the knowledge of the supernatural order. It is the most general and fundamental of all the disciplines. It aims to identify the nature and structure of all there is. Central to this discipline is the explanation of the relationship between Being and beings, of one and many.

Course Outcomes
CO 1: Defines the basic concepts in metaphysics (remembering)
CO 2: Demonstrates the first principles of being and knowing (understanding)
CO 3: Develops the notion of being (applying)
CO 4: Compares the concept of being at various levels of existence (evaluating)

Module 1: Introducing Metaphysics (10 hours)
Etymology, definition and nature of metaphysics; a brief history of metaphysics: Indian and Western; the starting point of metaphysics (10 hours)

Module 2: Notions, Principles, Methods and Categories (10 hours)
Fundamental notions and principles in metaphysics; methods of metaphysics; basic categories: Indian and Western

Module 3: Metaphysical Structure of Finite Being (16 hours)
Being and essence; substance and accidents, matter and form, act and potency

Module 4: Metaphysical Nature of Finite Being (8 hours)
Supposit and person; spirituality and immortality of the person
Module 5: Metaphysical Properties (8 hours)
Modes of Being: analogy of being; transcendentials: oneness, truth, goodness and beauty

Module 6: Metaphysical Problems (8 hours)
The problem of one and many; the problem of evil

Suggested Readings

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PYPK300T: PHILOSOPHY OF KNOWLEDGE
(Credits: 5 – 75 Hours)

Course Objectives
The philosophy of knowledge investigates the grounds of human knowledge. It deals with the nature, sources, and limits of human knowledge. This course has the objective of initiating students of philosophy into various theories of knowledge. There are four components of a knowledge situation: the knower, the known, the means of knowledge, and the knowledge itself. The knowledge of an object is produced in the subject by a certain medium. Hence, the students need to study in detail the source or how one tries to know the object and then evaluate whether the knowledge obtained is valid or invalid. Such an approach warrants one to look into the various conditions of knowledge on the one hand, and on the other, we need to evaluate whether knowledge is possible.

Course Outcomes
CO1: Explains the history of Indian and Western epistemological traditions (understanding)
CO2: Identifies the various sources of knowledge, theories of truth, possibilities of knowledge and justification of knowledge (applying)
CO3: Develops the mental faculties to steer clear of opinions and beliefs from true knowledge (creating)
CO4: Discusses contemporary issues in the philosophy of knowledge such as relativism, foundationalism, coherentism, reliabilism, contextualism, etc. (creating)

Module 1: Definition and Nature of Epistemology (10 hours)
Concepts and definitions: knowledge, knower, means of knowledge, the object of knowledge, scepticism, foundationalism, certainty; A brief history of epistemology: Indian and Western

Module 2: Knowledge and Belief (10 hours)
Theories of belief: belief as a mental act, belief as a mental state, belief as a behavioural disposition
Four conditions of knowledge: truth condition, belief condition, justification condition, MM Gettier’s counter-example and the condition of justification without falsity

Module 3: Sources of Knowledge (15 hours)
Perception Inference Comparison Verbal testimony Postulation
Non-cognition

Module 4: Theories of Truth (15 hours)
The correspondence theory of truth: theories of evidence - external and internal
The coherence theory of truth
The pragmatic theory of truth - Dewey, William James and Charles Pierce
Deflationary theory of truth, redundancy theory, performative theory and pro-sentential theory of truth
Module 5: Epistemic Justification (10)
Foundationalism, Coherentism, Reliabilism, Contextualism
The notion of certitude: logical certitude, ontological certitude, physical certitude, moral certitude, hermeneutics

Module 6: Theory of Knowledge in Indian Thought (15 hours)
The Vedic period
The doctrine of atman in the Upanishadic period
Systematic speculations (the absolute vs. the synthetic view of knowledge)

Suggested Readings
2. D.M. Datta, Six Ways of Knowing, The University of Calcutta. 1998

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PYGR301T: PHILOSOPHY OF GOD AND RELIGION
(Credits: 5 – 75 Hours)

Course Objectives
The course aims to describe, analyse, and evaluate the role of religion in the lives of humans since the earliest times and to discover, through rational interpretation of religion, the truth of religious beliefs (especially in God) and the value of religious attitudes and practices in the human quest for growth and fulfilment.

Course Outcomes
CO1: Outlines a rational interpretation of religious truths (understanding) CO2: Develops a series of arguments for the existence of God (applying) CO3: Examines the possibility of meaningful religious discourse (evaluating) CO4: Evaluates the role of religion in the life of humans since the earliest times (evaluating)

Module 1: Introduction (10 hours)
Shift from Theodicy to Philosophy of God Objects of Philosophy of God and Religion Philosophy of God and Theology

Module 2: Methods in the Study of Religions (10 hours)
Towards a definition of religion
Nature, necessity and Scope of comparative religions
Possibility of and the need for the study of comparative religions Commonality and differences among religions

Module 3: Knowing God (10 hours)
Meanings of meaning - Meaning vis à vis reference - Indirect and direct reference - negative way, positive way, and way of eminence
Faith and reason as two modes of God-talk - trust in the ability of reason - critique of reason as capable of reaching God - between rigorous proofs and complete non-rationality
‘Both-And’: modal language and model language.

Module 4: Rationality for God’s Existence (10 hours)
Pre-philosophical arguments: phenomenological approach, the argument from common human consent, natural desire for perfect happiness.
Philosophical Arguments: the ontological arguments (St Anselm, Descartes, Leibniz), the cosmological arguments (St Thomas, Samuel Clarke), the teleological arguments (St Thomas, William Paley).
Module 5: Challenges to the Existence of God (10 hours)

Module 6: Issues in Religions (10 hours)
Incarnation, prophet hood, death, re-birth, after-life, eschatology, liberation

Module 7: Religious Hermeneutics (10 hours)
Religion and moral value Religion and science Possibility of universal religion

Suggested Readings

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PYPM302T: POSTMODERNISM
(Credits: 4 – 60 Hours)

Course Objectives
As postmodern philosophy questions the importance of power relationships, personalization, and discourse in the construction of truth and worldviews, the students are provided with ample opportunities for critical thinking. The origin of postmodernism can be placed in the closing decades of the twentieth century, when it was first apparently conceived in the visual arts, and then spread to other areas, including philosophy and theology. The term is at once fashionable and elusive but has become a catchword in art, architecture, philosophy, literature, film and music. It has become a powerful concept that can no longer be ignored. It implies a shattering of innocent confidence in the capacity of the self to control destiny. It shatters all trust in global strategies of social planning and undertakes a radical critique of the philosophical systematization of grand theories or meta-narratives paving the way for a celebration of pluralism in all spheres of life.

Course Outcomes
CO1: Explains the origin, growth and development of the postmodern philosophy (understanding)
CO2: Develops the philosophies of prominent postmodern thinkers (applying)
CO3: Evaluates postmodern philosophy about postmodern literature, films, music and culture (evaluating)
CO4: Compiles the influences that postmodernism on contemporary thought (creating)

Module 1: Introduction (10 hours)
Preliminary clarification of postmodernism-Origin of postmodernism Characteristics of the modern age General nature and traits of postmodernism The transition from modernism to postmodernism Postmodernism as a break with the past Philosophical characteristics of postmodernism
### Module 2: Heralds of Postmodernism (15 hours)
Friedrich Nietzsche, Martin Heidegger, Emmanuel Levinas

### Module 3: Postmodern Activists (15 hours)
Michael Foucault, Jean-Francois Lyotard, Jacques Derrida

### Module 4: Postmodern Feminists (10 hours)
Luce Irigaray, Julia Kristeva, Judith Williamson

### Module 5: Postmodern Thinkers of India (10 hours)
Homi K. Bhabha, Gayatri Spivak, Jayanta Mahapatra

#### Suggested Readings

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### PYHP304T: PHILOSOPHY OF THE HUMAN PERSON AND MIND
(Credits: 4 – 60 Hours)

#### Course Objectives
The course aims to challenge and stimulate students philosophically to raise the fundamental question, “Who am I?” and to have clarity about human existence and nature by critically and creatively investigating metaphysical and epistemological questions regarding human subjectivity. Human existence is fundamentally co-existence and pro-existence. We are rooted in nature, formed by nurture, and sustained by God; we act upon the world, build up the community, and move towards God.

#### Course Outcomes
- CO1: Explains the metaphysical and epistemological questions regarding human subjectivity (understanding)
- CO2: Outlines the role of gender issues in understanding the human person (understanding)
- CO3: Examines the fundamental questions about Human Person (analysing)
- CO4: Elaborates the various human faculties that distinguish humans from other beings (creating)

#### Module 1: Introducing the Philosophy of the Human Person and Mind (10 hours)
After defining what the philosophy of the human person and mind is, the module deals with its distinguishing characteristics vis-à-vis other branches of anthropology and psychology and investigates the scope and methods of enquiry. The module also examines briefly the development of the topic in the historical context. Both the Eastern and Western course of development is examined for a synthesis of the concept of the human person.

#### Module 2: Evolution of Life and Human Person (10 hours)
The origin and evolution of life and the human person are studied from scientific, philosophical and religious perspectives. Directed evolution as proposed by Teilhard de Chardin is given importance as a synthesis of scientific, philosophical and religious views.

#### Module 3: Intellect and Will (15 hours)
Although there are several functions that human bodies perform and are common to all animals, human beings are uniquely endowed with intellect and will. The intellect is an immaterial cognitive faculty that strives actively towards intelligibility and
the will is the capacity to choose between the good and the evil that is known by the intellect. The nature of human knowledge with special reference to sense knowledge and intellectual knowledge, the relationship between intellect and will, acts of will, and freedom of will are explored in this unit. These two faculties reside in a spiritual coordinating substance: the soul. The origin, nature and immortality of the human soul are studied especially from a scholastic point of view.

**Module 4: Human Person as Inter-Subjective (15 hours)**

Human nature is inter-subjective and social and we belong to a community. This aspect of the human person is fundamental because all the species-specific characteristics such as language, culture, work and play have a social dimension. *Homo sapiens* are also *homo loquens, homo fabiens* and *homo ludens* and they are constitutive of beinghuman.

**Module 5: Gender Issues and Human Person (10 hours)**

It studies gender relations, gender issues, and gender as a structuring principle in human societies. Feminist points of view are presented to foster co-responsibility, mutual respect and partnership of women and men for building up a gender-just society.

**Suggested Readings**


**Mapping of COs to Syllabus**

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**PYSN305T: PHILOSOPHY OF SCIENCE AND NATURE**

(Credits: 4 – 60 Hours)

**Course Objectives**

Philosophy of Science and Nature intends to initiate students into bridging between philosophy, nature, and scientific developments. Apart from introducing students to various scientific paradigms, they are given opportunities to approach those theories from a critical philosophical angle to understand the basic vision of reality that is unveiled and also approach science from a holistic and integral angle. Philosophy began with wonder at the reality that was obvious to human eyes, yet its origin, makeup and growing up during the times gone by have surprised most thinkers. It is different from science as well as myth. The goal of all three is to explain reality, but the methods and courses that they hold on to are quite different. There is a slow development from myth to philosophy and then to science. Myths are not existentially true and meaningful; philosophy tries to be factually true and meaningful by rational investigation. Science attempts to be factually true and does not directly influence existential meaning. Myths provide us with intuitive and existential meaning. Philosophy gives us rational meaning. Science shows us empirical facts.

**Course Outcomes**

CO1: Shows the role philosophy plays in understanding nature and scientific developments (remembering)
CO2: Outlines the various scientific paradigms in understanding the universe (understanding)
CO3: Identifies the various philosophical and scientific theories that explain matter (applying)CO4: Proposes the prospects of the philosophy of science and nature (creating)
Module 1 Introduction to Philosophy of Science and Nature (8 hours)
Introduction; Pre-Socratic and Socratic Understanding of Nature Pre-Copernican Philosophy of Science and Nature Philosophy of Science and Nature in the Middle Ages

Module 2 Philosophy of Science and Nature During the Renaissance (15 hours)
Revolution and its Philosophical Implications Mechanical Philosophy of Nature Contributions made by Copernicus and others Isaac Newton and Classical Mechanics: the concept of force Other schools and their implications.

Module 3 Philosophy of Science and Nature in the Modern Period (15 hours)
Contemporary Philosophy of Science
Logical Positivism: basic ideas, clarifying of terms, implications and critique.
Historicism: basic ideas, persons, implications and critique

Module 4 Philosophy of Science and Nature in the Contemporary Period (15 hours)
Contemporary Philosophy of Nature
Relativistic Revolution: scientific-philosophical implications Quantum Mechanics and its philosophical implications Finite / Infinite Nature of the universe
Scientific theories on the origin and end of the universe

Module 5 The Future of Philosophy of Science and Cosmology (7 hours)
A virtual journey - our journey in science and nature The novel challenges: ecological crisis vs human greed Mechanization of the human mind and thinking patterns

Suggested Readings

Mapping of COs to Syllabus

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PYHS306T: HETERODOX SYSTEMS IN INDIA
(Credits: 4 – 60 Hours)

Course Objectives
The study of heterodox systems in India helps the students foster an understanding of Indian schools that oppose the authority of the Vedas. It enables the students to interpret diverse atheistic and theistic beliefs and practices and to foster an understanding of diverse systems of thought. Due to their universal outlook and philosophical relevance, Buddhism and Jainism have received increasing attention, even in the Western world. This course offers students an alternative thinking pattern,
Course Objectives
CO1: Explains the Materialistic Philosophy of India (understanding)
CO2: Examines the origin and development of the Heterodox Systems of India (analysing)
CO3: Compares the Buddhist and Jaina Philosophies in understanding human beings, the world and God (evaluating)
CO4: Assess the contributions of the Buddhist and the Jain thought to the Indian Society (evaluating)

Module 1: The Carvaka Philosophy (10 hours)
The origin and scope
The Carvaka epistemology
The Carvaka metaphysics
The Carvaka ethics

Module 2: The Jaina Philosophy of Knowledge (10 hours)
Introduction - origin and history
The Jaina theory of knowledge: nature and kinds of knowledge
The Jaina theory of judgement: syadvada, saptabhanginaya

Module 3: Jaina Metaphysics (10 hours)
The Jaina conception of substance
Classification of substance
The concept of the soul
The inanimate substances: matter, space, time, dharma and adharma

Module 4: Jaina Ethics and Religion (5 hours)
Bondage of the soul
Liberation
Jainism as a religion without a God

Module 5: The Ethical Teachings of Buddhism (10 hours)
Origin and history of Buddhism
Buddha, Hinayana, Mahayana
The teachings of Buddhism: the four noble truths, the eightfold path to liberation
The philosophical implications of Buddha’s teachings: theory of dependent origination, theory of karma, theory of universal change, theory of the non-existence of the soul

Module 6: The Buddhist Schools of Philosophy (15 hours)
The Madhyamika School of Philosophy
The Yogacara School of Buddhism
The Sarvastivada school of Buddhism - saurantika and vaibhashika schools

Suggested Readings

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PYFR307P: PROJECT WORK BASED ON FIELD STUDY
(Credits: 4 – 60 Hours)

Course Objectives
Project-based learning, especially field study, helps students to assess and to deepen the quality of acquired knowledge. It offers the students the possibility of learning beyond the classroom setting.
Course Outcomes

CO1: Identifies the subjects and helps draw correlations between subjects and surroundings, and how the surroundings may influence the behaviour (applying).

CO2: Outlines in-depth information on subjects because they are observed and analysed for a long period (understanding).

CO3: Influences the researcher to fill the gaps in data which can be understood by conducting in-depth primary research (evaluating).

CO4: Combines theory and practical research study by qualitatively analysing the data (creating)

The students are expected to carry out field research during the semester break after 6th semester on themes about the relevance, usefulness, popularity and application of philosophy, Psychology or English Literature in seminaries, colleges or universities under the guidance of a faculty using research tools such as interviews, focus groups, surveys and observation.

The following steps are to be followed while conducting the field study:

**Identify and acquire researchers in the field:** It is essential to acquire researchers who are specialized in the field of research.

**Identify the topic of research:** The researcher works on identifying the topic of research. The researchers are responsible for deciding what topic of research to focus on based on the gaps observed in the existing research literature.

**Identify the right method of research:** After fine-tuning the research topic, researchers define the right method to approach the aim and objectives of the research.

**Visit the site of the study and collect data:** Based on the objectives, the observations begin. The researcher goes on the field and starts collecting data either by visual observation, interviews or staying along with the subjects and experiencing their surroundings to get an in-depth understanding.

**Analyze the data acquired:** The researcher undergoes the process of data analysis once the data is collected. **Communicate the results:** The researchers document a detailed field study report, explaining the data and its outcome. Giving the field study a suitable conclusion.

The field research should be for a minimum duration of 60 hours which can be extended depending upon the convenience and requirement of the student and the organisation respectively. The rest of the hours are allotted for completing the Project Report. However, the entire duration of the course should not exceed 120 hours.

The Project Report must be in a spiral bind. It should be accompanied by a recommendation letter from the department and a certificate of authentication from a competent authority from where the research was carried out. The Contents of the Report must include:

1. Introduction.
2. Need of the study
3. Objectives of the study
4. Significance of the study
5. The methodology which was undertaken for the study
6. Description of the work done
7. Learning Outcomes
8. Feedback from the target audience/community members
9. Geotagged photographs

The assessment will be done as follows:

There would be a presentation (PPT) and Viva-Voce Examination during the 7th semester.

The Assessment for the project work based on field study will have the following components:

a) Report: 40 marks
b) Seminar Presentation: 30 marks
c) Viva-Voce Examination: 30 marks

Mapping of COs to Syllabus

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PYET400T: ETHICS
(Credits: 5 – 75 Hours)

Course Objectives
This course aims at introducing the students to the philosophical need for Ethics starting with a brief discussion of moral law and how the human person in his or her process of growth intuits ethical principles. Discussions about the dynamics of morality are undertaken to show how on the one hand new situations call for new responses from a moral point of view and on the other hand certain fundamentals of ethics remain the same in so far as there is something of a common human nature adequately understood. It seeks to respond to some of the important challenges to ethics as a philosophical discipline. Thus, we attempt to look at Indian as well as Western traditions. We, then, shall explore the chief ideas of virtue ethics in various philosophical thoughts and religious traditions. It also aims to understand the important aspects of human rights and the moral importance of duties then proceed with a discussion on current ethical questions. Living in social groups is an essential characteristic of humans. Sociality and individuality are not opposite poles but are related to each other. Therefore, the right knowledge of society with its institutions is essential. We also make a critical look at the political philosophy and moral questions arising out of it. By the end of the course, the students are oriented to gain a detailed understanding of the philosophical issues involved in many contemporary debates in the public sphere as well as developing moral reasoning skills and application of those skills to contemporary social and political issues.

Course Outcomes
CO1: Explains the nature and principles of human behaviour (understanding)
CO2: Summarises the history of Indian and Western traditions on ethics (understanding)
CO3: Develops the foundations of human behaviour (applying)
CO4: Discusses the various ethical issues in contemporary times and the challenges that legislations of liberal nations pose. (creating)

Module 1: Introduction to Ethics (10 hours)
Nature, scope and subject matter of Ethics Challenges and importance of ethics in the History of Indian Philosophy Ethics in the History of Western Philosophy Kinds of ethics
Relation with other disciplines

Module 2: Human Conduct and Responsibility (10 hours)
Human acts: Emotions, moods and desires
Knowledge
Freedom and determinism: Levels of willing and not willing
Modifiers of Responsibility: Ignorance, Strong Emotions, Fear, Force, habit
The indirect voluntary
Principle of doubt effect

Module 3: Criteria for Morality (10 hours)
The objective criterion of morality: eternal law, natural law, divine positive law
The subjective criterion of morality: conscience

Module 4: Virtue (10 hours)
Definition
Moral virtues
Cardinal virtues

Module 5: The Objective Good in Moral Life (10 hours)
Good, pleasure, convention, consequences
Intuition, reason, law, freedom
Situation ethics: Love, habit, happiness

Module 6: Ethical Issues Related to Human Life (10 hours)
Bio-Ethics: body care, abortion, suicide, mutilation, euthanasia, artificial birth control and sterilization.
Sexual Ethics: rape, masturbation, pre-marital sex, homosexuality, lesbianism, sodomy, bestiality, fornication, adultery and incest
Medical Ethics: what is medical ethics; duties of physicians, duties of nurses, patient and doctor relationship, cloning, stem cell; Hippocratic oath

Module 7: Social Ethics (15 hours)
Personal Ethics: relation to self; relation to the world; relation to others; relation to God; situation ethics
Societal Ethics: liberation ethics, human rights; rights of workers, strikes, social justice, alcoholism, substance abuse, punishments and capital punishment
Business Ethics: what is business ethics; patent rights, consumer protection and bribery
War and Peace: self-defence, just war theory, nuclear war, peace and non-violence
Global Issues: HIV/AIDS, poverty, corruption, child labour and militancy
Suggested Readings

Mapping of COs to Syllabus

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PYVP401T: VEDANTA PHILOSOPHY
(Credits: 5 – 75 Hours)

Course Objectives
This course makes the students familiar with the philosophy and spirituality of the Vedanta Schools of Philosophy. It is an introduction to various schools of Vedanta highlighting the history, the context of their origin, the authors and the main teaching of these schools. The focus is on interactive learning where the students will engage themselves in a rigorous and analytical examination of the key ideas present in these schools of Philosophy. The Vedanta Philosophy is an interpretation and exposition of the Jnana-khanda section of the Upanishads. The primary thrust of the systems is to delve into the Nature of the self, and its relation to the Ultimate Reality. The systems also speak about the nature of the world in which we live. In the process, the systems deal with how a seeker having lived in this mundane world, attains his liberation (Moksha) Vedanta philosophy, though, is an exposition of the Brahmasutrabhashyas, Upanishads and Bhagavad Gita, each one of them is different in their viewpoints.

Course Outcomes
CO1: Outlines the richness of the philosophy and spirituality embedded in the Vedantic texts (understanding).
CO2: Evaluates the Metaphysics, Epistemology, Ethics, and Means of Liberation proposed in Vedantic thought (evaluating)
CO3: Discuss the contributions of great thinkers like Shankara and Ramanuja for the resurgence of Hinduism (creating)
CO4: Assesses the subtle nuances that differentiate diverse schools of Vedanta (evaluating)

Module 1: Introduction (10 hours)
Origin, Meaning and Purpose of Vedanta Philosophy

Module 2: Advaita Philosophy of Shankara (20 hours)
Life, Works, Influences, Brahman and Atman, Knowledge, Maya, World, Liberation

Module 3: Visishtadvaita Philosophy of Ramanuja (15 hours)
Life, Works, Influences, Brahman and Atman, Knowledge, Maya, World, Way of Devotion

Module 4: Dvaita Philosophy of Madhava (10 hours)
Life, Works, Influences, Brahman and Atman, Maya

Module 5: Other Schools of Vedanta Philosophy (10 hours)
Dvaita Advaita of Nimbarka, Suddha Advaita of Vallabha, Achintya Bhedabheda of Chaitanya
Module 6: The Vaishnavite Philosophy of Srimat Shankerdev (10 hours)
Life, Works, Influences, Understanding of God, Way of Devotion

Suggested Readings

Mapping of COs to Syllabus

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PYCI404T: CONTEMPORARY INDIAN PHILOSOPHY
(Credits: 5 – 75 Hours)

Course Objectives
This course aims at allowing the students to absorb the new spirit of philosophising that emerged due to the mushrooming of different philosophical movements in contemporary India. It allows them to get a feel for the new religious and social outlook that has emerged over time in India. The students would imbibe the spirit of openness and determination shared by contemporary philosophers in India. The main philosophical movements were the Bhakti, Sufi, and Reform movements. The Bhakti movement brought about revolutionary changes in the moral, social, and political perspectives of the people of India. It underscored the need to stand for unity among the religions. The Sufi movement emphasises man’s role in enhancing social unity, cultural synthesis, and communal harmony. Reform movements impel us to look at religion critically and scientifically. In the 19th century, after the reform movements, India produced some eminent thinkers who, through their ideas, philosophical and political, shaped the minds of millions and contributed to the nation-building process.

Course Outcomes
CO1: Explains in-depth the philosophical ramifications of events like the Bhakti, Sufi and Reform Movements (understanding)
CO2: Analyses the political, social, and philosophical movements of India from the 19th century (analysing)
CO3: Assesses the philosophical thoughts of contemporary Indian thinkers like Gandhi, Vivekananda, K. C. Bhattacharya, Radhakrishnan, Aurobindo, Tagore, and others (evaluating)
CO4: Estimates the influences of ancient philosophy on contemporary Indian thought (creating)

Module 1: Bhakti Movement (15 hours)
Introduction
History of the Bhakti Movement
Nature and Characteristics of the Bhakti Movement
Leaders of Bhakti Movements: Ramanuja, Ramananda, Kabir, Namdeva, Gurunanak, Chaitanya, Tulsi Das, Guru Ramdas, Tukaram
Bhakti movement in South India: Nayanmars, Alwars, Basava Women leaders: Akkamahadevi, Janabai, Mirabai, Bahinabai
Implications of the Bhakti Movement: ethical and Philosophical

Module 2: Sufi Movement in India (15 hours)
Roots of Sufism
History and Development of Sufism
Sufism in India
Interaction between Hindu and Muslim saints

Module 3: Reform Movement in India (15 hours)
Modern reform movement: the historical context
Brahma Samaj: the universalistic reform movement
Arya Samaj: the nationalistic reform movement
19th Century Hindu universalism: Ramakrishna Paramahamsa, Ramkrishna Mission (Vivekananda), ISKCON Movement
The Guru movements: Osho, Satya Sai Baba,
Module 4: The Philosophy of Contemporary Thinkers (30 hours)
Vivekananda: the concept of God, the concept of the world, the concept of Maya, the concept of the human person, freedom and karma, liberation and the means of liberation, his idea of religion
Aurobindo: His idea of integral yoga, Involution and evolution, levels of reality, the destiny of human being Mahatma Gandhi: life, political ideas - Satyagraha, ahimsa, Sarvodaya, religion, the concept of God
B.R. Ambedkar: social philosophy, political ideas and socio-political criticism, economic ideals and social development, religious criticism and social transformation
S. Radhakrishnan: metaphysics, epistemology, religion and ethics, social and political philosophy

Suggested Readings

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PYPB405T: THE PHILOSOPHY OF THE BHAGAVAD GITA
(Credits: 5 – 75 Hours)

Course Objectives
The objective of this course is to make the students familiar with the philosophy and spirituality of the Bhagavad Gita. This course is an introduction to the Bhagavad Gita, highlighting the history, the context of the text, the author, and the main teaching of the text. The focus is on interactive learning, where the students will engage themselves in a rigorous and analytical examination of the key ideas present in the Bhagavad Gita. It gives answers to many existing philosophical dilemmas. The text highlights some important issues, like the nature of the self and the nature of the non-self, the different paths to liberation, the purpose of incarnation, the true nature of God, and the different qualities of a good person as well as a bad person. Hence, this text helps a student further reflect on Indian philosophy. The Bhagavad Gita is a spiritual classic. Though it is not a sruti text, it is highly regarded by devout Hindus and accepted by many other seekers of truth. This text helps the students delve deep into Indian spirituality. A text-based study of the Gita enables the students to understand and appreciate its rich spiritual and philosophical wealth.

Course Outcomes
CO1: Outlines the richness of the philosophy and spirituality embedded in the Gita (understanding)
CO2: Develops an appreciation for the Metaphysics of the Bhagavad Gita, particularly the Nature of God, the Nature of the true self, different paths to liberation, and the status of liberation (applying)
CO3: Evaluates the ethical values present in the Gita (evaluating)
CO4: Examines the leadership and management qualities Krishna and make them relevant in the present context (analysing)

Module 1: Introduction to the Bhagavad Gita (15 hours)
History, general context and author of the text
The immediate context of the Bhagavad Gita
The dilemma of Arjuna
Arjuna is a representative of every human person in crisis

Module 2: Main Philosophical Ideas in the Bhagavad Gita (15 hours)
The true nature of self
The true nature of the world
Different Paths to Liberation
The purpose of the incarnation

Module 3: Krishna as a Model of Leadership (10 hours)
Krishna’s type of leadership and management
Educative transformative leadership
The distinction between normal work and nishkama karma

Module 4: The Qualities of Persons with Sattva Guna and Tamas Guna (10 hours)
Qualities of people with demonic nature
Result of entertaining demonic qualities and living in delusion How to guard oneself against taking the road of demonic nature: Qualities of people with divine qualities, and final success for them

**Module 5: Text-based Study (25 hours)**
The text of the Bhagavad Gita will be critically explained for an in-depth understanding of its philosophy.

**Suggested Readings**

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MINOR COURSES (IN ENGLISH AND PSYCHOLOGY)

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EGGE106T: GENERAL ENGLISH I  
(Credits: 4 - 60 Hours)

Course Objectives
The objective of this course is to acquaint the students with language and literature and to whet their appetite for the same. The students are led to a gradual discovery of the three genres: fiction, drama, and poetry. They are expected to undertake an in-depth analysis of the texts. They are also encouraged to closely examine the various themes and motifs and to have a contextualized reading of the texts. If this exercise is taken seriously the students will acquire the skill to communicate effectively. The outcome will be the ability to critically evaluate and appreciate a particular work.

Course Outcomes
CO 1: Shows familiarity with vocabulary and phraseology (remembering)
CO 2: Illustrates the use of the language effectively in reading, writing, and speaking (understanding)
CO 3: Develops the ability to critically evaluate and appreciate a particular piece of writing (applying)
CO 4: Tests the knowledge of English grammar (creating)

Module I: Selected Novels (15 hours)
Anita Desai - Fasting Feasting  
Jane Austen - Sense and Sensibility

Module 2: Selected Dramas (15 hours)
Oscar Wilde - The Importance of Being Earnest  
Henrik Ibsen - A Doll’s House  
Harold Pinter - The Birthday Party

Module 3: Selected Poems (18 hours)
Kamala Das - My Mother at Sixty  
Six John Donne - Death Be Not Proud  
William Wordsworth - The World is Too Much with Us  
Dante Gabriel Rossetti - The Blessed Damozel

Module 4: Basic English Grammar (12 hours)
Grammar I  
Grammar II

Suggested Readings
1. Anita Desai, Fasting Feasting.
3. Das & Mohanty, Literary Criticism: A Reading, Oxford University Press.
5. Harold Pinter, The Birthday Party.
6. Henrik Ibsen, A Doll’s House.
7. Jane Austin, Sense and Sensibility.
11. Oscar Wilde, The Importance of Being Earnest.
Mapping of COs to Syllabus

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**PCGP100T: GENERAL PSYCHOLOGY**

(Credits: 4 – 60 Hours)

**Course Objectives**

This introductory course in psychology gives a brief historical sketch of the science of psychology and a glimpse into the methods used in psychology. It also provides knowledge about the various psychological processes that every human being experiences. The paper also has several practicals.

**Course Outcomes**

CO 1: Explains the developments and methods in psychology (understanding)
CO 2: Outlines the biological foundations of behaviour, and processes underlying sensation, perception, cognition, memory and motivation (understanding)
CO 3: Evaluates the different psychological processes and behaviours (evaluating)
CO 4: Proposes practicals based on the processes discussed theoretically thus offering the students a hands-on experience (creating)

**Module 1: Introduction to Psychology (10 hours)**

Definition and Goals of Psychology, Role of a Psychologist in Society
Modern Perspectives: Biological, Psychodynamic, Behaviouristic, Gestalt, Cognitive, Cross-Cultural, Humanistic and Evolutionary Methods: Experimental, Observation, Questionnaire and Inventories, Interview, Clinical Case Study

**Module 2: Biology and Behaviour (10 hours)**

Neurons: structure of neurons, neural impulses, synapses and neurotransmitters nervous system: central and peripheral nervous systems
Cerebral Cortex: structure and psychological importance in thought and language, the significance of left and right brain, split brain.
Effects of Hormones on Behaviour

**Module 3: Sensory-Perceptual Processes (10 hours)**

Sensation: basic concepts and processes in sensation
Types of Senses (An Overview): visual, auditory, gustatory, olfactory, tactile, vestibular, kinaesthetic and organic senses
Sensory Adaptation: advantages and disadvantages, integration of senses, sensory thresholds Perception: understanding perception, gestalt laws of organization
Different Process of Perception
Correlates of Perception: awareness, set, motives, needs, learning and attention Illusion: subliminal perception, extra-sensory perception

**Module 4: Memory and Forgetting (10 hours)**

Basic Processes: encoding, storage, retrieval Sensory Storage: iconic memory and echoic memory
STM-working memory, serial position curve, rehearsal, chunking
LTM-Units of Memory: declarative, procedural, semantic, episodic memory
Associative Models: explicit and implicit memory, retrieval cues, state-dependent and context-dependent memory, tip-of-the-tongue phenomena, flashbulb memory levels of processing, constructive processes in memory, schemas Forgetting: decay theory, interference theory, prospective memory, absence of retrieval cues, memory dysfunctions Improving Memory: mnemonic strategies

**Module 5: Learning and Cognitive Processes (10 hours)**

Attention: definition, characteristics, selective attention and divided attention process of thinking, Types: Reasoning-types, problem-solving, decision making, creative thinking, concept formation
Classical Conditioning: basics of conditioning, operant conditioning Language and thinking, imagery and thinking
Cognitive Learning: latent learning, observational learning, insight learning
Module 6: Motivation and Emotion (10 hours)
Motivation: meaning, approaches-instinct, drive reduction, arousal, incentive, cognitive, humanistic Maslow’s Need Hierarchy: types, physiological motivation (hunger, thirst, sex, maternal drive), psychological motivation (achievement, affiliation, power, parenting)
Emotion: meaning, the physiological basis of emotions
Theories-James Lange Theory, Cannon-Bard Theory, Cognitive Theory Emotional Expression

Suggested Readings

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EGGE207T: GENERAL ENGLISH II
(Credits: 4 – 60 Hours)

Course Objectives
The course intends to broaden the mental horizons of the students by unfolding before them the philosophy, wit, and wisdom that is contained in the selected literary works. It helps in the correction of taste, that is, the ability to distinguish between the excellent and the mediocre. The course assists the students in bringing the necessary literary gravitas to their academic pursuits.

Course Outcomes
CO 1: Shows familiarity with vocabulary and phraseology in written English (Remembering).
CO 2: Illustrates the use of the language effectively in selected short stories and essays (understanding).
CO 3: Develops the ability to articulate thoughts and ideas meaningfully coherently and cogently with certain lexical elegance (applying).
CO 4: Tests the knowledge of the English language and composition (creating).

Module 1: Selected Short Stories (20 hours)
The Happy Prince - Oscar Wilde The Necklace - Guy de Maupassant
The Open Window - Hector Hugh Munro The Last Leaf - O. Henry

Module 2: Selected Essays (20 hours)
The Origin of Species - Charles Darwin of Studies - Francis Bacon

Module 3: Language and Composition (20 hours)

Suggested Readings
4. Francis Bacon, Of Studies.
5. Guy de Maupassant, The Necklace.
6. Hector Hugh Munro, The Open Window.
8. O. Henry, The Last Leaf.
10. Wren & Martin, English Grammar and Composition.

Mapping of COs to Syllabus

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PCDP200T: DEVELOPMENTAL PSYCHOLOGY
(Credits: 4 – 60 Hours)

Course Objectives
Developmental psychology is a branch of psychology that seeks to provide a general introduction to various developmental concepts across the different stages of life, with the nature versus nurture debate as a concurrent theme. It focuses on advancing knowledge of the processes of change for individuals across the lifespan. Topics of research interest include developmental theories, methods of investigating life-span change, as well as such processes as cognition, memory, theories of mind, identity, risk-taking, social relationships, and problem behaviour.

Course Outcomes
CO 1: Explains human development from conception till adulthood (understanding)
CO 2: Develops topics such as biological beginnings, development and change across infancy, childhood, adolescence and adulthood (applying)
CO 3: Compares the psychological ramifications at the various stages of human development (analysing)
CO 4: Proposes healthy psychological growth of a human person (creating)

Module 1: Introduction (10 hours)
Concept of Human Development: Introduction, meaning, stages of lifespan development
Aspects of human development: physical, social, cognitive, moral principles of human Development (Balte) Factors influencing human development: ecological factors, hereditary factors
Theories of human development: Erickson, Piaget, Vygotsky (Dialectical), Kohlberg Biological Beginnings of Development
Genetic Foundations: genetic processes and genetic principles; chromosomal and gene-linked abnormalities

Module 2: Pre-natal Development and Infancy (10 hours)
Prenatal development: course of prenatal development; teratogens and prenatal environment, heredity, environment and individual differences
Infancy: characteristics of Infancy
Physical, motor development, emotional development, language development new-born reflexes and their adaptive value: (optical, Palmer, Babinsky, Moro, sucking, rooting, swimming, walking, placing), the importance of assessing new-born reflexes

Module 3: Childhood (10 hours)
Subdivisions of childhood, characteristics of each period
Aspects of development: physical development, cognitive development, language development, emotional development, psychosocial development

Module 4: Puberty and Adolescence (10 hours)
Puberty: meaning, biological changes (sexual maturation, growth spurt, secondary sexual characteristics) Reactions to physical changes
Adolescence: characteristics of adolescence Marcia’s stages of development of personal identity
Development of a career stage in vocational planning influences vocational planning Adolescent relationships: family, peers, adult society

Module 5: Adulthood (20 hours)
Subdivisions, characteristics of each stage Early adulthood
Vocational Adjustment: choosing an occupation, stability of vocational selection foundations of intimate relationships: friendship, love, sexuality
Marriage: marital adjustment and conditions influencing it Parenthood: adjustment to parenthood
Middle adulthood occupational adjustment: stable and unstable patterns, preparation for retirement Psychosocial changes: coping with midlife crisis
Changes in relationships: marriage, relationship with maturing children, ageing parents, siblings, grandmotherhood, friendships; late adulthood
Primary and secondary ageing, theories of ageing
Psychosocial aspects: models of coping, models of successful ageing, lifestyle and social issues (work retirement and leisure)
Personal relationships: relationship with adult children, siblings, great-grandparenthood Aspects of death: biological, socio-cultural aspects, psychological aspects, patterns of grieving
Suggested Readings

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EGAE309T: ALTERNATIVE ENGLISH I
(Credits: 4 – 60 Hours)

Course Objectives
The study of literature has to be discursive. This course presupposes a movement on the part of the students to engage in more serious literature to be able to identify the technique and craft of different authors. It intends to take the students to a higher level of appreciation for the work. It will also set in motion a preparedness for serious research.

Course Outcomes
CO1: Shows familiarity with vocabulary and phraseology in written English (Remembering).
CO2: Illustrates the use of the language effectively in selected poems, dramas and novels (understanding).
CO3: Develops the ability to articulate thoughts and ideas meaningfully coherently and cogently with certain lexical elegance (applying).
CO4: Tests the knowledge of the English language and composition (creating).

Module I Introduction to Poetry (20 hours)
Key terms, concepts and literary devices Selected Poems:
P. B. Shelley - Ode to the West Wind
Nissim Ezekiel - The Professor
William Butler Yeats - The Second Coming
Matthew Arnold - The Dover Beach

Module 2: Introduction to Drama (20 hours)
Key Terms and Concepts
Selected Dramas: George Bernard Shaw - Candida and Oliver Goldsmith - She Stoops to Conquer

Module 3: Introduction to Novel (20 hours)
Key terms Selected Novels:
George Orwell, The Animal Farm
Earnest Hemingway, The Old Man the Sea

Suggested Readings
2. Earnest Hemingway, The Old Man and the Sea.
5. George Orwell, The Animal Farm.
7. Matthew Arnold, The Dover Beach.
9. Oliver Gold Smith, She Stoops to Conquer.
10. P. B. Shelley, Ode to the West Wind.
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PCPP300T: THEORIES OF PERSONALITY AND POSITIVE PSYCHOLOGY
(Credits: 4 – 60 Hours)

Course Objectives
Understanding the theories of personality helps understand the behaviour patterns of individuals. It is important for the well-balanced psychological growth of an individual. Positive psychology, on the other hand, is the scientific study of what makes life worth living, focusing on individual and societal well-being. It acquaints the students with positive subjective experiences, positive individual traits, and positive institutions. It aims to improve the quality of life.

Course Outcomes
CO1: Explains the inner dynamics of human nature (understanding)
CO2: Demonstrates the uniqueness and the immense value of every person (understanding)
CO3: Identifies the various forces – both environmental and hereditary – that shape human personality (applying)
CO4: Examines the various theories of personality (analysing)

Module 1: Freud’s Classical Psychoanalytical Theory (15 hours)
The structure of personality: The Id, the Ego and the Superego
The dynamics of personality: psychic energy and instincts
The stages of development: oral, anal, genital, phallic, latency period, etc.
Contemporary Psychoanalytical Theory: Erikson’s concept of the life cycle and eight stages of human development

Module 2: Jung’s Analytical Theory (10 hours)
Analytical psychology versus psychoanalysis
The structure of personality: the ego, the personal unconscious and complexes, the collective unconscious
The Archetypes: persona, anima and animus, shadow, self

Module 3: Social Psychological Theories (10 hours)
Adler’s five major contributions to personality theory; the five major sources of his thought: inferiority feelings and compensation, striving for superiority, family, order of birth and personality, style of life
Fromm’s analysis of human loneliness and isolation the basic conditions of human existence and the specific needs; the five character types; the problem of human beings’ relations to society; humanistic communitarian socialism as the perfect society
Horney’s strategies for coping with basic anxiety; the ten ‘neurotic’ needs; moving towards people, moving away from people, and moving against people

Module 4: Organismic Theory (10 hours)
The principal features of the organismic theory
Kurt Goldstein: the structure of an organism; the dynamics of the organism; the development of the organism
Andras Angyal: the structure of the biosphere; the dynamics of the biosphere; the development of personality
Maslow’s humanistic psychology as the “third force,” the human potential movement, the hierarchy of motives, characteristics of self-actualized persons and peak experiences

Module 5: Rogers’ Person-Centred Theory (10 hours)
The structure of personality: organism and self; congruence and incongruence the dynamics of personality
The development of personality

Module 6: Constitutional Psychology (10 hours)
Spranger’s six types of personalities: theoretical, economic, aesthetic, social and power-politics types
Kretschmer’s three types of physiques and the corresponding personality types
Sheldon’s Atlas of men and Atlas of women
Module 7: Eastern Psychology (15 hours)
Eastern psychologies and Western personality theories
Abhidhamma theory: unhealthy and healthy factors; personality types, means to healthy personality; concentration and altered states of consciousness

Suggested Readings

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EGAE407T: ALTERNATIVE ENGLISH II
(Credits: 3–45 Hours)

Course Objectives
The study of literature has to be discursive. This course presupposes a movement on the part of the students to engage in more serious literature to be able to identify the technique and craft of different authors. It will take the students to a higher level of appreciation for the work. It will also set in motion a preparedness for serious research.

Course Outcomes
CO1: Shows familiarity with vocabulary and phraseology in written English (Remembering).
CO2: Illustrates the use of the language effectively in selected essays and plays (understanding).
CO3: Develops the ability to articulate thoughts and ideas meaningfully coherently and cogently with certain lexical elegance (applying).
CO4: Tests the knowledge of the English language and composition (creating).

Module 1: Essays (25 hours)
A Room of One’s Own - Virginia Woolf
The Purloined Letter - Edgar Allan Poe
The Praise of Chimney Sweepers - Charles Lamb
The Rocking Horse Winner - D. H. Lawrence
The Homecoming - Rabindranath Tagore
The Doll’s House - Katherine Mansfield

Module 2: Language & Linguistics (15 hours)
Module 3: Plays (20 hours)
Theatre of the Absurd – Martin Esslin

Suggested Readings
4. Das & Mohanty, Literary Criticism: A Reading, Oxford University Press.
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DEPARTMENT OF PHILOSOPHY

10. Virginia Woolf, A Room of One’s Own.

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PYRM402T: RESEARCH METHODOLOGY
(Credits: 2–30 Hours)

Course Objectives
The objectives of the course in Research Methodology include an understanding of the research process and acquiring the attitudes and skills essential for research, developing skills for interpretation, documentation and presentation of results of the research, the process of report writing and publication, and basic statistics.

Course Outcomes
CO1: Identifies the various components involved in research (applying).
CO2: Outlines the basics in Statistics (understanding).
CO3: Illustrates the different steps involved in the research process (understanding).

Module 1: Introduction to Research (5 hours)
Philosophical Foundations of Research; Natural and social science research- characteristics and scientific attitude. Scope of social science research

Module 2: Research designs, approaches and types (8 hours)
Research designs: Descriptive, Exploratory and Experimental: meaning, scope, characteristics, application in a social work setting.
Research Approaches: Qualitative and Quantitative Research: meanings, scope, methods, steps, sampling, data collection, analysis, interpretation and reporting. Strengths and weaknesses.
Evaluative research: Programme and project evaluation: concept, types, steps, reports.

Module 3: Steps in Research Process (12 hours)
Problem Formulation: Identifying the research issue, formulating the research topic and problem, reviewing the literature (library work), theoretical framework, formulating objectives, clarifying concepts, and variables- conceptual and operational, and formulating hypothesis.
Population and Sampling: Inclusion and exclusion criteria of population, the logic of sampling size and techniques: probability and non-probability sampling.
Sources, Collection and Analysis of Data: Secondary and primary sources. Data collection data editing, coding, master sheet, analysis, report writing. Using a computer for data analysis: coding, analysis- graphs and results.
Professional report writing

Module 4: Introduction to Statistics for Research (5 hours)

Suggested Readings

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PCSP400T: SOCIAL PSYCHOLOGY

(Credits: 3–45 Hours)

Course Objectives
The course seeks to give comprehensive knowledge about the psychological ramifications that follow from the fact that a human being is a social animal. Social psychology is the study of how individual or group behaviour is influenced by the presence and behaviour of others. The major question social psychologists ponder is this: How and why are people’s perceptions and actions influenced by environmental factors, such as social interaction?

Course Outcomes
CO1: Explains the psychological ramifications of human beings considered social beings (understanding)
CO2: Demonstrates the processes such as social relationships and problem behaviour (understanding)
CO3: Evaluates the role of society in the growth of a human person (evaluating)
CO4: Discusses concepts such as motivation, self-concept, attitude and conflict (creating)

Module 1: Introduction (15 hours)
Definition and History of social psychology
Theories: motivational, learning, cognitive, decision-making, interdependence, socio-cultural, evolutionary, and mid-range theories

Module 2: Social Perception (15 hours)

Module 3: Positive Social Relations (10 hours)
Pro-Social behaviour: origin, helping, influences (personal, interpersonal and situational), receiving help interpersonal attraction and affiliation: characteristics of the individual, others and situational influences

Module 4: Negative Social Relations (10 hours)
Perceiving Groups: stereotypes, prejudices (individual differences and reducing prejudice) Aggression: origin, influences (social and situational), forms, prevention and control

Module 5: Social Influences (10 hours)
Attitudes: formation, attitude and behaviour, attitude change
Group: formation, function (roles, status, norms and cohesiveness), productivity, groupthink, conflict and conflict resolution

Suggested Readings

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### SKILL ENHANCEMENT COURSES

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<tr>
<td>1</td>
<td>S E Course 1</td>
<td>PYMT102L</td>
<td>Basics in Motor Mechanics/Tailoring and Plumbing</td>
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<td>2</td>
<td>S E Course 2</td>
<td>PYOA104L</td>
<td>Basics in Office Automation</td>
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<td>3</td>
<td>S E Course 3</td>
<td>PYBE205L</td>
<td>Basics in Electrical and Electronics</td>
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#### PYMT102L: BASICS IN MOTOR MECHANICS/TAILORING AND PLUMBING

(Credits: 3 - 90 Hours)

**Course Objectives**

The course intends to offer hands-on training to the students in skills. In this skill enhancement course, the students are acquainted with two skills, namely, motor mechanics (for boys) and tailoring (for girls) and plumbing (for both boys and girls). The students will have 45 hours of theory classes and 45 hours of practicum.

**Course Outcomes**

- **CO 1:** Demonstrates basic skills in motor mechanics, tailoring and plumbing (understanding)
- **CO 2:** Shows the basic safety practices in motor mechanics, tailoring and plumbing (understanding)
- **CO 3:** Identifies the basic errors in motor mechanics, tailoring and plumbing (applying)
- **CO 4:** Analyses the basic operations in motor mechanics, tailoring and plumbing (analysing)

**Module 1: Basics in Motor Mechanics/Tailoring (25 hours of theory and 25 hours of practicum)**

Motor Mechanics: aggregates and components of a vehicle, hand tools and special tools, workshop calculations, terms and terminologies, components of a vehicle.

Tailoring: machine classification, needle anatomy, industrial sewing machine, cleaning of the sewing machine, sewing machine motors, threads, safety tips, sewing fundamentals, exercise, stitch and seam classification, sewing and fabric defects, recognising garment parts, sewing methods and garment construction.

**Module 2: Basics in Plumbing (20 hours of theory and 20 hours of practicum)**

Plumbing tools, piping materials and fittings, plumbing fixtures, designing plumbing systems, preparing for plumbing system installation, installing water supply piping, installing fixtures, faucets, and appliances.

**Suggested Readings**

1. Automobile Repair, New Delhi: Don Bosco Tech Society.

**Mapping of COs to Syllabus**

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#### PYOA104L: BASICS IN OFFICE AUTOMATION

(Credits: 3 – 90 Hours)

**Course Objectives**

This skill enhancement course in office automation is aimed at teaching the students digital concepts as well as various other skills that they will need to succeed in the modern workplace. The course offers an added advantage to students while applying for jobs in various sectors, be they governmental or non-governmental. The students will have 45 hours of theory classes and 45 hours of practicum.

**Course Outcomes**

- **CO 1:** Defines the various computer programmes that are employed for office management (remembering)
- **CO 2:** Explains the various uses of computers in office management (understanding)
- **CO 3:** Develops typing skills, designing and publishing using computer software (applying)
- **CO 4:** Discusses office procedures and the various devices used in a modern office (creating)
Module 1: Computer Science and Operating System (10 hours of theory and 10 hours of practicum)
Typing Skills, Basics of Computer, Programming, Windows

Module 2: Personal Computer Software Tools (10 hours of theory and 10 hours of practicum)
MS Word, MS Excel, MS PowerPoint

Module 3: Designing and Publishing software (15 hours of theory and 15 hours of practicum)
PageMaker, Photoshop and Corel Draw

Module 4: Office Procedures and the Devices Engaged in Modern Office (10 hours of theory and 10 hours of practicum)
Photocopier, Risograph, Scanners, Laminating Machine, etc.

Suggested Readings

Mapping of COs to Syllabus

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PYBE205L: BASICS IN ELECTRICAL AND ELECTRONICS
(Credits: 3 – 90 Hours)

Course Objectives
The course intends to offer hands-on training to the students in skills. In this skill enhancement course, the students are acquainted with two skills, namely, electrical and electronics. The students will have 45 hours of theory classes and 45 hours of practicum.

Course Outcomes
CO 1: Demonstrates basic skills in electrical and electronics (understanding)
CO 2: Shows the basic safety practices in electrical and electronics (understanding)
CO 3: Identifies the basic errors in electrical and electronics (applying)
CO 4: Analyses the basic operations in electrical and electronics (analysing)

Module 1: Basics in Electricals (25 hours of theory and 25 hours of practicum)
Basic tools & safety: introduction to electricity, safety precautions, elementary first aid, identification of different hand tools with their specifications-care and maintenance of hand tools, ohms law, resistance electric signs & symbols
Electrical Wires: identification of various types of wires used for house wiring, motor winding in electrical appliances, their uses and sizes
Electric Accessories & Meters: common electric accessories and fixtures with their specifications installation of different types of electric meters and instruments (portable type panel/board type) function and uses of ampere meter, voltmeter, energy meter, wattmeter, megger
Protective Devices: Understanding of fuses and circuit breakers (Kit-Kat Type, H.R.C. Fuse, Cartridge Fuse, M.C.B. ELCB) earthing: the purpose of earthing, methods of earthing (plate & pipe earthing)
Complete house-wiring layout, Splitting load wire by NEC I.E.E. rules, multi-storeyed system, fault finding and troubleshooting.

Module 2: Basics in Electronics (20 hours of theory and 20 hours of practicum)
Basic technical know-how in fitting, assembling, repairing and maintaining electronic equipment such as computers, televisions, solar panels, UPS, inverters and mobiles.
Domestic Appliances: working principles and circuits of common domestic equipment and appliances: calling bell, buzzer, alarms, electric iron, heater, light. electric kettle, heater/immersion heater, hot plate, oven, geyser, cooking range, mixer, washing machine, motor pump set, etc.

Suggested Readings
INTERNSHIPS (Conducted after 4th Semester and evaluated in 5th Semester)

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<th>Semester</th>
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<tr>
<td>5</td>
<td>Internship</td>
<td>PYIN303L</td>
<td>Teaching in Schools</td>
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PYIN303L: TEACHING IN SCHOOLS

Course Objectives
This course is intended to acquire practical know-how in teaching and the art of accompanying children. It provides a compelling reason to learn, teaches the skills of civic participation and develops an ethic of service and civic responsibility. It increases motivation and retention of academic skills as specific learning goals are tied to community needs. The students are expected to spend some days in schools that are assigned to them. They will be engaged in teaching and in other co-curricular activities that are beneficial to the children.

Course Outcomes
CO1: Develops familiarity with the social and economic situation of the localities where the internships are conducted (applying).
CO2: Extends the facilities of learning and teaching techniques to lesser privileged children (understanding).
CO3: Evaluates the teaching abilities or social sensibilities of students (evaluating).
CO4: Improves the intellectual and psychological well-being of the children as well as the beneficiaries of social work (creating).

The students have to undergo the internship during the semester break after the 4th semester. They are expected to keep a daily report of the activities that they carry out and the learning outcomes during the entire period of the internship. The faculty members will supervise them during this period. After completing their internship, they need to produce a certificate of completion from the headmasters or principals of the concerned schools.

The internships should be for a minimum duration of 30 hours which can be extended depending upon the convenience and requirements of the student and the school respectively. The rest of the hours are allotted for completing the Report. However, the entire duration of the course should not exceed 60 hours.

The Report must be in a spiral bind. It must be accompanied by a certificate of authentication from the headmaster/principal of the school in which the candidate underwent the internship. The Report must contain a detailed description of the activities performed, learning outcomes, feedback from the target group and Geotagged photographs.

The assessment will be based on the presentation (PPT) and Viva-Voce Examination after the completion of the internship.

The Assessment for the internship will have the following components:
- Report: 40 marks
- PPT Presentation: 30 marks
- Viva-Voce Examination: 30 marks

Mapping of COs to Syllabus

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RESEARCH PROJECT/DISSERTATION

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<tr>
<td>7</td>
<td>Research Project/Dissertation</td>
<td>PYDI403P</td>
<td>Dissertation Based on Themes in Philosophy or Psychology</td>
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<td>8</td>
<td>Research Project/Dissertation</td>
<td>PYDI406P</td>
<td>Comprehensive Evaluation of Dissertation and Philosophy (Viva-Voce)</td>
<td>6</td>
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PYDI403P: DISSERTATION BASED ON THEMES IN PHILOSOPHY OR PSYCHOLOGY
Credits: 6

Course Objectives
Dissertations are an important method of demonstrating that the students can identify a topic of concern to the field, and read, understand and incorporate the relevant literature into a new research question to be investigated. It involves active research, coming up with a question, following a defined methodology and engaging with the work of other researchers. It is a rite of passage within education and shows that the students can ‘do’ what they have been studying.

Course Outcomes
CO1: Develops descriptive, analytic and synthetic skills in writing (remembering).
CO2: Demonstrate a sense of originality, self-discipline and hard work (understanding)
CO3: Assumes a thorough knowledge of the subject matter under research (analysing)
CO4: Shows that the researcher can undertake independent work and, depending on the final result, move to a high standard in terms of quality (understanding)

- One thesis, not exceeding 18,000 words, on a specialised subject during the seventh semester
- Registration for the thesis will be done during the sixth semester.
- The student selects the theme and a guide (promoter) among the faculty members in consultation with the HoD, Department of Philosophy.
- The scheme of the thesis (with a minimum of 300 words) has to be submitted for approval before the completion of the sixth semester.
- The scheme shall include the relevance of the theme, methodology, titles, an outline of the chapters, and a working bibliography.
- The departmental meeting shall approve the schemes of the theses in the sixth semester itself.
- The students will be allotted 180 class hours during the seventh semester for the completion of the thesis.
- The thesis shall be submitted at least one month before the end of the seventh semester.
- The thesis should be typewritten in the format prescribed by the Department of Philosophy.
- Three bound copies of the thesis are to be submitted to the office.
- The thesis will be evaluated by the respective guide (promoter). There will also be a public defence of the thesis for 30 minutes in the eighth semester.

The Assessment for the dissertation will have the following components:

a. Evaluation of the guide (promoter): 60 marks
b. Viva-Voce Examination: 40 marks

Mapping of COs to Syllabus

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PYDI406P: COMPREHENSIVE EVALUATION OF DISSERTATION AND PHILOSOPHY (VIVA-VOCE)
Credits: 6

Course Objectives
The purpose of the comprehensive evaluation is for students to demonstrate mastery of knowledge in philosophy, the subject in which they are majoring. It also gives the students opportunities to exhibit their familiarity with research. The comprehensive evaluation of dissertations and philosophical subjects consists of a viva voce examination.

Course Outcomes
CO1: Develops systematic and critical philosophical thinking (applying)
CO2: Examines the extent of philosophical knowledge acquired during the course of study (analysing)
CO3: Evaluates the capacity of a candidate for a comprehensive understanding of things (evaluating).
CO4: Assesses the internalising capacity of the intellectual inputs (evaluating).

The students shall have a comprehensive viva voce examination at the end of the eighth semester. The students will be allotted 180 class hours for the examination. The duration of the viva voce examination will be an hour before two panels (2x2) of four examiners, which can be held in two different phases. In the first phase, the candidates will appear before the first panel, and they will be asked to present in brief the findings of the dissertation prepared in the seventh semester, and questions based on them will be asked. In the second phase, before the two-member panel, the candidates will be examined for 30 minutes on the principal courses in philosophy. This will also last for 30 minutes. Both panels will evaluate the performance of the candidates out of 100, and the average is taken for the final reckoning. The comprehensive viva voce examinations will carry a weightage of 6 credits.

Mapping of COs to Syllabus

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DEPARTMENT OF HOSPITALITY AND HOTEL ADMINISTRATION

PROGRAMME: BACHELOR OF SCIENCE in HOSPITALITY AND HOTEL ADMINISTRATION (BSC)

DEGREE: BSC HHA (HONOURS)/ BSC HHA (HONOURS) WITH RESEARCH

VISION
To develop design and deliver research-based personalized education that equips students to become global hospitality professionals. Our aim is to impart knowledge, skills and abilities to the students through the holistic approach for nurturing them as dependable human leaders. We do develop our students to interface with stakeholders and to deliver hospitality Professionals that add to the financial, intellectual, environmental, ethical, cultural and social growth of the nation

MISSION
The mission of this department is to be a leading hospitality institution imparting quality education of global excellence leading to hospitality ready professionals carrying ethical and social values.

PROGRAMME OUTCOMES (PO)
PO 1: Critical Thinking: Demonstrate professional aptitude, critical thinking, problem solving skills, and leadership skills needed for all sectors in the hospitality industry.
PO 2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one more foreign language.
PO 3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in the organizational and operational structure of hospitality industry.
PO 4: Effective Citizenship: Demonstrate awareness and understanding necessary for social concern and equity towards national development.
PO 5: Ethics: Apply ethical standards in the professional field and accept responsibility for them.
PO 6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO 7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the field of hospitality management.

PROGRAMME SPECIFIC OUTCOMES (PSO)
PSO 1: Conceptual skills: Proficient in the core functional and support areas of hospitality sectors to plan and coordinate business related events.
PSO 2: Management skills: Manage structures and finance of the industry, as well as disaster management.
PSO 3: Problem solving skills: Develop legal awareness for handling real-life challenges of hospitality industry.
PSO 4: Entrepreneurial skills: Achieve necessary skills to become a hospitality entrepreneur.

LIST OF COURSES
1.1: Introduction to Food & Beverage service
1.2: Introduction to gastronomy & hygiene practices
1.3: Multidisciplinary
1.4: Ability Enhancement
1.5: Introduction to room division
1.6: Common value added
1.7: Common value added
1.8: Community Engagement
1.9: Introduction to Food & Beverage service Practical
1.10: Introduction to gastronomy & hygiene practices Practical
2.1: Restaurant Ethics & Menu planning
2.2: Culinary & Baking skills
2.3: Multidisciplinary
2.4: Ability Enhancement
2.5: Functional areas & cleaning agents
2.6: Common value added
2.7: Common value added
2.8: Community Engagement
2.9: Restaurant Ethics & Menu planning Practical
2.10: Culinary & Baking skills Practical
2.11: Vocational Training **
3.1: In room dinning & beverages
3.2: Indian Gastronomy
3.3: Room reports & surface cleaning
3.4: Multidisciplinary
3.5: Ability Enhancement
3.6: Introduction to Marketing
3.7: In room dinning & beverages Practical
3.8: Indian Gastronomy Practical
3.9: Room reports & surface cleaning Practical
4.1: Bar operation & Outlet Management
4.2: Quantity Food Production
4.3: Front Office Management
4.4: Housekeeping supervision and Budgeting
4.5: Ability Enhancement
4.6: Bar operation & Outlet Management Practical
4.7: Quantity Food Production Practical
4.8: Front Office Management Practical
4.9: Housekeeping supervision and Budgeting Practical
4.10: Vocational Training **
5.1: Restaurant Planning & Management
5.2: Garde Manger & Confectionary
5.3: Revenue Management & Budgeting
5.4: Advance Housekeeping Management
5.5: Field Project/ Apprenticeship
5.6: Restaurant Planning & Management Practical
5.7: Garde Manger & Confectionary Practical
5.8: Revenue Management & Budgeting Practical
5.9: Advance Housekeeping Management Practical
6.1: Training & Development – Food & Beverage service
6.2: Training & Development – Gastronomy
6.3: Training & Development – Room divisions
6.4: Training report presentation
6.5: Eco – Gastronomy – North East Indian regions
6.6: Eco – Gastronomy – North East Indian regions Practical

4 YEAR UG Degree (Honours)
7.1: Modern Trends in Gastronomy – I / Modern Trends in Front Office –I
7.2: Modern Trends in Food & Beverage service –I / Modern Trends in Housekeeping – I
7.3: Basics of Tourism
7.4: Research Methodology
7.5: Project Phase –I / Dissertation Phase – I
7.6: Modern Trends in Gastronomy – I Practical / Modern Trends in Front Office –I Practical
7.7: Modern Trends in Food & Beverage service –I Practical / Modern Trends in Housekeeping – I Practical
8.1: Modern Trends in Gastronomy – II / Modern Trends in Front Office –II
8.2: Modern Trends in Food & Beverage service –II / Modern Trends in Housekeeping – II
8.3: Organizational Behaviour
8.4: Project Phase –II / Dissertation Phase – II
8.5: Modern Trends in Gastronomy – II Practical / Modern Trends in Front Office –II Practical
8.6: Modern Trends in Food & Beverage service –II Practical / Modern Trends in Housekeeping – II Practical

4 YEAR UG Degree (Research)
7.1: Research Methodology
7.2: Dissertation Phase – I
8.1: Dissertation Phase – II
Note: ** These courses are only applicable if the student opts out from the program after 1st, 2nd or 3rd year.

### Mapping of Courses to PO/PSOs

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#### 4 YEAR UG Degree (Research)

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### DETAILED SYLLABUS

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**HAFB100T: INTRODUCTION TO FOOD & BEVERAGE SERVICE**

(2 Credits – 30 hours) (L-T-P: 2-0-0)

**Objective(s)**

The objective of the course is to learn the basic knowledge about the departmental structures and outlets in the food & beverage service sector.
COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the Food and Beverage Industry and Service Areas. (Understand)
CO 2: Identify and demonstrate types and usage of food and beverage service equipments (Knowledge)
CO 3: Analyze types of Attributes required becoming a Food and Beverage Service Personnel. (Analyze)
CO 4: Develop, understand and demonstrate the different types of menus provided by different food outlets and their service techniques. (Create)

Module I: THE HOTEL & CATERING INDUSTRY (07 hours)
  a. Introduction to the Hotel Industry and Growth of the hotel Industry in India
  b. Role of catering establishment in the travel/tourism industry
  c. Types of F&B operations (Types of different F&B Outlets)
  d. Classification of Commercial, Residential/Non-residential
  e. Welfare Catering - Industrial/Institutional/Transport such as air, road, rail, sea, etc.
  f. Structure of the catering industry - a brief description of each

Module II: DEPARTMENTAL ORGANIZATION & STAFFING (08 Hours)
  a. Organization of F&B department of the hotel
  b. The principal staff of various types of F&B operations
  c. French terms related to F&B staff
  d. Duties & responsibilities of F&B staff
  e. Attributes of a waiter
  f. Inter-departmental relationships (Within F&B and other departments)

Module III: FOOD SERVICE OUTLETS & ANCILLARY DEPARTMENTS (8 hours)
  a. Specialty Restaurants
  b. Coffee Shop
  c. Cafeteria
  d. Fast Food (Quick Service Restaurants)
  e. Grill Room
  f. Banquets
  g. Bar
  h. Vending Machines
  i. Discotheque
  j. Pantry
  k. Food pick-up area
  l. Store
  m. Linen room
  n. Kitchen stewarding

Module IV: F & B SERVICE EQUIPMENTS (06 Hours)
  a. Familiarization & Selection factors of - Cutlery - Crockery - Glassware - Flatware – Hollowware- All other equipment used in F&B Service
  b. French terms related to the above

Suggested Readings

Mapping of Cos to Syllabus

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HAFB101L: INTRODUCTION TO FOOD & BEVERAGE SERVICE PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)
Objective(s):
The objective of the course is to learn the table layouts and identifications of basic tools and hygiene practices required in food & beverage service sector.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the principles of basic hygiene practices and body language in the department (Understand)
CO 2: Identify the process of laying tables arranging things in order. (Knowledge)
CO 3: Analyze & demonstrate service of water and serving plates (Analyze)
CO 4: Analyze & explain care and maintenance procedures of different equipment (Analyze)
CO 5: Develop & familiarize with different tools of F&B service. (Create)

Practical:
1. Hygiene and Etiquettes in Restaurant
2. Mis- En –Place and Mis- En –Scene activities
3. Identification of F&B Tools, types of equipment, Cutlery, Crockery, Glass & Chinaware, Flatware, Hollowware, Table Appointments, Linen, etc
4. Care and Maintenance of various Tools, a type of equipment, Flatware, Hollow wares.
5. Side board Organization and its importance
6. Laying & Relaying of Table.
7. Rules for Laying Cover, Various types of Napkin folds
8. Importance of Body Language and Dinning etiquettes.
9. Carrying a Salver/Tray, Plates, Glasses & other types of equipment
10. Service of Water
11. Handling the Service Gear
12. Clearing an Ashtray, and precautions to be taken care of for handling operation.

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HARM102T: RESTAURENT ETHICS & MENU PLANNING
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn different types of menu's & controlling procedures required in food & beverage service sector.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain the different types of breakfast and other meals and their service techniques (Understand)
CO 2: Identify and demonstrate the different types of menus provided by different food outlets. (Knowledge)
CO 3: Analyze and understand the different aspects of control methods used in food and beverage departments (Analyze)
CO 4: Analyze & classify the different types of Cigars and cigarettes. (Analyze)
CO 5: Develop & illustrate customer care and situation handling (Create)

Module I: TYPES OF MEALS & MENU (7 hours)

a. Breakfast-Introduction, Types, Service Methods,
b. Brunch, Lunch, Hi-Tea, Dinner, Supper, and others
c. Introduction to menu; Types-Ala Carte & Table D’hôte
d. Ala carte and TDH setups
e. Menu Planning, considerations, and constraints, Menu Terms
f. French Classical Menu- 11, 13, and 17 courses separately
g. Classical Foods & its Accompaniments with Cover
h. Indian regional dishes, accompaniments, and service

Module II: PREPARATION FOR SERVICE (7 hours)
Module I: ORGANIZING MISE EN SCENE (04 hours)

a. Organizing Mise-en-scene
b. Organizing Mise en place
c. TYPES OF FOOD SERVICE – silver service, pre-plated service, Cafeteria service, room service, buffet service, gueridon service, lounge service

Module III: SEQUENCE OF SERVICE & Food & Beverage Terminology (05 hours)

a. Handling Table reservation
b. KOTs & BOTs Duplicate & Triplicate System, Computerized K.O.T’s
c. The sequence of Food Service
d. Table Clearing Process
e. Billing Methods, Payment methods, and Cash

Module IV: CUSTOMER CARE AND HANDLING SITUATIONS (05 hours)

a. Unavailability of Table/reservation
b. Wrong Order Taking, Handling Unavailability of Food items
c. Handling Special Requests
d. Order Delays, Spillages, Return Food
e. Lost and found properties
f. Illness
g. Drunken Guest, Unethical appearance of Guest
h. Dealing with children and Infants
i. Handling specially able, Old age guest

Module V: TOBACCO & (06 hours)

a. History
b. Processing for cigarettes, pipe tobacco & cigars
c. Cigarettes – Types and Brand names
d. Pipe Tobacco – Types and Brand names
e. Cigars – shapes, sizes, colors, and Brand names
f. Care and Storage of cigarettes & cigars

Suggested Readings

Suggested Readings

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HARM103L: RESTAURENT ETHICS & MENU PLANNING PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn different types of menu services, KOT analysis, and service of hot and cold non-alcoholic beverages.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the different types of breakfast and other meals layout and tray set up with service techniques sequence (Understand)
CO 2: Understand and demonstrate the different types of service provided in restaurants as per types of menus provided in 5-star hotels in different food outlets. (Understand)
CO 3: Identify different aspects of the control method used in restaurants (Knowledge)
CO 4: Analyze Food and beverage departments by using KOT (Analyze)
CO 5: Develop & demonstrate service of cold & hot non-alcoholic beverages. (Create)
PRACTICAL
1. Writing a Menu
2. Breakfast Table Lay-out.
3. TDH & A la Carte Cover lay-out.
4. Receiving the guests
5. Sequence of Service
6. Taking an Order of Food & Making a KO T.
7. Table Service, Practice of meet greets and repeats.
8. Clearing, Crumbing, Presenting the bill
9. Service of Cold & Hot - Non-Alcoholic Beverages, Cigar and cigarettes

Mapping of Cos to Syllabus

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HADB200T: IN- ROOM DINNING & BEVERAGES
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s)
The objective of the course is to learn the concept of wine and beers and other fermented beverages and the service procedures for room service department.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:

CO 1: Explain the operation of the room service department. (Understand)

CO 2: Understand the concepts of wine making process, viticulture wine-based beverages. (Understand)

CO 3: Identify & describe the beer production procedure and classify beer. (Knowledge)

CO 4: Analyze and classify other fermented beverages (Analyze)

CO 5: Develop suggestive selling techniques & demonstrate order taking procedure (Create)

Module I: IN-ROOM DINING SERVICE (5 hours)

a. Introduction, general principles, and types care to be taken while dealing with active and passive guest
b. The cycle of Service, scheduling, and staffing
c. Forms and Formats
d. Order Taking, Suggestive Selling, breakfast cards
e. Time management- the lead time from order taking to clearance

Module II: ALCOHOLIC & NON-ALCOHOLIC BEVERAGES (10 Hours)

a. Definition & Classification of Alcoholic Beverages
b. Introduction to fermented beverages
c. Classification (Nourishing, Stimulating and Refreshing beverages)
d. Tea - Origin & Manufacture - Types & Brands
e. Coffee - Origin & Manufacture - Types & Brands
f. Juices and Soft Drinks
g. Cocoa & Malted Beverages - Origin & Manufacture

Module III: BEERS (05 hours)

a. Introductions to beer
b. A brief introduction to Beer Production
c. Types and Brands – Indian and International

Module IV: WINE (05 Hours)

a. Introduction,

b. Grapes (Varieties) viticulture vinification,
c. Classification,
d. Wine making, Storage, Brand Names.
Module V: AROMATIZED BEVERAGES & SAKE (08 Hours)

a. Definition, Types- Wine based & spirit-based
b. Usage and storage
c. Introduction, definition, manufacturing, Storage & Brands of SAKE

Suggested Readings

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COURSE CODE: IN – ROOM DINNING & BEVERAGES PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn the concept of arranging buffet setups & demonstration of preparing and serving beverages and cold, carved meats & salads.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain the application and able to prepare Flambé Dishes (Understand)
CO 2: Identify and apply the concepts of Banquet Service and Bar Setup operations (Knowledge)
CO 3: Analyze & demonstrate beverage services (Analyze)
CO 4: Create & execute buffet setups (Create)

Practical
1. Service of Spirits
2. Service of Wine
3. Service in Guest Room
4. Preparing Function prospectus
5. Different types of buffet setup
6. Preparations of Flambé dishes, Carving, Salad
7. Preparation/Demonstration of Classic and modern Cocktail

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HAIG202T: INDIAN GASTRONOMY
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn the history & cooking techniques of Indian foods and its regional variations.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain the history & Heritage of Indian Regional Gastronomy (Understand)
CO 2: Discuss the various Regional & specialty cooking in Indian Cuisines (Understand)
CO 3: Identify & explain the knowledge on Dum cooking and Tandoor Cooking (Knowledge)
CO 4: Analyze the History and cooking of Indian Sweets (Analyze)
CO 5: Develop & explain the kitchen layout and functioning of Indian kitchen organization (Create)
Module I: Basics of Indian Cuisine (6 hours)
   a. Introduction to Indian cuisine
   b. Masalas: classical blends, varieties and composition
   c. Indian herbs and spices
   d. Introduction to basic gravies of India
   e. Factors affecting the varieties in Indian regional cuisine

Module II: Indian kitchen layout & Organization (04 hours)
   a. Duties and responsibilities of Indian kitchen brigade
   b. Different Indian kitchen layouts
   c. Equipments used in Indian volume catering establishments

Module III: Regional cuisine in India (10 hours)
   a. Northern India: Kashmir, Punjab, Rajasthan
   b. Eastern India: Bengal, Assam, Tripura, Mizoram, Nagaland, Manipur, Arunachal Pradesh, Meghalaya
   c. Western India: Gujarat, Maharashtra
   d. Southern India: Tamil Nadu, Kerala, Andra Pradesh, Telangana
   e. Central India: Madhya Pradesh, Uttar Pradesh, Bihar

Module IV: Gastronomic specialties and cooking in India (04 hours)
   a. Indian street foods – Introduction, types
   b. Festival cooking – Introduction, types, importance
   c. Dum Cooking – Introduction, Origin, equipments used & classical dishes
   d. Tandoor - Introduction, Origin, equipments used & classical dishes

Module V: Indian Mithai (06 hours)
   a. Introduction
   b. Regional variation in Indian Mithai – Ingredients, technique, types
   c. Classical dishes – Names & description.

Suggested Readings:
1. Food Production Operations: Parvinder S Bali , Oxford Publication
3. A Taste Of India, Madur Jaffery, Great Britain Pavilion Books Ltd.
4. Zaik Ka Safar, Jiggs Kalra Daawat, Jiggs Kalra, New Delhi, Allied Publishers
5. The Professional Chef, Arvind Saraswat, New Delhi, Ubs Publishers

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HAIG203L: INDIAN GASTRONOMY PRACTICAL
(2 Credits – 60 hours)(L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn the various commodities & spices used in Indian food preparations and cooking skills of various forms of Indian foods.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Develop knowledge of Indian spices, pulses, sweetening agents and compose different preparations using Indian gravies (Understand)
CO 2: Identify & demonstrate the traditional home style cooking and breakfast cooking (Knowledge)
CO 3: Identify & Demonstrate fusion of traditional Indian food & street food with modern techniques (Knowledge)
CO 4: Analyze plan and organize a theme menu as in Industrial cooking (Analyze)
CO 5: Create various sweet preparations of India (Create)
Practical:

Gravies and their preparations
1. Popular breakfast preparations across India
2. Prepare Indian sweets and savories
3. Prepare varieties of Indian pickles & chutney
4. Street food in India
5. Introduction to large scale / quantity food production
6. Menu 1 – Assamese cuisine
7. Menu 2- Punjabi cuisine
8. Menu 3 – Awadhi cuisine
9. Menu 4 – Bengali cuisine
10. Menu 5- Rajasthan cuisine
11. Menu 6- Kerala cuisine
12. Menu 7- Maharashtra cuisine
13. Menu 8- Hyderabadi cuisine
14. Menu 9- Goa cuisine
15. Menu 10 – Tamil Nadu cuisine

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SUGGESTED MENU:

**Menu 1 (Breakfast)**
Kanda Poha
Bedmi Puri & Alu Subji
Aloo Paratha

**Menu 5 (Street Food)**
Vada Pao
Bhel Puri
Dabeli

**Menu 9 (Punjabi cuisine)**
Lassi
Channa Masala
Sarson ka Saag
Makki Di Roti
Gajar Ka Halwa

**Menu 10 (Awadhi Cuisine)**
Galouti Kebab
Navratna Korma
Awadhi Murgh Biriyani
Naan
Badam Halwa

**Menu 14 (Maharashtra cuisine)**
Ethaka Appam
Erissery
Nadan Kozhi Varuthathu
Malabar Parota
Palada Payassam

**Menu 18 (Pickles)**
Aam ka Achar
Nimbusu kar Mitha Achar
Bharwan Mirchi Achar
Imli ka achar

**Menu 1 (Breakfast)**
Luchi & Alu Dum
Besan ka Chilla
Chole Bhature

**Menu 6 (Street Food)**
Punugulu
Dhokla
Jhal Muri

**Menu 11 (Bengali cuisine)**
Piyazi
Kossa mangsho
Basanti Pulao
Aamsotto Khejur Chutney
Jeera Rice

**Menu 15 (Hyderabadi cuisine)**
Hyderabadi Chicken Biriyani
Mirchi ka Salan
Burani Raita
Double ka Meetha

**Menu 16 (Goa Cuisine)**
Ros Omlete
Goan Fish Curry
Pork Vindaloo
Bibinca

**Menu 17 (Tamil Nadu cuisine)**
Rasam
Beans Proiyal
Chicken Chettinadu
Lemon rice
Paruppu Payassam

**Menu 19 (Mithai)**
Shahi Tukra
Kaju Barfi
Balushahi
Gulab Jamun

**Menu 20 (Tandoor)**
Tandoori chicken
Achari Paneer tikka
Bharwan Aloo Tikka
Lasuni Naan
HABO204T: BAR OPERATIONS & OUTLET MANAGEMENT
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the layout, work scenario, and various cocktails prepared in Bar’s of food outlets and the concept of function catering.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand and describe the layout of functional areas (Understand)
CO 2: Identify the concepts of function catering in the hotel industry. (Knowledge)
CO 3: Understand the gueridon service origin, specialty and their preparation. (Understand)
CO 4: Analyze & Illustrate bar operations (Analyze)
CO 5: Develop and demonstrate different Cocktail preparations (Create)

Module I: PLANNING & OPERATING VARIOUS F&B OUTLET (10 hours)
a. The physical layout of functional and ancillary areas, Objective of a good layout
b. Steps in planning, Factors to be considered while planning
c. Calculating space requirement
d. Various set ups for seating
e. Planning staff requirement
f. Menu planning, Constraints of menu planning
g. Selecting and planning of heavy-duty and light equipment
h. Requirement of quantities of equipment required like crockery, Glassware, Cutlery - steel or silver, etc.
i. Planning Décor, furnishing fixtures, etc.

Module II: FUNCTION CATERING (06 Hours)
a. Banquets
b. Banquet protocol
c. Informal banquet
d. Buffets

Module III: GUERIDON SERVICE (08 hours)
a. History of gueridon
b. Definition
c. General consideration of operations
d. Advantages & Dis-advantages
e. Types of trolleys
f. Factor to create impulse, Buying – Trolley, open kitchen
g. Gueridon equipment
h. Common preparations, flambé dishes, Carving, Salad making, etc., Trolley service - Beverages, Starters, Desserts, etc.

Module IV: BAR OPERATIONS (06 Hours)
a. Types of Bars
b. Cocktail
c. Dispense
d. Area of Bar
e. Front Bar
f. Back Bar
g. Under Bar (Speed Rack, Garnish Container, Ice well, etc.)
h. Bar Stock
i. Bar Control
j. Bar Staffing
k. Opening and closing duties

Module V: COCKTAILS & MIXED DRINKS (07 hours)
a. Definition and History
b. Classification
c. Recipe, Preparation, and Service of Popular Cocktail
Suggested Readings

Mapping of Cos to Syllabus

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HABO205L: BAR OPERATIONS & OUTLET MANAGEMENT PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn the briefing standards of hospitality sector and demonstrate the skills of serving alcoholic beverages including cocktails.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explore the set up tray and trolley lay up for room service (Understand)
CO 2: Analyze & demonstrate the knowledge for taking orders (Knowledge)
CO 3: Analyze & demonstrate service standards for serving Beer, Wines and cold & hot non-alcoholic beverages. (Analyze)
CO 4: Create & Explain the importance of conducting briefing and de-briefing. (Create)

Practical
1. Understanding Room Service Amenities, Room Service equipments
2. Room Service Tray & Trolley Lay-out.
3. Functional Layouts for room service
4. Role play: Knocking & opening the guest door, wishing the guest, placing tray, checking order, presenting the bill, greeting at the exit.
5. Order taking on the telephone
6. Set-up for In Rooms.
7. Conducting Briefing/De-Briefing.
8. Taking an Order & Service of Beer, Other Fermented & Brewed Beverages.
9. Taking an order & Service of –Sparkling, Aromatized, Fortified, Still Wines. Order of service (starting with wine approval from the host, wrapping the bottle with the napkin, etc.)
10. Opening different types of wine bottles. (Different types of corkscrews)
11. Use of different glasses, holding & carrying glasses
12. Set up a table with a Prepared Menu with wines.

Mapping of Cos to Syllabus

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HAQF206T: QUANTITY FOOD PRODUCTION
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the concept of bulk cookery and various types of menus associated with bulk cookery

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain the requirement of equipments for volume feeding. (Understand)
CO 2: Discuss the concepts of bulk cooking and banqueting menus. (Understand)
CO 3: Identify & conceptualize all aspects regarding the institutional and industrial catering (Identify)
CO 4: Analyze, evaluate, analyze and interpret theoretical and practical skills of usage of different commodities in the kitchen (Analyze)
CO 5: Develop & explain the quantity purchase system. (Create)

Module I: QUANTITY FOOD PRODUCTION EQUIPMENTS (08 hours)
- Equipment required for mass/volume feeding
- Heating and cooling equipment
- Care and maintenance of equipment
- Modern developments in equipment manufacture

Module II: MENU PLANNING (10 Hours)
- Basic principles of menu planning-recapitulation
- Points to consider in menu planning for various volume feeding outlets such as Industrial, Institutional, Mobile Catering Units
- Planning menus for School/ College students, Industrial workers, Hospitals, Outdoor parties, Theme dinners, Transport facilities, cruise lines, airlines, railway
- Nutritional factors

Module III: INDENTING (08 hours)
- Principles of Indenting for volume feeding
- Portion sizes of carious items for different types of volume feeding
- Modifying recipes for indenting for large scale catering

Module IV: PLANNING (08 Hours)
Principles of planning for quantity food production concerning Space allocation, Equipment selection, and Staffing

Module V: VOLUME FEEDING (10 Hours)
- Institutional and industrial Catering
- Hospital Catering,
- Highlights of Hospital Catering for patients, staff, visitors Diet menus, and nutritional requirements
- Off-Premises Catering, Problems associated with off-premises catering
- Reasons for growth and development Menu Planning and Theme Parties
- Concept of a Central Production Unit
- Mobile Catering
- Characteristics of Rail, Airline (Flight Kitchens and Sea Catering)
- Quantity Purchase & Storage Introduction to the purchasing system

Suggested Readings
1. P. S. Bali, Quantity Food Production Operations and Indian Cuisine, Oxford University Press, New Delhi, 2012

Mapping of COs to Syllabus

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HAQF207L: QUANTITY FOOD PRODUCTION PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate various forms of bulk cooking and planning of menu’s where bulk cooking is essential.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain & demonstrate the preparation of different menus. (Understand)
CO 2: Identify the quantity required for volume cooking (Knowledge)
CO 3: Analyze the Ability to describe and handle the food outlet (Analyze)
CO 4: Develop & apply the practical knowledge for planning an elaborate Menu’s (Create)

Practical
To formulate/demonstrate 15 sets of menus as volume cooking with demo situations handling procedure.

SUGGESTED MENU:

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<tr>
<td>Cream of Mushroom</td>
<td>Sprout &amp; cherry tomato salad</td>
<td>Roasted Mushroom &amp; corn salad</td>
<td>Pumpkin &amp; Garlic soup</td>
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<td>Baked potatoes nuggets</td>
<td>Golden crevettes frites</td>
<td>Pan fried fish cakes</td>
<td>Zucchini fritters</td>
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<td>Meat ball casserole</td>
<td>Steamed greens in mustard sauce</td>
<td>Veg stroganoff</td>
<td>Steamed chicken in garlic sauce</td>
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<tr>
<td>Herb Pilaf</td>
<td>Soft cheese buns</td>
<td>Herb Rice</td>
<td>Spaghetti Aglio – olio</td>
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<tr>
<td>Spicy Corn salad</td>
<td>Macaroni Bell pepper salad</td>
<td>Chicken pasta salad</td>
<td>Apple and Pear salad</td>
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<tr>
<td>Buffalo chicken wings</td>
<td>Veg croquettes</td>
<td>Cheese balls</td>
<td>Crispy chicken popcorn</td>
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<td>Penne Alfredo</td>
<td>Chicken piccata with bread sauce</td>
<td>Spaghetti Arrabiatta</td>
<td>Eggplant Parmigiana</td>
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<td>Date crepes with fruit compote</td>
<td>Cream &amp; Nut Pudding</td>
<td>Lemon cheesecake</td>
<td>Fruit Parfait</td>
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<th>Exp 9 (Indian)</th>
<th>Exp 10 (Indian)</th>
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<tr>
<td>Kachumber salad</td>
<td>Aloo Bonda</td>
<td>Mutter cheese Tikki</td>
<td>Masala Channa Chaat</td>
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<td>Methi Corn Bhajia</td>
<td>Kadhai Paneer</td>
<td>Gobhi Adraki</td>
<td>Dalchha Gosht</td>
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<td>Chicken tikka Masala</td>
<td>Jeera Rice</td>
<td>Dal Hariyali</td>
<td>Achari Aloo Kulcha</td>
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<td>Butter Naan</td>
<td>Malpua</td>
<td>Dhania Pulao</td>
<td>Kalakad Halwa</td>
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<td>Mint Jaggery Sherbet</td>
<td>Cucumber &amp; coconut</td>
<td>Kimchi Salad</td>
<td>Chili cucumber salad</td>
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<td>Oats Tikki</td>
<td>Gazpacho</td>
<td>Gobhi Manchurian</td>
<td>Spring rolls</td>
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<td>Aloe Vera Subji</td>
<td>Steamed chicken</td>
<td>Sichuan Fish</td>
<td>Hot garlic chicken</td>
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<td>Beetroot Paratha</td>
<td>Spinach &amp; kidney beans crepes</td>
<td>Veg fried rice</td>
<td>Lemon coriander fried rice</td>
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<td>Gats Ladoo</td>
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Mapping of COs to the syllabus

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HAFO208T: FRONT OFFICE MANAGEMENT
(2 Credit – 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn the property management system and front desk operations along with the responsibilities of night auditor.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain and describe the entire property management system and the importance of computer in front office. (Understand)
CO 2: Identify and apply the entire check-in and check-out procedure of guest. (Knowledge)
CO 3: Analyze the process of settling bills of the guests, accounting procedures, handling front office cash and foreign exchange. (Analyze)
CO 4: Develop and analyze the idea about the night auditing and the job responsibilities of the night auditor. (Create)
Module I: PROPERTY MANAGEMENT SYSTEM (08 hours)
a. Importance of Computer in Front Office
b. Introduction to PMS
c. PMS application in Front Office (Reservation, Front Desk, Room, Cashier, Night Audit, set up, Reporting, back-office Module)
d. Different PMS systems

Module II: CHECK-IN AND CHECK-OUT PROCEDURE (12 Hours)
a. Check-in Procedure in different situations like: - guest having confirmed reservation, Walk-in Guest, Group/crew, Scanty Baggage Guest, International Travelers, Club floor guest
b. Check out activity at various desks: - Bell Desk, lobby, Reception, Cashier
c. Different Methods of Settlement: -Cash, Credit Card, Cheques, Travel's cheques, Bill to company, Combined settlement method, checking of mini bar and taking of guest feedback.
d. Check out options: - On Desk Express Check out, Self-Check out
e. Forms & Formats

Module III: MANAGING CASH & CREDIT (08 Hours)
a. Front office Accounting Cycle
b. Credit control process in various cases: - guest pay by Credit Card, Travel agent voucher, airline, Scanty baggage, Credit control during the stay, credit facility to companies, check-in tour group. Problems may arise in credit control
c. The process required in cash Control
d. Handling Foreign Exchange

Module IV: NIGHT AUDITING (08 Hours)
a. Importance of Night Auditing,
b. Duties & Responsibility of Night Auditor
c. Common Revenue Centers of a Hotel
d. Basis steps involved in preparing Night Audit: - Complete posting, reconcile room status discrepancies, verify room rates, verify no show reservations, Cash Deposit, Clear & Back up the system, Distribute report
e. Vouchers/Folios/Ledgers/Allowances/Reports

Suggested Readings
5. Michael Kasavana and Cahell, Managing computers in hospitality industry, AHLA, 1996

Mapping of COs to Syllabus

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HAFO209L: FRONT OFFICE MANAGEMENT PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate various forms and formats required to maintain in front desk.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: CO 1. Explain & take part in the check-in and check-out process and the application of PMS in the process. (Understand)
CO 2: CO 2. Identify the role of GRA, Bell boy, Cashier, Concierge (Knowledge)
CO 3: CO 3. Analyze to handle and compile different forms and formats of the department (Analyze)

PRACTICAL
1. Preparing & filling up Registration cards during Check-in,
2. Handling Check in – walk-in, confirmed reservation, group
3. Handling Check out – BTC, combined settlement method, cheque, card, cash
4. Role play of bell desk
5. Front office cashiering practices and night audit practice  
6. Role play of concierge  
7. Filling various vouchers, folios, handling allowances,  
8. Foreign Currency exchange

Mapping of COs to the syllabus

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HARP300T: RESTAURENT PLANNING & MANAGEMENT  
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):  
The objective of the course is to learn & demonstrate various forms and formats required to maintain in front desk.

COURSE / LEARNING OUTCOMES:

At the end of this course student will be able to:

CO 1: Discuss in-depth understanding of planning and operating a restaurant. (Understand)  
CO 2: Identify the different concepts of catering operations. (Knowledge)  
CO 3: Understand menu management and material management. (Understand)  
CO 4: Analyze & illustrate inventory control. (Analyze)  
CO 5: Develop the budget of the department. (Create)

Module I: RESTAURANT PLANNING (10 hours)

a. The physical layout of functional & ancillary areas  
b. Objectives of a good layout,  
c. Steps in planning  
d. Factors to be considered while planning, calculating space requirements  
e. Various set-ups for sitting,  
f. Planning staff requirements,  
g. Menu planning  
h. Selection of equipment, lighting, fixtures, crockery, cutlery, etc.

Module II: MENU MANAGEMENT (08 Hours)

a. Introduction, Types of Menus, Menu Planning Considerations & Constraints  
b. Menu Costing and Pricing  
c. Menu Merchandising, Menu Engineering  
d. Menu Fatigue, Menu as an In-House Marketing Tool.

Module III: MATERIALS MANAGEMENT (04 Hours)

a. Introduction, Necessity & Function and Techniques  
b. Classification and Technology used in materials management.

Module IV: INVENTORY & BUDGETARY CONTROL (14 hours)

a. Importance, objectives, methods, levels & technique  
b. Perpetual inventory, monthly inventory, pricing of commodity, comparison of physical and perpetual inventory  
c. Introduction, Objective  
d. Budgetary Control Process, Stages in the preparation of Budgets  
e. Budgeting for F&B Operations,  
f. Variance Analysis.

Suggested Readings

3. Cousins J, Foskett, D, Gillespie C. Food and Beverage Management, Pearson Education India, 2006  

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HARP301L: RESTAURANT PLANNING & MANAGEMENT PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

**Objective(s):**
The objective of the course is to learn how to prepare duty roasters, layouts of different types of food outlets and Managerial skills to manage them.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
- CO 1: Understand the layout plan for different food outlets. (Understand)
- CO 2: Identify & analyze staff requirements and make a duty roster for implementation. (Knowledge)
- CO 3: Analyze & explain and demonstrate operations of the restaurant, bar, and special events (Analyze)
- CO 4: Develop the skills to familiarize with different cocktails and preparation methods. (Create)

**Practical**
1. F&B Staff Organization-Class Room Exercise (Case Study method)
2. Developing Organization Structure of various Food & Beverage Outlets
3. Determination of Staff requirements in all categories
4. Making Duty Roster
5. Preparing Job Description & Specification
6. Conducting Briefing & Debriefing
7. Restaurant, Bar, Banquets & Special Events
8. Drafting Standard Operating Systems (SOPs) for various F & B Outlets
9. Supervising Food & Beverage operations
10. Preparing Restaurant Log
11. Designing & setting the bar
12. Preparation & Service of Cocktail & Mixed Drinks

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HAGC302T: GARDE MANGER & CONFECTIONARY
(3 Credits – 45 hours) (L-T-P: 3-0-0)

**Objective(s):**
The objective of the course is to learn different layout and procedures require maintaining the standards in garde Manger and confectionary sections of commercial kitchens.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
- CO 1: Discuss the layout and use of equipment in the larder section of the kitchen. (Understand)
- CO 2: Understand the preparation of charcuterie. (Understand)
- CO 3: Identify, compare and translate between appetizer and garnishes (Knowledge)
- CO 4: Analyze the basic icing and topping terms with special reference to patisserie (Analyze)
- CO 5: Develop & illustrate different sandwiches with making and storing methods (Create)

**Module I: LARDER & CHARCUTIERIE (06 hours)**

a. Layout & equipment
b. Terms & larder control
c. Duties and responsibilities of the larder chef
d. Sausages & forcemeats
e. Brines, cures & marinades
f. Ham, bacon & gammon

g. Galantines & pate

Module II: APPETIZERS & GARNISHES (08 hours)
a. Classification of Appetizers
b. Examples of Appetizers
c. The historic importance of culinary Garnishes
d. Explanation of different Garnishes

Module III: SANDWICHES (08 Hours)
a. Parts of Sandwiches
b. Types of Bread
c. Types of filling – classification
d. Spreads and Garnishes
e. Types of Sandwiches
f. Making of Sandwiches
g. Storing of Sandwiches

Module IV: CAKE (06 Hours)
Introduction, types of bases, flavors, garnishes, tools and equipment & commodities

Module V: ICINGS & TOPPINGS (04 hours)
Varieties of icing, Using of Icings Difference between icings & Toppings

Suggested Readings
4. Y. Ashok Kumar, Textbook of bakery and confectionary, PHI, 2012
6. L J Henneman, Patisserie, Routledge, 2005

Mapping of C0s to Syllabus

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HAGC303L: GARDE MANGER & CONFECTIONARY PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate various preparations of garde manger and confectionaries.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Demonstrate various types of sandwiches, sausages, forcemeats (Understand)
CO 2: Identify & relate different desserts (Knowledge)
CO 3: Analyze, explain and demonstrate the different bakery & confectionary-making procedures with the temperature required. (Analyze)
CO 4: Create various types of appetizers of various cuisines. (Create)

Practical
1. Various preparations of sandwiches
2. Various preparations of sausages
3. Various preparations of forcemeats
4. Various preparations of desserts from world cuisine.
5. Different varieties of Bread
6. Different varieties of Chocolate,
7. Different varieties of Meringues,
8. Different varieties of Frozen Dessert.
9. Various preparations of Appetizers – Indian cuisine
10. Various preparations of Appetizers – French cuisine
11. Various preparations of Appetizers – Italian cuisine
12. Various preparations of Appetizers – Chinese cuisine

SUGGESTED MENU:

<table>
<thead>
<tr>
<th>Exp 1 (sandwiches)</th>
<th>Exp 2 (Sausages)</th>
<th>Exp 3 (Forcemeats)</th>
<th>Exp 4 (Desserts)</th>
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<tbody>
<tr>
<td>BLT</td>
<td>Breakfast sausages</td>
<td>Chicken &amp; bellipapper roulade</td>
<td>Tiramisu</td>
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<td>Chicken Club</td>
<td>Cajun Sausages</td>
<td>Chicken &amp; Spinach terrine</td>
<td>Crepe Allemande</td>
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<td>Cheese Potato Grilled</td>
<td>Hot Italian sausages</td>
<td>Prawn &amp; garlic Pate’</td>
<td>Chocolate Mousse</td>
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<td>Pinwheel sandwich</td>
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<th>Exp 7 (Meringues)</th>
<th>Exp 8 (Frozen desserts)</th>
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<td>Focaccia</td>
<td>Chocolate Sandesh</td>
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<td>Strawberry Sorbet</td>
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<td>Lavash</td>
<td>Chocolate Marzipan</td>
<td>Meringue cookies</td>
<td>Orange Sherbet</td>
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<td>Soda Bread</td>
<td>Choco cashew Pudding</td>
<td>Macaroons</td>
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<td>Paneer Potli</td>
<td>Salade Lyonnais</td>
<td>Caprese salad</td>
<td>Egg Drop Soup</td>
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<td>Souffle Au Fromage</td>
<td>Grilled veg Bruchetta</td>
<td>Cong You Bing</td>
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<td>Chicken 65</td>
<td>Tapenade canape’</td>
<td>Stuffed Dates</td>
<td>Baozi</td>
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<td>Dahi Vada</td>
<td>Paillasons de courgettes</td>
<td>Whipped ricotta</td>
<td>Cantonese spring rolls</td>
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Mapping of Cos to Syllabus

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HARB304T: REVENUE MANAGEMENT & BUDGETING
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn the yield management and the concept of room revenue used in the front desk sectors of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the Yield Management, its concept, rates, and different booking horizons and Statistical representations. (Understand)
CO 2: Identify the budgeting and forecasting and to analyze room revenue. (Knowledge)
CO 3: Create & describe and implement role plays of guest complaint handling. (Create)

Module I: YIELD/REVENUE MANAGEMENT (09 hours)
a. Yield in hotel industry
b. Methods of measuring hotel performance/yield
c. Elements and benefits of yield management
d. Challenges in Yield management
e. Yield management strategies
f. Measuring Yield

Module II: FORECASTING (07 Hours)
a. Concept of forecasting
b. Benefits of forecasting
c. Data/ records required for forecasting room availability

Module III: BUDGETING (07 hours)
a. Types of budget & budget cycle
b. Making front-office budget
c. Factors affecting budget planning

d. Capital & operations budget for front office

e. Refining budgets, budgetary control

f. Forecasting room revenue

Module IV: GUEST COMPLAINT HANDLING / PROBLEM SOLVING (07 hours)

a. Types of complain

b. Process, thumb rules

c. Common complaints / problems

d. Situation handling

Suggested Readings
5. Michael Kasavana and Cahell, Managing computers in hospitality industry, AHILA, 1996

Mapping of COs to Syllabus

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HARB305L: REVENUE MANAGEMENT & BUDGETING PRACTICAL

(2 credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate different SOP’s and files and formats regarding memberships, budgets & guest complaints required in front desk of hospitality sector.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:

CO 1: Explain the techniques of room up selling, enrollment in loyalty membership programs and maintain guest history
(Understand)

CO 2: Identify & handle guest complain and different situations in front office. (Knowledge)

CO 3: Analyze & Construct operating budget, calculate staff requirements and allocate duties accordingly. (Analyze)

CO 4: Develop & implement all the SOP’s of front office and list about different countries and their capitals, currency, flags chart etc. (Create)

PRACTICAL
1. Up selling of Rooms
2. Enrollment in loyalty membership programs
3. Role play on handling guest complain
4. Handling of inebriated guest, guest with special care, guest involved in inappropriate activity
5. Role of telephone operator in different situation
6. Maintaining guest history
7. Capitals, currencies, airlines and flags chart
8. Preparing operating budget for front office operation
9. Calculating staff requirement
10. Preparing duty rota’s
11. Evaluation of SOP’s

Mapping of COs to Syllabus

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HAPR306T: TRAINING & DEVELOPMENT: FOOD & BEVERAGE SERVICE
Objective(s):
The objective of the course is to learn the importance and future prospects of industrial exposure training in food & beverage service sector of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the basics of training in Food & Beverage service (Understand)
CO 2: Analyze the skills development through training (knowledge)
CO 3: Develop & identify the future prospectus through training & development in Food & Beverage service (Create)

Module – I: Introduction to Training (10 hours)
a. Importance & objective of training in food & beverage service
b. Benefits, Future prospectus of training in food & beverage service
c. Areas to cover: room dinning, banquets, bar, etc.

Module – II: Types of Trainings (10 hours)
a. Orientation
b. In House
c. Mentorship
d. External training

Module – III: Challenges & Opportunities (10 hours)
a. Challenges: Initial phase of training
b. Opportunities: After the completion of training
c. Case studies of at least 4 renowned successful professionals from Food & Beverage service

Module – IV: Development (10 hours)
a. Initial vs. After training
b. Enhancement of: skills, communication, confidence, motivation
c. Balance between theoretical & practical knowledge
d. Company culture’s: knowledge, do’s and don’t
e. Team work: Importance, efficiency, flexibility
f. Entrepreneurship skills

Module – V: Experience (12 hours)
a. Talent through training
b. Problem solving ability
c. Safety & security
d. Types of clients & behaviour

Suggested Readings

Mapping of CO’s with syllabus

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HALB307L: TRAINING & DEVELOPMENT: GASTRONOMY
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s):
The objective of the course is to learn the importance and future prospects of industrial exposure training in gastronomy sector of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the basics of training in gastronomy (Understand)
CO 2: Analyze the skills development through training (knowledge)
CO 3: Develop & identify the future prospectus through training & development in gastronomy (Create)

Module – I: Introduction to Training (10 hours)
- a. Importance & objective of training in gastronomy
- b. Benefits, Future prospectus of training in gastronomy
- c. Areas to cover: different sections in the commercial kitchens

Module – II: Types of Trainings (10 hours)
- a. Cutting skills
- b. Cooking skills
- c. Re chaufhe cooking
- d. Hygiene & Sanitation

Module – III: Challenges & Opportunities (10 hours)
- a. Challenges: Initial phase of training in commercial kitchen
- b. Opportunities: After the completion of training
- c. Case studies of at least 4 renowned successful professionals from gastronomy

Module – IV: Development (10 hours)
- a. Initial vs. After training
- b. Enhancement of: skills, communication, confidence, motivation, patience
- c. Balance between theoretical & practical knowledge of gastronomy
- d. Kitchen culture’s: knowledge, do’s and don’t
- e. Team work: Importance, efficiency, flexibility
- f. Entrepreneurship skills

Module – V: Experience (10 hours)
- a. Talent through training
- b. Problem solving ability
- c. Safety & security
- d. Types of clients & behaviour
- e. Improvement in Cooking
- f. Knowledge of cuisines

Suggested Readings

Mapping of CO’s with syllabus

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HAIT308L: TRAINING & DEVELOPMENT: ROOM DIVISION
(4 Credits – 60 hours) (L-T-P: 4-0-0)

Objective(s):
The objective of the course is to learn the importance and future prospects of industrial exposure training in the room divisions sector of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
- CO 1: Discuss the basics of training in room division (Understand)
- CO 2: Analyze the skills development through training (knowledge)
- CO 3: Develop & identify the future prospectus through training & development in room divisions (Create)

Module – I: Introduction to Training (05 hours)
- a. Importance & objective of training in room divisions
- b. Benefits, Future prospectus of training in room divisions
- c. Areas to cover: public areas, front desk, cleaning agents, etc.
Module – II: Types of Trainings (08 hours)
   a. Orientation
   b. In House
   c. Mentorship
   d. External training

Module – III: Challenges & Opportunities (07 hours)
   a. Challenges: Initial phase of training
   b. Opportunities: After the completion of training
   c. Case studies of at least 4 renowned successful professionals from room division

Module – IV: Development (08 hours)
   a. Initial vs. After training
   b. Enhancement of : skills, communication, confidence, motivation
   c. Balance between theoretical & practical knowledge
   d. Organizations culture’s: knowledge, do’s and don’t
   e. Team work : Importance, efficiency, flexibility

Module – V: Experience (08 hours)
   a. Talent through training
   b. Problem solving ability
   c. Safety & security
   d. Types of clients & behaviour

Suggested Readings

Mapping of CO’s with syllabus

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HAPR306L: TRAINING REPORT PRESENTATION
(4 Credits – 120 hours) (L-T-P: 0-0-4)

Objective(s):
The objective of the course is to prepare the training report which was learned during industrial exposure training and also completes the log book.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand and analysis to the practical experience and actual working environment for developing their skills and capabilities, as well as enhancing their intellectual and emotional persona. (Understand)
CO 2: Identify & integrate classroom theory with workplace practice. (Knowledge)
CO 3: Analyze & gain an understanding of administrative functions and company culture. (Analyze)
CO 4: Develop skills to demonstrate various activities of all the core departments. (Create)

Module I - TRAINING EXPOSURE SUMMERY (50 hours)
The 22 weeks of industrial training would be divided by the hotel for the four key areas of Food Production, Food and Beverage Service, Accommodation Operation, and Front Office Operations and student has to collect information’s which will be needed to them during compiling of the training report.

Module 2 - TRAINING REPORT (40 hours)
a. During the training report the students has to complete the training report which will includes the details of the training organization, there USP, facilities of the various department.
b. The outcome and experience they gain from the training.

Module 3 - LOG BOOK (30 hours)
During the training the student has to duly sign the log book from the departmental authorities as a proof of there experience and learning skills from the specific department.
Mapping of Cos to Syllabus

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HAGT400T: MODERN TRENDS IN GASTRONOMY – I
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the modern advancement in the gastronomy sector and the benefits of research & development.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss and describe various global cuisines and modern aspects on gastronomy. (Understand)
CO 2: Identify and learn the benefits of gastronomic tourism (Knowledge)
CO 3: Analyze the concept of production management and its importance (Analyze)
CO 4: Develop skills and illustrate the research & product development in gastronomy and other modern trends (Create)

Module I: Global cuisine (14 hours)
b. Ingredients used, cooking techniques and specialty
c. International recipe and there description
d. Importance of global cuisine & ingredients – Health & sustainability

Module II: Ancient Grains & Super foods (06 hours)
a. Introduction – Ancient grains
b. Types , description, cooking techniques – Ancient grains
c. Health benefits from ancient grains
d. Introduction – Super foods
e. Types , description, cooking techniques – Super foods
f. Health benefits from Super foods

Module III: Gastronomic Tourism (8 hours)
a. Introduction, history & features
b. Types & categories
c. Benefits of gastronomic tourism
d. Gastronomic tourism – Designing
e. New trends in Gastronomic tourism

Module IV: Production Management (5 hours)
a. Kitchen organization
b. Allocation of Work Job Description, Duty Roasters
c. Production Planning, Production Scheduling
d. Production Quality & Quantity Control
e. Forecasting Budgeting, Yield Management

Module V: Research & Product development (06 hours)
a. Testing new equipment - Commercial and small equipments used in kitchen
b. Developing new recipes – Impact of modern trends, Themes, location, clients etc.
c. Food Trails – based on costing, nutritional value, calorie count, portion sizes

Suggested Readings
3. Robert D Saik, Food 5.0: How we feed the future, 2019
4. Saurabh kumar Dixit, The routledge handbook of gastronomic tourism, 2021
5. Anne Murcott, Warren Belasco, Peter Jackson, The handbook of food research, 2013
6. Satya J. Rustogi, Global Food Production, 2019
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HAGT401L: MODERN TRENDS IN GASTRONOMY – I PRACTICAL
(2 Credits – 60 hours) (L-T-P:0-0-2)

Objective(s):
The objective of the course is to prepare & demonstrate the global cuisines and preparations which are on the basis of innovations and research.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Demonstrate menus from global cuisine (Understand)
CO 2: Identify & demonstrate recipes from ancient grains (Knowledge)
CO 3: Identify & demonstrate recipes from super foods (Analyze)
CO 4: Develop the skills through innovations and research in gastronomy and create recipes (Create)

Practical
Expt. 1: Various preparations from – Italian cuisine
Expt. 2: Various preparation from – French cuisine
Expt. 3: Various preparation from – Mexican cuisine
Expt. 4: Various preparation from – Moroccan cuisine
Expt. 5: Various preparation from – Lebanese cuisine
Expt. 6: Various preparations from – Chinese cuisine
Expt. 7: Various preparations from – Thai cuisine
Expt. 8: Various preparations from – Japanese cuisine
Expt. 9: Various preparations from – Mediterranean cuisine
Expt. 10: Various preparations from – Ancient grains
Expt. 11: Various preparations from – Ancient grains
Expt. 12: various preparations from – Super foods
Expt. 13: Various preparations from – Super foods
Expt. 14: Various preparations based on innovations and research
Expt. 15: Various preparations based on innovations and research
Expt. 16: Various preparations based on innovations and research

SUGGESTED MENU:

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<tr>
<th>Exp 1 (Italian cuisine)</th>
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<th>Exp 4 (Moroccan cuisine)</th>
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<tr>
<td>Caprese salad</td>
<td>French onion soup</td>
<td>Avocado salad</td>
<td>Harira</td>
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<tr>
<td>Minestrone Milanese</td>
<td>Coq au vin</td>
<td>Grilled veg Quesadilla</td>
<td>Makouda</td>
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<td>Spaghetti Carbonara</td>
<td>Ratatouille</td>
<td>Chilli corn carne</td>
<td>Kefta tagine</td>
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<td>Mango &amp; coconut Pannacotta</td>
<td>Baguette</td>
<td>Mexican rice</td>
<td>Mint tea</td>
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<td>Exp 5 (Lebanese cuisine)</td>
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<td>Kibbeh</td>
<td>Cantonese chicken soup</td>
<td>Som tom salad</td>
<td>Veg Tempura</td>
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<td>Falafel</td>
<td>Mushroom Pepper &amp; Salt</td>
<td>Tom Yam soup</td>
<td>Tamagoyaki</td>
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<td>Fattoush</td>
<td>Mapo Tofu</td>
<td>Chicken Massaman curry</td>
<td>Karaage</td>
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<td>Baboussia</td>
<td>Veg Hakka Noodles</td>
<td>Pad thai</td>
<td>Yakisoba</td>
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<td>Greek Salad</td>
<td>Crispy millet fritters</td>
<td>Millet walnut salad</td>
<td>Grilled peach &amp; papaya salad,</td>
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<td>Shakshuka</td>
<td>Wild rice &amp; mushroom soup</td>
<td>Quinoa veg soup</td>
<td>Couscous meatball soup,</td>
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<td>Moussaka</td>
<td>Mexican amaranth Stew</td>
<td>Chicken &amp; kamut casserole</td>
<td>Steamed salmon with broccoli,</td>
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<td>Pitta bread</td>
<td>Quinoa &amp; date brownies</td>
<td>Wild rice pudding</td>
<td>Blueberry banana pancake</td>
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<td>Roasted veggies &amp; millet salad</td>
<td>Menu &amp; Recipes based on</td>
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<td>Tomato barley soup</td>
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<td>Grilled salmon with honey</td>
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HAFO402T: MODERN TRENDS IN FRONT OFFICE – I
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the green practices and modern technologies used for the better services in the modern era of front desk procedures and data’s for record keeping

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the quality of service as per their expectation with the help of various modern tools. (Understand)
CO 2: Explain the various technologies which have added to the modern techniques of Front Office functions. (Knowledge)
CO 3: Illustrate and examine the new concepts of vacation and accommodation ownerships. (Analyze)
CO 4: Identify the various implementations of green practices in Front Office (Create)

Module I: QUALITY SERVICE IN FRONT OFFICE (12 hours)
a. Lodging as a guest service business, developing a quality culture
b. Role of Manager in quality, determining guest service expectation,
c. Planning guest service process – recognizing basic concerns
d. Determining and delivering guest service expectations
e. EGQ and NPS
f. Recording Feedback
g. Post Departure Guest Relation

Module II: DIGITALIZATION (06 Hours)
a. Specialized mobile apps
b. AI and Hotel Chat boats
c. Self-check-in Desk Technology

Module III: TIMESHARE & VACATION OWNERSHIP (10 Hours)
a. Definition and types of timeshare options
b. Difficulties faced in marketing timeshare business
c. Advantages & disadvantages of timeshare business
d. Exchange companies -Resort Condominium International, Intervals International
e. How to improve the timeshare / referral/condominium concept in India- Government’s role/industry role

Module IV: MODERN ACCOMMODATION CONCEPTS (06 Hours)
a. Benefits of Modern accommodation concepts
b. Examples of new conceptual hotels -Smart Hotels, Bunker Hotels, Tree House, Zostel, Under water Hotels, Glass Hotels etc.

Module V: GREEN PRACTICES (06 Hours)
a. Implementation of 3 R’s (Reduce, Reuse, Recycle)
b. Eco-Bells
c. Contactless Check-in
d. No paper policy

Suggested Readings
1. Adam harris, Richard Castle, Kristy Espat and more.,More Reservations, happier guest: The ultimate guide for the Modern

Mapping of COs to Syllabus

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HAF0403L: MODERN TRENDS IN FRONT OFFICE – I (PRACTICAL)
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the modern procedures of working environment of a digitally equipped front desk area of an hospitality sector.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Apply techniques of self-check-in & check-out procedures and express check-in & check-out procedure. (Understand)
CO 2: Demonstrate handling of various situations like bomb threats and suicide threats. (Knowledge)
CO 3: Analyze guest feedback and ensuring guest satisfaction with the use of technology. (Analyze)
CO 4: Evaluate post departure procedures and credit limit criteria. (Create)

PRACTICAL
1. Self-Check-in Procedure
2. Express check-in procedure
3. Self-Check-out Procedure
4. Express check-out procedure
5. Role play on handling bomb threat
6. Role play on handling suicide threat
7. Record online guest feedback and utilization of it in future
8. Ensuring Guest Satisfaction with the help of technology
9. Post departure procedure
10. Monitoring guest credit limits

Mapping of COs to Syllabus

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HAFS404T: MODERN TRENDS IN FOOD & BEVERAGE SERVICE – I
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the modern advancements and concepts introduced in the food & beverage service the hospitality sector

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the modern concepts of service area and their implementations (Understand)
CO 2: Identify new concepts of outlets and tourism through beverages in global scenario (Knowledge)
CO 3: Analyze different aspects of digitalization in service sector (Analyze)
CO 4: Develop the skills and illustrate the benefits & modern aspects through sustainability in beverage sector (Create)
Module I: Beverage Pre Mix (6 hours)
a. Definition, classification, Importance  
b. Uses and benefits  
c. Popular brands – Name, country of origin, description

Module II: Modern theme outlets (8 hours)
a. Types & classifications  
b. Utilization of space  
c. Lighting effects & design consideration  
d. Advantages & utilization of various entertainment facilities

Module III: Beverage Tourism (9 hours)
a. Types & categories  
b. Benefits of beverage tourism  
c. New trends in beverage tourism

Module IV: Digitalization in Food & Beverage service (9 hours)
a. Impact of digitalization on service Industry  
b. E - commerce  
c. Latest trends and techniques of digital advancements in service industry

Module V: Sustainability in Food & Beverage services (9 hours)
a. Sustainable packaging & its importance  
b. Energy efficient equipments  
c. Food waste & recycling  
d. Sustainable CSR practices

Suggested Readings
1. Saamia Bukhani Restaurant refined: Exploring trends in the restaurant industry, 2020  
4. Gabriela Ionescu, Sustainable Food & Beverage Industries: Assessments and Methodologies, 2021  
5. Mehmet Sarioglan, New trends in Food & Beverage Enterprises & Production management, 2022

Mapping of COs to Syllabus

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HAFS405L: MODERN TRENDS IN FOOD & BEVERAGE SERVICE - I PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the newly developed products and concepts which are the USP of modern food & beverage service sector of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Demonstrate the beverage pre mix for making cocktails and Mocktails. (Understand)  
CO 2: Identify & analyze the layout plan for different modern food outlets for implementation. (Knowledge)  
CO 3: Analyze, explain and demonstrate digitalization in beverage sector (Analyze)  
CO 4: Develop the skills to familiarize with different concepts of sustainability & digitalization in beverage sector (Create)

Practical
Expt. 1: F&B Staff Organization-Class Room Exercise (Case Study method)  
Expt. 2: Developing Organization Structure of various modern Food & Beverage Outlets  
Expt. 3: Develop modern concepts for beverage tourism  
Expt. 4: Create demo iternary for beverage tourism  
Expt. 5: Preparing Job Description & Specification for modern F&B outlets  
Expt. 6: Conducting Briefing & Debriefing
HAHK406T: MODERN TRENDS IN HOUSEKEEPING – I
(3 Credits: 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the new developments and technological advancements in housekeeping sector of hospitality

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Describe the importance of eco friendly products and practices (Knowledge)
CO 2: Identify the modern trends of hospitality housekeeping (Understand)
CO 3: Illustrate software usage in housekeeping (Apply)
CO 4: Advertise the different modern day housekeeping practices (Analyze)

Module I – Eco Practices in Housekeeping (07 hours)
a. Introduction
b. Types of eco friendly practices
c. Importance of eco friendly practices
d. Sustainable cleaning products

Module II – Hygiene & Sanitation (07 hours)
a. Modern theory of hygiene & sanitation in guest rooms and public areas
b. Importance of hygiene & sanitation
c. International standards
d. Modern equipments used for hygiene & sanitation

Module III – Eco friendly amenities & products (08 hours)
a. Energy conservation products
b. Ozone treatment
c. Toiletries
d. Eco friendly chemicals
e. Recyclable amenities

Module IV – Modern Technologies in Housekeeping (07 hours)
a. IT amenities
b. Uses of latest software in housekeeping
c. Forecasting GRA requirement
d. Modified intercom telephone systems
e. Daily housekeeping scheduling

Module V – Case Study (07 hours)
a. Case study 1
b. Case study 2
c. Case study 3

Suggested Readings:
1. Mayola Fernandes, Modern practices Implemented in Housekeeping by 5 – star hotels, 2020
2. Pralay Ganguli, Housekeeping management in hotel & service Industry, 2019

Mapping of CO’s to syllabus

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HAHK407L: MODERN TRENDS IN HOUSEKEEPING – I PRACTICAL
(2 Credits: 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the newly developed products and concepts which are the USP of modern housekeeping sector of hospitality.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Recognize different modern items and chemicals used in housekeeping (Knowledge)
CO 2: Discuss the effective cleaning and sanitation of guest rooms (Understand)
CO 3: Demonstrate cleaning process of guest rooms (Apply)
CO 4: Classify the uses of software in housekeeping (Analyze)

Practical
1. Familiarising eco friendly items of housekeeping
2. Introduction to eco friendly amenities
3. Introduction to housekeeping software
4. Introduction to hygiene & sanitation agents
5. Handling of chemicals
6. Deep cleaning of model guestrooms using chemicals
7. Surface cleaning
8. Duty roster making
9. Demonstration of room amenity replenishment
10. Identification of health hazards

Mapping of CO’s to syllabus

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HAGY408T: MODERN TRENDS IN GASTRONOMY –II
(3 Credits – 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the new offbeat cuisines of India and importance of media and opportunities in Entrepreneurships in modern gastronomic sector.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the concept and idea of new Indian cuisines and new developments in food industry (Understand)
CO 2: Identify the factors which leads to sustainability (Knowledge)
CO 3: Analyze the importance of media in food industry (Analyze)
CO 4: Develop your skills and illustrate the importance and challenges in food entrepreneurships. (Create)

Module I: Offbeat cuisines of India (10 hours)
1. A detailed study on – Uttarakhandi, Kathiawadi, Parsi , Mappila, Adivasi, Melenadu & Konkani cuisine
2. Traditional preparation methods
c. Utensils and accompaniments

**Module II: Modern trends & developments (09 hours)**
- Lab grown meats
- Plant based dairy products
- Super foods
- Micro greens
- Edible flowers
- Immune boosting foods
- Meal kits
- Seaweed consumption
- Micro greens

**Module III: Sustainability in gastronomy (08 hours)**
- Sustainability – Definition, importance, impacts on environment
- Sustainable food cycle
- Sustainable food cultivation & climate change- crops, livestock, marine
- Role of NGO’s, government and non government sector in sustainable food movements

**Module IV: Media Importance in Gastronomy (09 hours)**
- Types of media benefits the gastronomy
- Role of social media in gastronomy
- Food photography
- Food advertising
- Food styling

**Module V: Food entrepreneurship (08 hours)**
- Opportunities and challenges in food entrepreneurship
- Food business opportunities in India
- Research and development in food business

**Suggested Readings**
1. RDN Frye, Amanda, Barbara Scheule, Introductory Food, 2019
2. Signe Rousseau, Food and social media, 2012
3. Valentina Marinescu, Food nutrition and media, 2021
4. Paul collinson, Food and sustainability in the twenty-first century, 2019
5. Paola De Barnardi, Danny Azucar, Innovations in food ecosystems: Entrepreneurship for a sustainable future, 2019

**Mapping of CO’s to syllabus**

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**HAGY409L: MODERN TRENDS IN GASTRONOMY – II PRACTICAL**
(2 Credits – 60 hours) (L-T-P: 0-0-2)

**Objective(s):**
The objective of the course is to demonstrate & learn the offbeat cuisines of India and newly developed concepts of gastronomy which supports sustainability and modern trends.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
- CO 1: Demonstrate menus from offbeat cuisine of India (Understand)
- CO 2: Identify & demonstrate recipes based on modern trends in gastronomy (Knowledge)
- CO 3: Identify & demonstrate menus which supports sustainability in gastronomy (Analyze)
- CO 4: Develop the skills through innovations and research in gastronomy and create demo entrepreneurship ideas (Create)

**Practical**
- Expt. 1: Various preparations from – Uttarakhand cuisine
- Expt. 2: Various preparation from – Kathiwadi cuisine
Expt. 3: Various preparation from – Parsi cuisine  
Expt. 4: Various preparation from – Mappila cuisine  
Expt. 5: Various preparation from – Adivasi cuisine  
Expt. 6: Various preparations from – Melenadu cuisine  
Expt. 7: Various preparations from – Konkani cuisine  
Expt. 8: Various preparations from – Micro greens  
Expt. 9: Various preparations from – edible flowers  
Expt. 10: Various preparations from – Immune boosting foods  
Expt. 11: Various preparations from – Seaweeds  
Expt. 12: Various preparations from – Plant based dairy  
Expt. 13: Various preparations from – sustainable food menu  
Expt. 14: Various preparations from – sustainable food menu  
Expt. 15: Demo entrepreneurship ideas – Based on gastronomy  
Expt. 16: Demo entrepreneurship ideas – Based on gastronomy

**SUGGESTED MENU:**

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<td>Patra ni machli</td>
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<td>Adadiya pak</td>
<td>Berry pulao</td>
<td>Thalassary biriyani</td>
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<td>Dhuska</td>
<td>Mango Rasam</td>
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<td>Spring salad</td>
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<td>Carrot kosambari</td>
<td>Bambil fry</td>
<td>Broccoli micro green soup</td>
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<td>Dubki tiyan</td>
<td>Pandi curry</td>
<td>Bharli vangi</td>
<td>Micro green pesto sandwich</td>
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<td>Bothal bhaat</td>
<td>Akki roti</td>
<td>Caldine veg curry</td>
<td>Lemon – garlic pasta with arugula</td>
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<tr>
<th>Exp 9 (Edible flowers)</th>
<th>Exp 10 (Immune boosting foods)</th>
<th>Exp 11 (Seaweeds)</th>
<th>Exp 12 (Plant based dairy)</th>
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<tr>
<td>Edible flower Gazpacho</td>
<td>Chicken &amp; turmeric soup</td>
<td>Seaweed salad with sesame dressing</td>
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<td>Rose jam &amp; strawberry Bruchetta</td>
<td>Lentil stuffed sweet potatoes</td>
<td>Grilled chicken with seaweed butter</td>
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<td>Edible flower canapé</td>
<td>Pumpkin &amp; broccoli curry</td>
<td>Tofu &amp; seaweed stir fry</td>
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<td>Squash blossoms with goat cheese</td>
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<th>Exp 15 (Entrepreneurship ideas)</th>
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<td>Fish head &amp; coconut root soup</td>
<td>Cucumber peel pickles</td>
<td>Students should develop their skills on food entrepreneurship in theory classes and come up with innovative recipes which can be used for revenue generation</td>
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**HAFR410T: MODERN TRENDS IN FRONT OFFICE – II**

(3 Credits: 45 hours) (L-T-P: 3-0-0)

**Objective(s):**

The objective of the course is to learn the modern rules, licenses & green certifications of newly developed concepts of front desk and hospitality sector.
COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Analyze the concept of home stay and find out about the licenses and rules and regulations to be followed in India. (Understand)
CO 2: Explain the various new technologies in reference to concierge of front office. (Knowledge)
CO 3: Summarize the various certifications which can be obtained for green practices in hotel industry and analyze the SOP’s adopted towards safety and security of guest. (Analyze)
CO 4: Discuss various case studies on modern trends in front office and determine its implications and impact on hotel industry. (Create)

Module I: HOMESTAY (06 hours)
a. Concept of Homestay
b. Classification of Homestay
c. Homestay licenses, rules & Regulations in India

Module II: HIGH-TECH CONCIERGE TECHNOLOGY (06 Hours)
a. Virtual Tour
b. AI in Concierge
c. Examples of Hi-tech Concierge Technologies adopted by hotels worldwide

Module III: INTERNATIONAL CERTIFICATION OF GREEN PRACTICES (08 Hours)
a. Eco-leaf rating
b. Green Globe
c. Green Key
d. Nordic Swan rating
e. LEEDS

Module IV: MODERN SAFETY AND SECURITY IN FRONT OFFICE (08 Hours)
a. Modern Equipment used in Front Office
b. Key handling/ Safe Deposit
c. SOP of handling suspicious guest
d. SOP of handling single lady traveler
e. Change of SOP for guest handling post Covid-19

Module V: CASE STUDY (08 Hours)
Case Studies on various examples in relation to Front Office Trends

Suggested Readings
1. Adam Harris, Richard Castle, Kristy Espat and more., More Reservations, happier guest: The ultimate guide for the Modern hotelier, Cloudbeds, 2022

Mapping of COs to Syllabus

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HAFR411L: MODERN TRENDS IN FRONT OFFICE – II (PRACTICAL)
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the modern standard procedures and uses of virtual orientation in the field of front desk area and hospitality.
COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Explain the concept of virtual orientation of hotel and its facilities as well as orientation of the city. (Understand)
CO 2: Model itinerary of guest. (Knowledge)
CO 3: Apply SOP’s of hygiene & sanitation and other standards procedures in front office as per requirements and analyze the applications of modern apps in various procedures. (Analyze)
CO 4: Create unique experience for guest together with construction of forms and formats. (Create)

PRACTICAL
Expt. 1: Virtual Orientation of Hotel
Expt. 2: Virtual Orientation of city in which the hotel is situated
Expt. 3: Digital itinerary creation
Expt. 4: Post Covid-19 hygiene & sanitation in front office
Expt. 5: Application of modern apps and features in front office like voice technology etc
Expt. 6: Flexible check-in and check-out procedure
Expt. 7: Providing unique experience/wow experience
Expt. 8: Dealing with fake currencies
Expt. 9: Updated forms and formats
Expt. 10: Role play

Mapping of COs to Syllabus

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HABS412T: MODERN TRENDS IN FOOD & BEVERAGE SERVICE –II
(3 Credits: 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the modern advancements in beverage outlets and new trending concepts of beverages.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the concepts of modern advancements in beverage outlets and trends (Understand)
CO 2: Identify & analyze the marketing strategies in beverage sector (Knowledge)
CO 3: Analyze and develop skills on modern trends in cocktails and Mocktails (Analyze)
CO 4: Develop the skills and illustrate the entrepreneurship options in beverage sector (Create)

Module I: Innovation’s in Beverage sector & outlets (08 hours)
a. Robotics service innovation
b. Companion beverage bars
c. Advance beverage productions
d. Artificial Intelligence

Module II: Modern trends & developments in beverages (07 hours)
a. Herbal & Botanical flavours in beverages
b. Sober trend – Low and non alcoholic drinks
c. Functional drinks
d. Alternative spirits
e. Fermented beverages & teas

Module III: Marketing strategies in Food & Beverage (08 hours)
a. Customer loyalty programs
b. Digital presence in social media
c. Paid media promotions
d. Search engine optimization

Module IV: Modern cocktail & Mocktail trends (08 hours)
Module V: Beverage entrepreneurship (07 hours)

a. Opportunities and challenges in beverage entrepreneurship
b. Beverage business opportunities in India
c. Research and development in beverage business

d. Modern garnish techniques

Suggested Readings

3. Douglas Raggio, Start a Food & Beverage business, 2022

Mapping of COs to Syllabus

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HABS413L: MODERN TRENDS IN FOOD & BEVERAGE SERVICE - II PRACTICAL

(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the modern advancements in beverage outlets and new trending concepts of beverages.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:

CO 1: Demonstrate the beverages based on modern trends. (Understand)
CO 2: Identify & analyze the developments happening in beverage sector and demonstrate. (Knowledge)
CO 3: Analyze & demonstrate modern trends in cocktails & Mocktails (Analyze)
CO 4: Develop the skills to familiarize with different concepts of sustainable garnishes used for Cocktails and Mocktails (Create)

Practical
Expt. 1: Demonstrate herbal & botanical flavored beverages
Expt. 2: Demonstrate zero and non-alcoholic drinks
Expt. 3: Demonstrate functional drinks
Expt. 4: Demonstrate fermented beverages
Expt. 5: Demonstrate various preparations of tea
Expt. 6: Demonstrate throw back cocktails
Expt. 7: Demonstrate two spirit cocktails
Expt. 8: Demonstrate sustainable garnishes
Expt. 9: Demonstrate zero waste Mocktails
Expt. 10: Demonstrate Immune booster Mocktails
Expt. 11: Demonstrate fruit slushies

Mapping of Cos to Syllabus

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OR

COURSE CODE: MODERN TRENDS IN HOUSEKEEPING – II

(3 Credits – 45 hours) (L-T-P: 3-0-0)
Objective(s):
The objective of the course is to learn the modern advancements in rooms division and new trending concepts of rooms and the management skills.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Describe the importance of employee training (Knowledge)
CO 2: Identify the modern trends of hospitality housekeeping (Understand)
CO 3: Point out software utility in housekeeping (Analyze)
CO 4: Reframe the outsourcing process (Analyze)

Module I – Training & Motivation (08 hours)
a. Training methods
b. Disease and infection control
c. Covid sanitation training
d. Fire safety training and drills

Module II – Modern laundry operations (05 hours)
a. Eco friendly chemicals
b. Optimization of laundry settings
c. Outsourcing laundry practices
d. Water treatment
e. Recycling water

Module III – Safety & Security (08 hours)
a. Modern technologies for security
b. Uses of AI for guest security
c. Usage of IP cameras for face tracking
d. Modern guest security practices
e. International standards

Module IV – Outsourcing Services (08 hours)
a. Importance
b. Different outsourcing services
c. Cost efficiency
d. Outsourced employment

Module V – Case Study (06 hours)
a. Case study 1
b. Case study 2
c. Case study 3

Suggested Readings:

Mapping of CO’s to syllabus

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HAHG415L: MODERN TRENDS IN HOUSEKEEPING – II PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)  

Objective(s):
The objective of the course is to demonstrate the modern advancements in room divisions and new trending concepts of rooms and forms & formats.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Label training and other activity drills in housekeeping (Knowledge)
CO 2: Demonstrate modern laundry cleaning techniques and processes (Understand)
CO 3: Classify different software used in housekeeping department (Analyze)
CO 4: Construct different forms and formats (Create)

Practical
Expt. 1: Introduction to types of training and motivation process
Expt. 2: Fire safety training drills
Expt. 3: Introduction to modern laundry chemicals and items
Expt. 4: Cleaning of soiled linen using modern laundering techniques
Expt. 5: Removing stains from dirty linen
Expt. 6: Introduction to safety and security in hotels
Expt. 7: Software handling
Expt. 8: Outsourced employees duty roster making
Expt. 9: Forms and formats
Expt. 10: Laundry forms

Mapping of CO’s to syllabus

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### MINOR COURSES

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**HAGH104T: BASICS OF GASTRONOMY & HYGIENE PRACTICES**

(2 Credits – 30 hours) (L-T-P: 2-0-0)

**Objective(s):**
The objective of the course is to learn the basic and introductory knowledge of gastronomy sector of hospitality.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:

CO 1: Discuss the hygiene and skills required in workplace. (Understand)

CO 2: Identify and analyze basic food commodities and their preparations (Knowledge)

CO 3: Analyze the basic knowledge of baking and breads. (Analyze)

CO 4: Demonstrate the safety procedures in handling kitchen equipment’s (Create)

CO 5: Develop the operation flow of the food production department (Create)

**Module I: INTRODUCTION TO GASTRONOMY & HIERARCHY (08 hours)**

a. Attitudes, behavior & personal hygiene in the kitchen
b. Uniforms & protective clothing
c. Aims and objectives of cooking food
d. Various textures & consistencies
e. Classical & Modern Brigade
f. Duties and responsibilities of various chefs

**Module II: METHODS OF COOKING FOOD (05 hours)**

a. Methods of Cooking: Roasting, Grilling, Frying, Baking, Broiling, Poaching, Boiling
b. Principles of each of the above
c. Care and precautions to be taken
d. Selection of food for each type of cooking

**Module III: Introduction to Bakery (05 hours)**

a. Introduction & types of ovens
b. Basic bakery ingredients – uses, importance
c. Different types of breads – Description, country of origin

**Module IV: COMMODITIES & TERMS USED IN GASTRONOMY (06 Hours)**

a. Cuts & classification of vegetables
b. Classification of fruits
c. Egg cookery
d. Stocks & its uses
e. Thickening & Raising agents
f. List of culinary terms & their explanation
Module V: Food Hygiene (05 Hours)

a. Food & its relation to health
b. Food allergy and precautions
c. General Principles of Food Hygiene
d. Food Hazards & risk
e. Types (Infections and intoxications) & its preventive measures
f. HACCP (Basic Principle and implementation)

Suggested Readings
5. K. Arora, Theory of Cookery, Frank Brothers, 1992

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HAGH105L: BASICS OF GASTRONOMY & HYGIENE PRACTICES PRACTICAL
(2 Credits: 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to demonstrate the basic and introductory kitchen tools of commercial kitchen & basic cuts of vegetables.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the usage of kitchen tools (Understand)
CO 2: Identify the safety principles at the food production area (Knowledge)
CO 3: Analyze commonly used raw material (Analyze)
CO 4: Analyze & demonstrate basic cuts of vegetables (Analyze)
CO 5: Develop & demonstrate basic bread preparations (Create)

Practical
Expt. 1: Familiarization and Understanding kitchen equipment and tools
Expt. 2: Understanding Personal Hygiene and Kitchen Hygiene & its importance.
Expt. 3: Understanding kitchen layouts, kitchen knife, and hand tools
Expt. 4: Identification of commonly used raw material
Expt. 5: Basic hygiene practices& Importance of Kitchen Uniform.
Expt. 6: Various Safety practices to be observed in the kitchen
Expt. 7: Basic cuts of vegetables
Expt. 8: Methods of Cooking
Expt. 9: Various classical preparation of Egg.
Expt. 10: Preparation of Stock, Soup & Sauces
Expt. 11: Fire Fighting
Expt. 12: Basic bread preparations

Mapping of COs to the syllabus

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HACB106T: CULINARY & BAKING SKILLS  
(2 Credits: 30 hours) (L-T-P: 2-0-0)

Objective(s):  
The objective of the course is to learn & develop theoretical skills of various kinds of soup, sauces & stocks and various kinds of meat & fish cookery.

COURSE / LEARNING OUTCOMES:  
At the end of this course student will be able to:
CO 1: Discuss the basic recipes and outline the different Soups and Sauces preparations (Understand)
CO 2: Identify different food commodities. (Knowledge)
CO 3: Analyze the various processes of cooking methods required for fish & meat cookery (Analyze)
CO 4: Develop & illustrate meat and fish cookery (Create)
CO 5: Identify various types of bakery & confectionary items (Knowledge)

Module I: Soups (05 hours)
 a. Definition, Importance, classification – Broth, Bouillon, puree, cream, velouté, chowder, bisque, consommé
 b. Cold soups
 c. International soups
 d. Garnishes and accompaniments

Module II: Sauces (04 hours)
 a. Definition, Importance, classification of sauces and mother sauces
 b. Derivatives of mother sauces
 c. Contemporary & Proprietary sauces
 d. Difference between sauce and gravy

Module III: FISH COOKERY (04 hours)
 a. Introduction to fish cookery
 b. Classification of fish with examples
 c. Cuts of fish with menu examples
 d. Selection of fish and shellfish
 e. Effects of heat on the cooking of fish

Module IV: MEAT COOKERY (06 hours)
 a. Introduction to meat cookery
 b. Cuts
 c. Variety meats
 d. Poultry
 e. Menu examples of each

Module V: Basic Bakery & confectionary (05 hours)
 a. Muffins – Introduction, types
 b. Cookies & Doughnuts – Introduction, types
 c. Pastries- Types and uses

Module VI: Food commodities (06 hours)
 a. Nuts – classification & uses
 b. Fruits – classification & uses
 c. Herbs – types & uses
 d. Pulses & cereals – types and uses.

Suggested Readings
2. P. S. Bali, Quantity Food Production Operations and Indian Cuisine, Oxford University Press, New Delhi, 2012

Mapping of COs to Syllabus

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HACB107L: CULINARY & BAKING SKILLS PRACTICAL
(2 Credits – 60 hours) (L-T-P: 0-0-2)

Objective(s)
The objective of the course is to demonstrate the basic kitchen preparation such as soups, sauces and basic recipes of meats, fish & poultry and easy to prepare food items in commercial kitchens.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand the uses of different kitchen equipment & commodities. (Understand)
CO 2: Identify, demonstrate and explain cuts of fish and meat (Knowledge)
CO 3: Identify, demonstrate basic preparation of sauces & soups (Knowledge)
CO 4: Analyze & illustrate cuts of poultry (Analyze)
CO 5: Create & demonstrate different preparations of cookies, muffins, doughnut and pastries (Create)

PRACTICAL
Expt. 1: Familiarization and Understanding kitchen equipment and tools
Expt. 2: Cuts of fish with menu examples
Expt. 3: Cuts of Meat with menu examples
Expt. 4: Various preparation of cookies, muffins, doughnut and pastries
Expt. 5: Cuts of Poultry with menu examples
Expt. 6: To illustrate the various uses of kitchen commodities in food preparations.
Expt. 7: To demonstrate various derivatives of sauces and their uses.
Expt. 8: To demonstrate various soups and there garnishes.
Expt. 9: To demonstrate various cuts of fruits and there uses.
Expt. 10: To demonstrate various uses of nuts in gastronomy.
Expt. 11: To demonstrate various uses of pulses & cereals.
Expt. 12: To demonstrate the uses of various herbs and spices.

Mapping of Cos to Syllabus

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SUGGESTED MENU:

Menu 1
Consomme Julienne
Cream of Tomato soup
Chicken & Corn Broth
Pumpkin and Apple soup

Menu 2
French Onion soup
Mulligatawny
Gazpacho
Minestrone

Menu 3 (Mother sauce)
Baked potato gratin
Grilled lamb leg with Espagnole sauce
Meat balls in Tomato sauce

Menu 4 (Mother sauce)
Macedoine Mayonnaise
Grilled veg with Hollandaise sauce
Poached chicken in Velouté sauce

Menu 5
Fish Fingers with Tartar sauce
Grilled fish with lemon butter Sauce
Fish croquettes

Menu 6
Potato Mustard salad
Shepherd’s Pie
Meat casserole
Herb Pilaf

Menu 7
Chicken Cutlet
Pan fried chicken
Boiled vegetables
Herbed Mashed potatoes

Menu 8
Fruit & Nut salad
Spiced lentil soup
Veg Au Gratin
Vanilla custard

Menu 9
Waldorf Salad
Potato Lyonnaise
Fish casserole
Cinnamon crepes with apple sauce

Menu 10
Greens with basic vinaigrette
Chicken Stew
Pilaf rice
Caramel custard

Menu 11
Trio of mushroom Salad
Ratatouille
Beans ragout
Herbed Pancakes

Menu 12
French Lentil salad
Grilled vegetables
Chicken in Vinegar sauce
Soft Buns
HARS210T: ROOM REPORTS & SURFACE CLEANING
(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s)
The objective of the course is to learn the importance and procedures of cleaning different kinds of surfaces and formats & reports generated by room divisions.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the different room status and the reports & formats used by room division. (Understand)
CO 2: Identify the guest services provided by room division and the procedures followed. (Knowledge)
CO 3: Analyze, recall and describe the entire room reservation system of the hotel (Analyze)
CO 4: Develop & illustrate cleaning procedures for different surfaces (Create)

Module I: ROOM STATUS AND REPORTS USED IN ROOM DIVISION (10 hours)
a. Occupied, Vacant
b. Out Of Order / Out Of Service
c. Occupancy Report
d. Arrival Report
e. Managers Flash
f. Discrepancy Report
g. Turn away report
h. Say over list, expected arrival list, Expected departure list
i. other forms and formats

Module II: GUEST SERVICES (05 Hours)
a. Handling Guest Mail
b. Keys and keys Handling
c. Guest Paging
d. Safety Deposit Lockers
e. Wakeup call
f. Room Movement
g. Lost and Found

Module III: ROOM RESERVATION (05 hours)
a. Importance, Functions, Different Channels & sources, and Types of reservation.
b. Cancellations and Amendments
c. Handling Individual & Group reservations
d. Various Forms & Formats

Module IV: CARE AND CLEANING OF DIFFERENT SURFACES (10 Hours)
a. Metals
b. Glass
c. Leather, Leatherettes, Resins
d. Plastic
e. Ceramics
f. Wood
g. Wall finishes
h. Floor finishes

Suggested Readings

Mapping of COs to Syllabus

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**COURSE CODE: ROOMS REPORTS & SURFACE CLEANING PRACTICAL**

(2 Credits - 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate the importance and procedures of cleaning different kinds of surfaces and formats & reports generated by room divisions.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
CO 1: Familiarize with different room status and the reports used in room division (Understand)
CO 2: Analyze & Demonstrate, role play on – room reservation, key handling, wakeup call, telephone handling and lost and found. (Analyze)
CO 3: Create & demonstrate on different surface cleaning – glass, metal and wood (Create)

**PRACTICAL**
Expt. 1: Identification of room status and outline of various reports generated in room division – room status report, arrival report, discrepancy report, occupancy report
Expt. 2: Handling room reservation
Expt. 3: Role play of key handling and safety deposit locker
Expt. 4: Role play of Room Movement
Expt. 5: Role play of handling guest wakeup call
Expt. 6: Role play of handling guest telephone at control desk
Expt. 7: Role play on lost and found
Expt. 8: Cleaning of different surfaces - Glass cleaning, Metal Cleaning, Wood Cleaning
Expt. 9: Practical involving following activities- Scrubbing, polishing, wiping, washing, rinsing, swabbing, mopping, sweeping, brushing, buffing
Expt. 10: Practical involving following activities- Scrubbing, polishing, wiping, washing, rinsing, swabbing, mopping, sweeping, brushing, buffing

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**HASB212T: HOUSEKEEPING SUPERVISION & BUDGETING**

(2 Credits – 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn the supervision skills and budget control methods used in the housekeeping department of hospitality sector.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
CO 1: Discuss the basic contents of housekeeping and guestrooms (Understand)
CO 2: Analyze the supervision process of housekeeping (Analyze)
CO 3: Develop & reframe the budgetary control methods (Create)

**Module – I: Standard Contents of a Guestroom (08 hours)**

a. Guestroom furniture
b. Furniture arrangement
c. Guestroom fixture and fittings
d. Beds, mattresses and bedding  
  e. Soft furnishing  
  f. Guestroom accessories  
  g. Placement of guest supplies  

**Module – II: Supervision in Housekeeping (07 hours)**  
  a. Role of a supervisor  
  b. Specific functions of supervisors  
  c. Importance of a supervisor  

**Module – III: Housekeeping Control Desk (07 hours)**  
  a. Coordination with other departments  
  b. Handling telephone calls  
  c. Paging systems and methods  
  d. Situation handling  
  e. Room move / Room shift  

**Module – IV: Budgeting for housekeeping expenses (08 hours)**  
  a. Types of budget  
  b. Housekeeping expenses  
  c. Budget planning process  
  d. Income statement of the rooms division  
  e. Controlling expenses  
  f. Inventory control and stock – taking  
  g. Purchasing  

**Suggested Readings**  

**Mapping of CO’s with syllabus**  

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**HASB213L: HOUSEKEEPING SUPERVISION & BUDGETING PRACTICAL**  
(2 Credits – 60 hours) (L-T-P: 0-0-2)  

**Objective(s):**  
The objective of the course is to learn & demonstrate the skills required to understand the function of chambermaid’s trolley and cleaning agents & equipments.  

**COURSE / LEARNING OUTCOMES:**  
At the end of this course student will be able to:  
CO 1: Developing skills for the loading of a chambermaid’s trolley (Understand)  
CO 2: Identify & explain a guestroom layout (Knowledge)  
CO 3: Analyze & understand the usage of cleaning agents and equipment (Analyze)  

**Practical**  
1. Familiarising guest room amenities  
2. Identification of housekeeping equipment (Manual / Mechanical)  
3. Familiarising with chambermaid’s trolley  
4. Cleaning of different surfaces  
5. Practical involving following activities- Scrubbing, polishing, wiping, washing, rinsing, swabbing, mopping, sweeping, brushing, buffing  
6. Stain removal
7. Practical activities involving the usage of cloths and their types, abrasives, polishes, chemical agents, and commercially available products

Mapping of COs to the syllabus

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HAHM310T: ADVANCED HOUSEKEEPING MANAGEMENT
(2 Credits: 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn various aspects of decorations required in rooms & focused areas and causes & prevention aspects of safety and security.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Discuss the basics of ancillary activities (Understand)
CO 2: Analyze the security systems of a hotel (knowledge)
CO 3: Develop & identify the decorations of the department (Create)

Module – I: Linen and Laundry (05 hours)
a. The linen and laundry room
b. Storage, exchange, par stock, linen control, laundry process
c. Dry cleaning
d. Handling guest laundry
e. Uniforms and sewing room

Module – II: Safety and Security (08 hours)
a. Work environment safety
b. Potential hazards in housekeeping
c. Fire prevention and fire safety
d. First aid
e. Crime prevention
f. Medical emergencies
g. Scanty baggage
h. Lost and found

Module – III: Interior designing (07 hours)
a. Basic types of design
b. Elements and principles of design
c. Design for physically challenged
d. Color and lighting
e. Flooring
f. Carpets and floor maintenance
g. Window and window treatment

Module – IV: Flower Arrangement (04 hours)
a. Flower arrangement basics
b. Designing flower arrangement
c. Japanese / oriental flower arrangement
d. Common flowers and foliages

Suggested Readings
**HAHM311L: ADVANCED HOUSEKEEPING MANAGEMENT PRACTICAL**
(2 Credits: 60 hours) (L-T-P: 0-0-2)

**Objective(s):**
The objective of the course is to learn & demonstrate the concept of interior decorations, bed making & flower arrangements.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:

CO 1: Develop skills & construct a model room with various concepts of interior decoration (Understand)

CO 2: Analyze & demonstrate the process of bed-making (Analyze)

CO 3: Create & illustrate various flower arrangement techniques (Create)

**Practical**
1. Flower arrangement
2. Making floor plans, wall elevations, and templates
3. Creating a model of a guest room / public area with interior decoration themes
4. Cleaning of guestroom
5. Bed making & Turndown service
6. Mini-bar handling

**Mapping of CO’s to syllabus**

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**HANE312T: ECO GASTRONOMY: NORTH EASTERN INDIA**
(2 Credits: 30 hours) (L-T-P: 2-0-0)

**Objective(s):**
The objective of the course is to learn the concept of importance of gastronomy towards the economy and ways to improve the economy through various sustainable gastronomic practices.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:

CO 1: Discuss and describe various aspects of eco gastronomy. (Understand)

CO 2: Identify and learn the benefits of eco gastronomic (Knowledge)

CO 3: Analyze the concept of geo gastronomy in North Eastern India (Analyze)

CO 4: Develop skills and illustrate the research & product development in eco gastronomy for North Eastern India (Create)

**Module – I: Introduction (05 hours)**

a. Definition, Importance, benefits
b. Five dimensions of taste as per eco gastronomy
c. Fundamental categories of eco gastronomy
d. Eco gastronomy vs. Gastronomy

**Module – II: Eco Gastronomy in North East (8 hours)**

a. Tribal cooking techniques
b. Importance of ethnic cuisine
c. Sustainability in cultivation and farming
d. Ethnic foods in festivals

**Module – III: Challenges of Eco Gastronomy in North east (07 hours)**

a. Junk & fast foods
b. Urbanization and busy lifestyles
c. Competition among local producers
d. Food habits of teenagers

Module – IV: Future Development of Eco Gastronomy in North East (08 hours)

a. Gastronomic tourism
b. Slow food movements
c. Green Gastronomy
d. Awareness and campaign’s

Suggested Readings

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HANE313L: ECO GASTRONOMY: NORTH EAST INDIAN REGIONS PRACTICAL
(2 Credits: 60 hours) (L-T-P: 0-0-2)

Objective(s):
The objective of the course is to learn & demonstrate the concept the eco gastronomy through the various cuisines from North East.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand spices, pulses, sweetening agents of North East and compose different preparations (Understand)
CO 2: Identify & demonstrate the traditional home style cooking and breakfast cooking (Knowledge)
CO 3: Identify & Demonstrate traditional fermentation techniques of North East (Knowledge)
CO 4: Analyze plan and organize a theme menu (Analyze)
CO 5: Create various sweet preparations from North East (Create)

Practical:
Expt. 1: Gravies and their preparations
Expt. 2: Popular breakfast preparations from North East
Expt. 3: Prepare North East sweets and savories
Expt. 4: Prepare varieties of North East pickles & chutney
Expt. 5: Street food of North East
Expt. 6: Introduction to large scale / quantity food production
Expt. 7: Menu 1 – Assamese cuisine
Expt. 8: Menu 2- Arunachal Pradesh
Expt. 9: Menu 3 – Mizoram
Expt. 10: Menu 4 – Meghalaya
Expt. 11: Menu 5- Manipur
Expt. 12: Menu 6- Nagaland
Expt. 13: Menu 7- Tripura
Expt. 14: Menu 8- Fermented foods from North East
Expt. 15: Menu 9- North East Menu
Expt. 16: Menu 10 – North East Menu

Mapping of COs to the syllabus

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### SUGGESTED MENU:

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<th>Menu 3 (Mizo Breakfast)</th>
<th>Menu 4 (Meghalaya Breakfast)</th>
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<tbody>
<tr>
<td>Jolpaan</td>
<td>Khura</td>
<td>Rice</td>
<td>Putharo</td>
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<td>Paani Pitha</td>
<td>Zan</td>
<td>Bai</td>
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<th>Menu 5 (Manipuri Breakfast)</th>
<th>Menu 6 (Naga Breakfast)</th>
<th>Menu 7 (Tripura Breakfast)</th>
<th>Menu 8 (Assamese Cuisine)</th>
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<tr>
<td>Tan</td>
<td>Egg Sheep</td>
<td>Sweet Poha</td>
<td>Xaak aru Bhaji</td>
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<td>Aloo Kangmet</td>
<td>Black Tea</td>
<td>Bangui</td>
<td>Aloo Pitika</td>
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<td></td>
<td>King chilli chutney</td>
<td>Bhater Bhat</td>
<td>Baanhgajor Lagot Kukura</td>
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<td>Plain rice</td>
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<th>Menu 9 (Arunachal cuisine)</th>
<th>Menu 10 (Meghalaya Cuisine)</th>
<th>Menu 11 (Mizoram cuisine)</th>
<th>Menu 12 (Manipur cuisine)</th>
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<td>Pasa</td>
<td>Nakham Bitchi</td>
<td>Bai</td>
<td>Singju</td>
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<td>Chura Sabji</td>
<td>Do —o- Kalai</td>
<td>Chhum Han</td>
<td>Eromba</td>
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<td>Pika Pila</td>
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<td>Arsa Beipenek</td>
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<th>Menu 15 (Street Food – North East)</th>
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<td>Rosep Aon</td>
<td>Mui Borok</td>
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<td>Thenthuk</td>
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<td>Naga Fish curry</td>
<td>Wahan Mosdeng</td>
<td>Kappa</td>
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<td>Galho</td>
<td>Gudok</td>
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<th>Menu 17 (Street Food - North East)</th>
<th>Menu 18 (Pickles)</th>
<th>Menu 19 (North East Menu)</th>
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<td>Kelli chana</td>
<td>Ou Tenga</td>
<td>Curated by students based on home cooking methods</td>
<td>Curated by students based on home cooking methods</td>
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<td>Sanipiau</td>
<td>Banana Flowers</td>
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<td>Chikhvi</td>
<td>Bamboo shoots</td>
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<td>King chili</td>
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### HABT408T: BASICS OF TOURISM

(3 Credits: 45 hours) (L-T-P: 3-0-0)

**Objective(s):**
The objective of the course is to learn the basic knowledge about the tourism sector in hospitality with its different aspects.

**COURSE / LEARNING OUTCOMES:**
At the end of this course student will be able to:
- CO 1: Contextualize tourism within broader cultural, environmental, and economic dimensions of society. (Knowledge)
- CO 2: To outline the resources of tourism and different aspects of tour operations. (Understand)
- CO 3: Explain the diverse nature of tourism, including culture and place, global/local perspectives, and experience design and provision. (Understand)
- CO 4: Examine the different elements of geography and the relationship with tourism. (Analyze)
- CO 5: Illustrate the tour operations (Apply)

**Module I: CONCEPT OF TOURISM (06 hours)**
- a. Origin, objectives, Elements, Scope & Nature of tourism
- b. Job opportunities and employment generation in the tourism industry

**Module II: TOURISM PRODUCTS AND RESOURCES (08 hours)**
- a. Architectural heritage
- b. Culture & Fairs and festivals of India
- c. Natural and other tourism resources

**Module III: TOUR OPERATIONS (08 hours)**
- a. Meaning & Definition
- b. Types of Tourists: Inbound, Outbound & Domestic.
- c. Tour Packaging—definition, components of tour package Types of Package Tour: Independent Tour, Inclusive Tour,
- d. Escort Tour, Business Tour
- e. Guides & escorts– The re-role and function Qualities required to be a guide or escort

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Regulations and Syllabus 2023-24
Module IV: ITINERARY PLANNING (08 hours)
- Steps to planning a Tour, Planning Route map
- Transport booking—reservation,
- Accommodation—Reservation & Food facilities
- Tour Costing

Module V: SOCIO-ECONOMIC IMPACT OF TOURISM (07 hours)
- Impact of tourism on culture
- People to people contact enhancement
- Environmental hazards

Suggested Readings

Mapping of Cos to Syllabus

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HARM409T: RESEARCH METHODOLOGY
(2 Credits: 30 hours) (L-T-P: 2-0-0)

Objective(s):
The objective of the course is to learn the basic knowledge about the research work and different approaches, process and methods of data collection in research work.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand the idea of conducting a research (Explain)
CO 2: Analyze the different approaches of a research process (Analyze)
CO 3: Explain the research concepts (Understand)
CO 4: Define the different methods of data collection and different research designs (Knowledge)

Module I – Introduction to Research (06 hours)
- Define research
- Objectives of research
- Types of research
- Significance of research
- Research process
- Criteria’s of a good research

Module II – Defining Research Problem (04 hours)
- Research problem
- Selecting the problem
- Necessity of defining the problem
- Techniques involved in defining a problem

Module III – Research Design (05 hours)
- Meaning of research design
- Need for research design
- Features of a good design
- Concepts of research design
- Principles of research design

Module IV – Sampling Design (04 hours)
- Census and sample survey
b. Steps in sample design

c. Criteria’s of selecting a sampling procedure

d. Types of sample design

**Module V – Data Collection (05 hours)**

a. Collection of primary data

b. Observation method, interview method, questionnaire

c. Methods of data collection

d. Collection of secondary data

e. Primary data vs. Secondary data

**Suggested Readings**


3. Sarangi, Research Methodology, Taxmann, New Delhi


**Mapping of CO’s to syllabus**

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**HAOB410T: ORGANIZATIONAL BEHAVIOUR**

(3 Credits: 45 hours) (L-T-P: 3-0-0)

**Objective(s):**

The objective of the course is to learn the basic knowledge about the behaviors & approaches of employees and employers towards an organization.

**COURSE / LEARNING OUTCOMES:**

At the end of this course student will be able to:

CO 1: Understand the organizational theory and structure (understand)

CO 2: Identify behavioural and individual perspectives (Knowledge)

CO 3: Analyze focus group behaviour (Analyze)

CO 4: Reframe different cultures and developments in an organization (Evaluate)

**Module – I: Organizational theory (10 hours)**

a. Introduction to organization

b. Organization theory

c. Organization structure

d. Effectiveness of organizational structure

**Module – II: Organizational behaviour and individual perspective – I (08 hours)**

a. Overview of organizational behaviour

b. Individual behaviour and learning

c. Perception

d. Attitudes and values

**Module – III: Organizational behaviour and individual perspective – II (08 hours)**

a. Personality and emotions

b. Stress management

c. Motivation

d. Job design and Job satisfaction

**Module – IV: Group behaviour (06 hours)**

a. Group formation and structure

b. Communication

c. Conflict management

d. Team building and leadership

e. Power and politics
Module – V: Organizational culture and development (10 hours)

a. Organizational culture and climate
b. Organizational change
c. Organizational development
d. Emerging trends in organizational behaviour

Suggested Readings

Mapping of CO’s to syllabus

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### SKILL ENHANCEMENT COURSES

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### HAIR108L: INTRODUCTION TO ROOMS DIVISIONS

(3 Credits: 45 hours) (L-T-P: 3-0-0)

**Objective(s):**
The objective of the course is to learn the history and classifications of hotel sector of hospitality and the organizational chart along with duties and responsibilities of various levels in room divisions.

**COURSE / LEARNING OUTCOMES:**

At the end of this course student will be able to:

CO 1: Understand the history of the Hospitality Industry and the core areas of rooms division and analyze its co-ordination with other departments. (Understand)

CO 2: Analyze the classification of hotels and the different types of guest rooms and accommodations. (Analyze)

CO 3: Develop the layout of front office/housekeeping, organizational chart, duties & responsibilities and personality traits of room division staff. (Create)

**Module I: INTRODUCTION TO HOSPITALITY INDUSTRY & ROOMS DIVISION (06 hours)**

- a. Hospitality and its origin
- b. Hotels, their evolution, and growth
- c. A brief introduction to hotel core areas with special reference to Rooms Division
- d. Coordination with other departments

**Module II: CLASSIFICATION OF HOTELS AND HOTEL ROOMS (12 Hours)**

- a. Size
- b. Star
- c. Location & clientele
- d. Ownership basis
- e. Independent hotels
- f. Management contracted hotel
- g. Chains
- h. Franchise/Affiliated
- i. Supplementary accommodation
- j. Time shares and condominium
- k. Types of Guest Rooms

**Module III: LAYOUT AND ORGANIZATIONAL CHART OF ROOM DIVISION (12 hours)**

- a. Layout of Front Office and Housekeeping department – Small, Medium & Large hotels
- b. Organizational Chart of Housekeeping and Front Office – Small, Medium & Large hotels
- c. Duties and responsibilities of staff
- d. Personality Traits

**Suggested Readings**


**Mapping of COs to Syllabus**

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HAIR108L: INTRODUCTION TO ROOMS DIVISIONS PRACTICAL

Objective(s):
The objective of the course is to learn the identification of various rooms along with hygiene standards and importance of communication and etiquettes.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand the importance of hygiene standards and basic manners required for guest services. (Understand)
CO 2: Identify different equipment and furniture used in room division (Knowledge)
CO 3: Analyze & implement communication (verbal & non-verbal) for various guest services. (Analyze)
CO 4: Develop different types of guest rooms and identify the supplies and their positions. (Create)

PRACTICAL
1. Basic Manners, Grooming & Hygiene Standards, its importance,
2. Room Division Communication (verbal/non-verbal) - Body language, Gestures, Facial expression, eye contact, voice
3. Identification of equipment and furniture used in room division.
4. Telephone etiquettes, Dialogues
5. Welcoming Guest
6. Escorting, Message handling
7. Familiarization with guest room.
8. Guest Room Supplies and Position
9. Layout of different types of guest room
10. Team Building

Mapping of COs to Syllabus

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HAFA109L: FUNCTIONAL AREAS & CLEANING AGENTS
(3 Credits: 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn the basic concepts of rooms divisions which are very necessary for day to day smooth function in room division.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand the basic functional areas of room division and outline the layouts of the areas. (Understand)
CO 2: Identify & recall and describe the entire guest cycle. (Knowledge)
CO 3: Analyze & elaborate on the basic concept of tariff decisions, pricing of rooms and meal plans. (Analyze)
CO 4: Develop & analyze the different types of cleaning techniques, cleaning equipments and cleaning agents along with their care and maintenance. (Create)

Module I: FUNCTIONAL AREAS & CLEANING AGENTS (8 hours)

a. Hotel Entrance, Lobby
b. Bell Desk
c. Reception Desk, Cashier
d. Concierge
e. Reservation
f. Telephone Operator
g. Housekeeping Control Desk
h. Linen Room, Uniform Room
i. Laundry
j. Florist Room
k. Layout of the areas

Module II: TARIFF (06 Hours)
a. Room tariff, Tariff fixation / calculating room tariff
b. Types of room tariff: Rack rate, discounted rates.

c. Meal Plan and its type

d. Forms & Format/ Tariff Card/Brochure

Module III: GUEST CYCLE (06 hours)
Pre-arrival, Arrival, Stay, Departure & Post Departure

Module IV: CLEANING AND CLEANING AGENTS USED IN HOTELS (10 Hours)

a. Principles of cleaning, hygiene, and safety factors in cleaning
b. Methods of organizing cleaning
c. Frequency of cleaning daily, periodic, special
d. Design features that simplify cleaning
e. Types of cleaning equipment
f. Types of cleaning agents
g. General Criteria for selection
h. Use, Care, and Storage
i. Distribution and Controls

Suggested Readings

Mapping of COs to Syllabus

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HAFA109L: FUNCTIONAL AREAS & CLEANING AGENTS PRACTICAL

Objective(s):
The objective of the course is to learn & demonstrate the use and maintenance of various cleaning agents & equipments and role play on various situations based on room divisions.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:

CO 1: Understand the different equipment and cleaning agents used in room division (Understand)
CO 2: Analyze the care and maintenance of cleaning equipment and cleaning agents (Knowledge)
CO 3: Analyze different functional areas of room division. (Analyze)
CO 4: Create & Demonstrate, role play on – bell desk operation, concierge operations, handling telephone & few cleaning procedure along with the forms and formats required to be filled (Create)

PRACTICAL

Expt. 1: Identification of equipment used in functional areas of room division
Expt. 2: Care and maintenance of the equipment
Expt. 3: Familiarization of cleaning agents according to classification
Expt. 4: Layout the various functional areas of room division – laundry, linen room, lobby
Expt. 5: Role play of bell desk operations
Expt. 6: Role play of Paging
Expt. 7: Role play of concierge operations
Expt. 8: Role play of handling telephone
Expt. 9: Room attendant trolley set up
Expt. 10: Fill forms and formats

Mapping of Cos to Syllabus

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HAIM214L: INTRODUCTION TO MARKETING
(3 Credits: 45 hours) (L-T-P: 3-0-0)

Objective(s):
The objective of the course is to learn & demonstrate the use and maintenance of various cleaning agents & equipments and role play on various situations based on room divisions.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand the concept of marketing (Understand)
CO 2: Identify the consumer buying behavior (Knowledge)
CO 3: Analyze the market segmentation process (Analyze)
CO 4: Develop an understanding about marketing components (Create)

Module – I: Introduction to Marketing (07 hours)
a. Introduction
b. Market & Marketing
c. Marketing process
d. Concepts of marketing
e. Functions of marketing
f. Importance of marketing
g. Market orientations

Module – II: The Marketing Process (08 hours)
a. Introduction
b. 4P’s of marketing
c. Modern components of marketing mix (3P’s)
d. Developing an effective marketing mix
e. Market planning
f. Market implementation and control

Module – III: Consumer Buying Behaviour (06 hours)
a. Introduction
b. Characteristics
c. Types of buying decision behavior, Henry Assael Model, Consumer & buying decision
d. Process
e. Buyer decision process for new products
f. Buying motives & behavior models

Module – IV: Business Buyer Behaviour (07 hours)
a. Introduction
b. Characteristics of business markets
c. Difference between consumer and business buyer behavior
d. Buying situation in industrial / business market
e. Buying roles in industrial marketing
f. Factors that influence business buyers
g. Steps in business buying process

Module – V: Segmentation, Targeting & Positioning (08 hours)
a. Introduction
b. Concepts of market segmentation
c. Benefits of market segmentation
d. Requisites of effective market segmentation
e. Process of market segmentation
f. Bases of segmenting consumer markets
g. Targeting, Market positioning, Advertising and sales promotion
h. Sales force management
Suggested Readings:
1. Kotlar, Phillip, Marketing Management, Prentice Hall, New Delhi

Mapping of CO’s to syllabus

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VOCATIONAL TRAINING – I **
Note: If the student wants to discontinue the program of “B.sc in Hospitality & Hotel Administration” after 1st year of study, then the student have to undergo a vocational training to get the “certificate” in the same program.

HABV110I: BASIC VOCATIONAL TRAINING
(4 Credits – 120 hours) (L-T-P: 0-0-4)

Objective(s):
The objective of the course is to complete the training program of 2 months and prepare the training report which was learned during the training exposure and also completes the log book.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand and analysis to the practical experience and actual working environment for developing their skills and capabilities, as well as enhancing their intellectual and emotional persona. (Understand)
CO 2: Identify & integrate classroom theory with workplace practice. (Knowledge)
CO 3: Analyze & gain an understanding of administrative functions and company culture. (Analyze)
CO 4: Develop skills to demonstrate various activities of all the core departments. (Create)

Module I - TRAINING EXPOSURE SUMMARY (50 hours)
The 08 weeks of vocational training would be from any two key areas of hospitality such as Food Production, Food and Beverage Service, Accommodation Operation, and Front Office Operations and student has to collect information’s which will be needed to them during compiling of the training report.

Module 2 - TRAINING REPORT (40 hours)
- During the training report the students has to complete the training report which will includes the details of the training organization, there USP, facilities of the various department
- The outcome and experience they gain from the training

Module 3 - LOG BOOK (30 hours)
During the training the student has to duly sign the log book from the departmental authorities as a proof of their experience and learning skills from the specific department.

Mapping of Cos to Syllabus

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VOCATIONAL TRAINING - II**
Note: If the student wants to discontinue the program of “B.sc in Hospitality & Hotel Administration” after 2nd year of study, then the student have to undergo a vocational training to get the “Diploma” in the same program.
HASV215I: SPECIALIZATION VOCATIONAL TRAINING
(4 Credits – 120 hours) (L-T-P: 0-0-4)

Objective(s):
The objective of the course is to complete the training program of 2 months and prepare the training report which was learned during the training exposure and also completes the log book.

COURSE / LEARNING OUTCOMES:
At the end of this course student will be able to:
CO 1: Understand and analysis to the practical experience and actual working environment for developing their skills and capabilities, as well as enhancing their intellectual and emotional persona. (Understand)
CO 2: Identify & integrate classroom theory with workplace practice. (Knowledge)
CO 3: Analyze & gain an understanding of administrative functions and company culture. (Analyze)
CO 4: Develop skills to demonstrate various activities of all the core departments. (Create)

Module I - TRAINING EXPOSURE SUMMARY (50 hours)
The 08 weeks of vocational training would be from the hospitality organization for the one key area such as Food Production, Food and Beverage Service, Accommodation Operation, and Front office Operations and student has to collect information’s which will be needed to them during compiling of the training report.

Module 2 - TRAINING REPORT (40 hours)
a. During the training report the students has to complete the training report which will includes the details of the training organization, there USP, facilities of the various department
b. The outcome and experience they gain from the training

Module 3 - LOG BOOK (30 hours)
During the training the student has to duly sign the log book from the departmental authorities as a proof of their experience and learning skills from the specific department.

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RESEARCH PROJECT /DISSERTATION

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BSC HHA (Honours) with Research

HADI411P: DISSERTATION PHASE – I
(18 Credits -540 Hours) (L-T-P: 0-0-36)

HADI412P: DISSERTATION PHASE – II
(20 Credits -600 Hours) (L-T-P: 0-0-40)
COMMUNITY ENGAGEMENT COURSES
(SERVICE LEARNING)
THEORY

PROGRAMME: BACHELOR OF COMPUTER APPLICATIONS (BCA) HONOURS/HONOURS WITH RESEARCH

CACE109T: SERVICE LEARNING
(Credit: 2 Hours: 30)

PROGRAMME: BACHELOR OF COMMERCE (BCOM) HONOURS/HONOURS WITH RESEARCH

CMCE111T: SERVICE LEARNING
(Credit: 2 Hours: 30)

PROGRAMME: BACHELOR OF BUSINESS ADMINISTRATION (BBA) HONOURS/HONOURS WITH RESEARCH

MTCE110T: SERVICE LEARNING
(Credit: 2 Hours: 30)

Objective: Service Learning will aim to support the development of basic skills among the students namely, critical and creative thinking, reflection, communication, collaboration, information literacy, and social skills. The emphasis will be on active civic participation. As the students will actively involved in a wide range of experiences, which will benefit both the community at large and the students in particular and in the process the goals of the curriculum shall be achieved

COURSE/LEARNING OUTCOMES
After learning this course, the students will be able to:

CO1: Define and explain the Service-Learning framework (Remembering)
CO2: Explain the nature and types of community engagement work (Understanding)
CO3: Identify the need and importance of social responsibility (Applying)
CO4: Analyse the need for social intervention through community partners (Analysing)
CO5: Evaluate the academic outcomes through Service Learning (Evaluating)
CO6: Elaborate upon the social understanding to the issues faced in the community (Creating)

Assessment Process:
The allotment of marks will be as follows:
Internal Assessment: 40 marks
(This will consist of one test to find out the knowledge acquired by students; attendance; discipline)
External Assessment: 60 marks
(This will consist of the field work, logbook diary, report submission of the field work, viva-voce and presentation)
The Assessment will go beyond evaluation of only the final outcome. All the steps must be completed successfully.

I. Regular reporting and feedback - to allow continual adjustment and improvement.
II. Involving all stakeholders in the evaluation process is desirable.
III. Students will be given a log book diary which they will have to fill up on a regular basis. This comprehensive diary will have different sections which will effectively help the students to plan, document their activities and will act as a self-monitoring tool to measure the objectives, activities undertaken and the learning outcomes achieved.
IV. Each faculty of the department will act as a supervisor for five or six students. The students will submit their logbook diary on a weekly basis. The logbook diary will have to be complete in all aspects along with supporting documents like photographs, etc.
V. Once the assigned field activity is complete, all the students will prepare a project report on the basis of the prescribed structure.
VI. Final presentation will be held wherein each student will present their report.

Module I: Concept of Service Learning (3 Hours)
Service Learning – meaning, concept, definition; value based framework of Service Learning; Understanding the core standards of Service Learning such as respect, reciprocity, relevance, and reflection; Elements of Service Learning; Understanding Service Learning – Its philosophy, historical background, purpose, value and theoretical framework; Locating Service Learning within the University context; Principles of Service Learning; Classification of Service Learning Models; Experiential Learning; Reflective Learning; Journaling; Service Learning Pedagogy; Difference between Service Learning and other community experiences

Module II: Community Engagement and Community Partnerships (3 Hours)
Community Engagement – concept, meaning, definition and principles; benefits of community engagement, models of community engagement; Civic Engagement, University Community Engagement, Community partnerships – meaning, benefits, Reflection – meaning, definition and implications; Critical inquiry - meaning, definition and implications; Engaged Research - meaning, definition and implications;

Historical context of University Community Partnership; Understanding Community & Community Partnership; Ethical understanding of partnership; Understanding the agency of the Community – as co-educators; Community barriers

Module III: Social Responsibility and Communication Basics (3 Hours)
Social Responsibility – meaning, benefits, Socio-economic context – meaning, definition, Social issues – meaning, Understanding of society & social issues ; Conflict – meaning, types, Understanding various conflict resolution strategies; Community level partnerships – meaning, significance, types; Social Justice – meaning and implications; Communication – meaning, types, channels of communication, models of communication

Module IV: Identifying the Partners in the Community (3 Hours)
Partners in the community – meaning, types and functions of Community Partners namely, Corporate, Government and PSU Organizations, Panchayats, Community settings, Clinical settings, NGO’s, Anganwadi Centres, Self Help Groups, Schools, Business Firms, Community Markets, Weekly Haats, Customer Relationship Management, etc

Module V: Basics of Professional Skills (3 Hours)
Aspects of Professional Skills Development: Factors affecting individual behaviour - personal, environmental and organizational, individual diversity –biographical and demographic characteristics, self-esteem, self-monitoring Individual decision-making process, rational decision-making, decision-making styles, common biases and judgment errors in decision-making, individual v/s group decision-making. 
Basics of Planning and Organising - Nature and purpose of planning, planning process, types of plans Types of groups, stages of group development, characteristics of effective teams, how group status influences individual behavior, leaders and their role in teams, characteristics of an effective leader.

Module VI: Service Learning Projects (15 hours)
Service Learning Projects – stages, investigation, preparation, action, reflection, demonstration and documentation. 

Note: Emphasis on Group Work, Projects, Case Studies, Assignments, Journaling, Report Preparation, Presentations, Workshops, Group Conferences Individual Conferences etc.

Suggested Readings
5. Julie A. Hatcher and Robert G. Bringle, Understanding Service Learning and Community Engagement
6. Farbar Katy, Change the World with Service Learning

PROGRAMME: BACHELOR OF SCIENCE CHEMISTRY (BSC) HONOURS/HONOURS WITH RESEARCH

CHCE117T: ELEMENTS OF SERVICE LEARNING IN CHEMISTRY
(Credit: 2 Hours: 30)

COURSE OUTCOMES
CO1: Understanding social responsibility of higher educational institutes. (Understanding)
CO2: Identifying problems in the community and where students originated. (Applying)
CO3: Influence to get involved in the local community to gain insight into local issues. (Evaluating)
CO4: Adopt strong leadership skills which allow students to work well in a team. (Creating)

Module I (10 lectures)
Principles of Service learning; classification of service-learning models; difference between service Learning and other community experiences; historical context of University Community Partnership; service learning for an undergraduate chemistry student.
Module II (5 lectures)
Social responsibility of educational institutes; meaning of community university engagement (CUE), engaged teaching, and engaged research.

Module III (15 lectures)
Conceptualisation of the idea of service learning through practical implementations such as (any two) (i) organizing awareness programmes on scientific temper for nearby communities, (ii) participating in demonstrations of scientific experiments for school children to remove the fear of pursuing higher studies in science, (iii) imparting knowledge and guidance to school students for proper understanding of various topics of their chemistry curriculum.

Suggested Readings

Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF SCIENCE MATHEMATICS (BSC) HONOURS/HONOURS WITH RESEARCH

MACE110T: COMMUNITY ENGAGEMENT AND SERVICE LEARNING
(Credit: 2 Hours: 30)

COURSE OUTCOMES
1. Develop understanding on Community University Engagement. (Remembering)
2. Acquire knowledge of the measures taken by HEIs towards community engagement. (Understanding)
3. Analyse a problem pertaining to the community by applying methods of participatory research. (Analysing)
4. Apply various tools of CPBR to address real life issues of the communities. (Applying)
5. Decide a suitable tool to connect with a certain community by identifying the major barriers. (Evaluating)

Module I: (Service Learning and Community University Engagement) (10 lectures)
Definition of Service Learning (SL), goals and objectives of SL. Meaning of community university engagement (CUE), Historical overview of Higher Educational Institutes (HEIs) in India, role played by various commissions in CUE, various policies adopted by University Grants Commission (UGC), objectives and structure of schemes adopted by UGC, measures taken by HEIs towards community engagement.

Module II: (Role of HEI fostering social responsibility) (10 lectures)
Understanding social responsibility of higher education institutes, forms of community engagement, notion of engaged teaching, engaged research, engaged service, meaning of an active citizen. Meaning of Community Based Participatory Research (CBPR), methods and tools associated with CBPR. Skills to utilize CPBR fostering social responsibility especially post emergency like pandemic etc.

Module III: Assignments (10 lectures)
a. Visiting nearby villages to collect data on the percentage of students enrolling into schools per year and represent the same using various Mathematical models.
b. To conduct fact finding visits in local areas to address a particular problem by helping the community understanding the situation employing tools like maps and meetings.

Suggested Readings
Where’s the learning in service learning, J. Eyler, D.E. Giles Jr.

Mapping of COs to Syllabus

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SERVICE LEARNING COURSES

PROGRAMME: BACHELOR OF SCIENCE PHYSICS (BSC) HONOURS/HONOURS WITH RESEARCH

PSCE108T: ELEMENTS OF SERVICE LEARNING IN PHYSICS
(Credit: 2 Hours: 30)

COURSE OUTCOMES
1. Explain the meaning of service learning and active learning. (Understanding)
2. Illustrate engaged teaching and engaged research. (Understanding)
3. Organise service learning. (Applying)

Module I: (6 lectures)
Understanding social responsibility of educational institutes; meaning of community university engagement (CUE), engaged teaching, engaged research.

Module II: (9 lectures)
Active learning. Service learning; principles of service learning; classification of service learning models; difference between service Learning and other community experiences; historical context of University Community Partnership; service Learning for an undergraduate physics student.

Module III: (15 lectures)
Conceptualisation of the idea of service learning through any two of the following practical implementations: (i) participating in awareness programmes on scientific temper for nearby communities, (ii) taking part in demonstrations of scientific experiments for school children to eradicate the fear of pursuing higher studies in science, (iii) providing guidance to school students for understanding the topics of their physics curriculum, (iv) providing video lectures and/or demonstrations for school students.

Suggested Readings

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PROGRAMME: BACHELOR OF ARTS EDUCATION (BA) HONOURS/HONOURS WITH RESEARCH

EDCE106T: SERVICE LEARNING (A COMMUNITY-UNIVERSITY ENGAGEMENT PROGRAMME)
(Credit: 2 Hours: 30)

COURSE OUTCOMES
1. Learn the concept of service learning and community engagement. (Remembering)
2. Understand the importance of service learning and community engagement for developing the skills of addressing real life issues in one’s own community. (Understanding)
3. Develop the ethics of civic participation. (Applying)
4. Develop an understanding of the importance of communication skills in interacting with community members. (Understanding)
5. Be exposed to and empathize with people who are less fortunate than they are, economically, socially, academically, medically etc. (Applying)
6. Organize awareness programmes, rallies, campaigns, social service etc. (Analysing)
7. Develop the skills of problem solving and reflective thinking. (Analysing)
8. Realize one’s potentiality to make a difference in the life of their community members. (Evaluating)
9. Understand and experience the system of inequality that exists in the Educational system. (Evaluating)
10. Applying the pedagogical concepts learned in class in the educational institutions of the community. (Creating)

Module I: Service Learning and Community- University Engagement
Concept of service learning and community-university engagement; History of service learning in the context of Indian Universities; Principles for an effective service learning; Principles of a good service learning pedagogy; Models of Service learning: Project Model, Charity Model, Social Justice Model.
1. Programs of Service learning: Community Engagement, Field Education, Volunteerism, Internship.
2. Benefits of Service learning: For Students, Academic enhancement, Personal/ Professional Growth, Understanding Diversity, Civic learning, Critical reflection, For the University, For the community.
3. Service learning: A means to Inclusive Education: Experiential Learning, Expo populations, Challenge to comfort

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Module II: Practices for Service Learning and Community- University Engagement

By collaborating with the Community Members, Village Panchayats, Parents, Educational Institutions (Heads, Teachers and Students), Anganwadis, Balwadis etc. and following the mentioned Models and Programs of Service Learning students can be engaged with the community welfare in the following ways: (Any....)

1. Creating awareness among community members regarding Early childhood care and nutrition.
2. Creating awareness among community members about parenting.
4. Creating awareness among school children and community members and providing training in developing one's life skills.
5. Providing teachers training in pedagogy.
6. Providing training to school teachers in the use of ICT for enhancing students' learning.
7. Providing training to teachers in the preparation of teaching aids by using available community resources.
8. Creating awareness on Mental Health and strategies for its sustenance.
9. Creating awareness on the importance of Physical health and ways of maintaining one's health.
10. Creating awareness on the importance of education and ways of creating a conducive environment for proper learning.
11. Creating awareness on AIDS.
13. Creating awareness on life skills and ways to develop one's life skills.

EVALUATION:

INTERNAL

Attendance
Non-Formal
Project presentation and Viva

EXTERNAL

Organization of activities and project report

Suggested Readings


Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF ARTS ENGLISH (BA) HONOURS/HONOURS WITH RESEARCH

EGCE108T: SERVICE LEARNING - LANGUAGE COMMUNICATION
(Credit: 2 Hours: 30)
Course Outcomes
1. Describe the nature of Service Learning and the principles of Community University Engagement (Remembering)
2. Understand the importance of engagement with nearby communities and develop a mutual partnership in terms of the sharing of knowledge with the local communities (Understanding)
3. Apply the principles of Community University Engagement in the linguistic study of local communities in terms of spoken English and study of speech expressions (Applying)
4. Analyze the linguistic expressions of the communities and the gap of communication in terms of English language. (Analyzing)
5. Evaluate the expressions of the communities and summarize the socio-cultural constructs behind the expressions under Service-learning study. (Evaluating)
6. Design a project report on their understanding of Service learning and involvement with the communities. (Creating)

Module I: Understanding Service Learning (15 lectures)
Introduction to Service Learning; Understanding Community University Engagement; Historical Overview of Community University Engagement in India; Principles of Community University Engagement; Forms of Community University Engagement; Community Based Participatory Research; Social Responsibility of Higher Education Institutions of India

Module II: Interaction with Communities (15 lectures)
Foundations of English grammar; English phonetic symbols (vowels and consonants); Common idioms and phrases in English; Understanding the Key concepts of languages: the socio-cultural context; Exploring different speech communities; Learning unique linguistic expressions; Exploring idioms and phrases: the socio-cultural construct that binds them; Basics of translation; Field Visit; Assessment: Assignment writing and Submission

Suggested Readings

Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF ARTS MASS COMMUNICATION (BA) HONOURS/HONOURS WITH RESEARCH

MCCE110T: COMMUNITY MEDIA
(Credit: 2 Hours: 30)

COURSE OUTCOMES
1. Define and explain service learning and participatory approach to social development (Remembering)
2. Classify the different types of community media (Understand)
3. Utilise community media for social change and development (Applying)
4. Analyse storytelling formats and content about development issues (Analyzing)
5. Identify opportunities for discussing development issues using community media (Evaluating)
6. Produce content for community media (Creating)

Module 1: Introduction to Service-Learning (5 Lectures)
Concept of Service Learning— definition, principles, models of different Higher Education Institution Service Learning; Service Learning as a medium of social change.

Module 2: Understanding Community and Community Participation (5 Lectures)
Understanding Community, Participatory approach to social development; Principles of community participation;
Participatory Rural Appraisal.

**Module 3: Community Media and Community Engagement (5 Lectures)**
Understanding Community Media, Types, Purpose, Relevance and Significance, Skills, tools and Techniques of community media, Practices of Community Media, Participatory communication, socio-cultural media, Communication for Social and Behaviour Change, ethical issues.

**Module 4: Community Practicum and Learning Activities (15 Lectures)**
Internship, Community Mobilisation, Awareness/Advocacy campaign, folk performances, community meetings, rural reporting, community radio programmings, community video, case studies.

**Suggested Readings**
1. A to Z in Projects Cycle Management: A Results Based Approach, P. J. Lukose, 2015, Media House Publications, New Delhi
5. Media, Communication and Development: Three Approaches, Linje Manyozo, 2012, Sage India

**Mapping of COs to Syllabus**

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**PROGRAMME: BACHELOR OF ARTS PSYCHOLOGY (BA) HONOURS/HONOURS WITH RESEARCH**

**PCCE111T: SERVICE LEARNING**
(Credit: 2 Hours: 30)

**Module 1: introduction to Service Learning (5 hours)**
Nature, Objectives, Historical Overview, Models, Qualities, Role of Higher Education Institutions (HEIs), Benefits, Challenges and Opportunities of Service Learning.

**Module 2: Social Responsibilities of HEIs (5 hours)**
Understanding Social Responsibilities of HEIs, Community-University Engagement, Engaged Teaching, Research and Service, Principles for Community Engagement, Forms of Community Engagement, Community Based Participatory Research.

**Module 3: Understanding Rural Society (5 hours)**
Rural Life Style, Rural Society, Rural Economy and Livelihood, Rural Institutions (Traditional Rural Organisations, Self-Help Groups, Panchayati Raj Institutions), Rural Development Programmes (Sarva Siksha Abhiyan, Beti Bachao Beti Padhao, Swatchh Bharat, Ayushman Bharat, MNREGA etc.).

**Module 4: Community Psychology (5 hours)**
Definition and Historical Overview of Community Psychology, Principles of Community Psychology, Individual and family wellness, Sense of Community, Respect for Human Diversity, Social Justice and Empowerment, Community Mental Health.
PROGRAMME: BACHELOR OF ARTS ECONOMICS (BA) HONOURS/HONOURS WITH RESEARCH

ENCE111T: SERVICE LEARNING
(Credit: 2 Hours: 30)

Objectives:
● Service-learning is a method of teaching through which students apply their academic skills and knowledge to address real-life needs in their own communities.
● Service-learning provides a compelling reason to learn and teaches the skills of civic participation and develops an ethic of service and civic responsibility.
● Service-learning increases motivation and retention of academic skills as specific learning goals are tied to community needs.

COURSE/ LEARNING OUTCOMES
● Students strengthen their ethic of social and civic responsibility.
● Understand problems in a more complex way, including underlying issues.
● Learn how to work more collaboratively with others on real problems.
● Learn about other cultures and respect for cultural differences.
● Observe how decisions are made and how they can impact people’s lives.

Module I – Meaning and scope of service learning (15 hours)
Understanding Service Learning - Its philosophy, historical background, purpose, value & theoretical framework; Locating Service Learning within the University context; Principles of Service Learning; Classification of Service Learning Models; Experiential Learning; Reflective Learning; Journaling; Service Learning Pedagogy; Difference between Service Learning and other community experiences ; Historical context of University Community Partnership; Understanding Community & Community Partnership; Ethical understanding of partnership; Understanding the agency of the Community – as co-educators; Community barriers; Understanding of society & social issues.

Module II – Labor Economics (Community research model) (15 hours)
Students work in small groups to produce a report for a career and job resource center. Serving a broad spectrum of labourers in the greater Sonapur area in which they study the effectiveness of vocational training in improving the labor market opportunities for non-college bound youths. Students should also be able to interact with the organization’s staff to learn more about the livelihood opportunities and challenges that workers face (specially women) in the labour market. The project includes: field survey, data entry and analysis of field information using appropriate statistical tools.

Suggested Readings

PROGRAMME: BACHELOR OF ARTS PUBLIC ADMINISTRATION (BA) HONOURS/HONOURS WITH RESEARCH

PACE111T: SERVICE LEARNING
(Credit: 2 Hours: 30)

COURSE OUTCOMES
At the end of this course students are able to:
1. Learn the concept of service learning and community engagement. (Remembering)
2. Understand the importance of service learning and community engagement for developing the skills of addressing real life issues in one’s own community. (Understanding)
3. Develop an understanding of the importance of communication skills in interacting with community members. (Understanding)
4. Be exposed to and empathize with people who are less fortunate than they are, politically, economically, socially, academically etc. (Applying)
5. Organize awareness programmes, rallies, campaigns, social service etc. (Analysing)
6. Develop the skills of problem solving and reflective thinking. (Analysing)
7. Realize one’s potentiality to make a difference in the life of their community members. (Evaluating)
8. Understand and experience various political and administrative issues that exist in the Society. (Evaluating)

**Module I: Introduction to Service learning (10 hours)**

Nature, Objectives, Historical Overview, Models, Qualities, Role of Higher Education Institutions (HEIs), Benefits, Challenges and Opportunities of Service Learning

**Module II: Social Responsibilities of HEIs (10 hours)**

Understanding Social Responsibilities of HEIs, Community-University Engagement, Engaged Teaching, Research and Service, Principles for Community Engagement, Forms of Community Engagement, Community Based Participatory Research.

**Module III: Understanding Rural Society (20 hours)**

Rural Life Style, Rural Society, Rural Economy and Livelihood, Rural Institutions (Traditional Rural Organisations, Self-Help Groups, Panchayati Raj Institutions), Rural Development Programmes (Sarva Siksha Abhiyan, Beti Bachao Beti Padhao, Swatchh Bharat, Ayushman Bharat, MNREGA etc.).

**Module IV: Practices for Service learning and Community (10 hours)**

Internship, Community Mobilization, Awareness/Advocacy campaign, community meetings, rural reporting, case studies.

**Suggested Readings**


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**PROGRAMME: BACHELOR OF SCIENCE BOTANY (BSC) HONOURS/HONOURS WITH RESEARCH**

**BOCE112T: SERVICE LEARNING ON ETHNOBOTANICAL PRACTICES**

(Credit: 2 Hours: 30)

**Course Outcomes**

At the end of this course students will be able to:

**CO1**: Ability to think critically and analyze what they have learned in the classroom and how to apply their theoretical knowledge in the real world for the betterment of the society (Applying)

**CO2**: Development of social accountability and greater participation in community services (Applying)

**CO3**: Development of communication skill, personality skill, decision making ability and other career related skill (Evaluating)

**CO4**: Awareness about the cultural diversity and their relationship with traditional plants (Understanding)

**CO5**: Better understand the basic concepts of ethno-botany and their conservation practices (Understanding)

**CO6**: Recognize the ethno-botanically important plants species (Remembering)

**Module I: Introduction to Service learning (10 Hours)**
SERVICE LEARNING COURSES

Definitions; Aims and Objectives of Service Learning; Types of Service Learning; Principles of Service Learning; Important tools of Service Learning; Scopes of Service Learning; Benefits of Service Learning; Community based Service Learning and Volunteering Service Learning.

Module II: Introduction to Ethno-botany (10 Hours)
Concepts of Ethno-botany: Definitions, Interdisciplinary; Aims and Objectives of Ethno-botany; Scope of Ethno-botany: Documentation, Preservation, Conservation; Application of Ethno-botany; Concept on Rare Endangered and Threatened (RET) Taxa; Basic concept on the Conservation and Management of native plants; Basic concept on Intellectual Property Right (IPR).

Module III: Orientation Programme (10 Hours)
Lectures from experts; Discussion on various issues related to health and wellness, environment, waste management, education; Videos on community services

Service Learning on Ethno-botanical practices (200 Hours)
Implement of an interaction programme with the local ethnic group to understand their relationships with the native plants; Awareness programme on the conservation and management of rare and medicinal plants; Awareness campaign on the reconstruction of forest in the local community; Fundraise for cultivation of medicinal plants in the community; Combat of invasive plants to restored ecosystems in preserve areas for public use.

Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF SCIENCE ZOOLOGY (BSC) HONOURS/HONOURS WITH RESEARCH

ZGCE110T: FOUNDATIONS OF SERVICE LEARNING
(Credit: 2 Hours: 30)

COURSE OUTCOMES
1. Develop an understanding about the importance of service to community. (Understanding)
2. Identify the needs of a community. (Applying)
3. Apply skills acquired in Zoology to render service to community. (Creating)
4. Examine what can be learned from the community. (Analyzing)

Module I (5 hours)
Service learning: Definitions; Principles of Service Learning; Awareness of Community; Involvement with Community; Commitment to service

Module II (10 hours)
Waste Management: Principles of waste management; types of waste and their management; eco-friendly waste management; Health and Hygiene: Role and control of vectors of various diseases; Personal hygiene

Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF HOSPITALITY AND HOTEL ADMINISTRATION (BSC) HONOURS/HONOURS WITH RESEARCH

HACE110T: INTRODUCTION TO COMMUNITY ENGAGEMENT
(Credit: 2 Hours: 30)

COURSE OUTCOMES
5. Develop an understanding about the importance of service to community. (Understanding)
6. Identify the needs of a community. (Applying)
7. Apply skills acquired in hospitality to render service to community. (Creating)
8. Examine what can be learned from the community. (Analyzing)

Module I (10 hours)
Service learning: Definitions; Principles of Service Learning; Awareness of Community; Involvement with Community; Commitment to service

Module II (20 hours)
Sustainable modules of hospitality: Reduce, Reuse, and Recycle of waste materials generated by hospitality sectors; handling food waste; corporate social responsibilities activities – health & hygiene awareness programs, sustainable waste management programs.

Mapping of COs to Syllabus

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PROGRAMME: BACHELOR OF PHILOSOPHY (BA) HONOURS (MINORS IN ENGLISH AND PSYCHOLOGY)

CBSL100T: SERVICE LEARNING: THEORY
Duration: 30 Hours

Objectives
Service Learning aims to support the development of basic skills among the students namely, critical and creative thinking, reflection, communication, collaboration, information literacy, and social skills. The emphasis will be on active civic participation. As the students will be actively involved in a wide range of experiences, which will benefit both the community at large and the students in particular and in the process the goals of the curriculum shall be achieved.

Course Outcomes
CO 1: Defines and explain the Service-Learning framework (remembering)
CO 2: Explains the nature and types of community engagement work (understanding)
CO 3: Identifies the need and importance of social responsibility (applying)

Module I: Concept of Service Learning (8 hours)
Service Learning – meaning, concept, definition; value-based framework of Service Learning; Understanding the core standards of Service Learning such as respect, reciprocity, relevance, and reflection; Elements of Service Learning; Understanding Service Learning – Its philosophy, historical background, purpose, value and theoretical framework; Locating Service-Learning within the University context; Principles of Service Learning.

Module 2: Community Engagement and Community Partnerships (8 hours)
Community Engagement – concept, meaning, definition and principles; benefits of community engagement, models of community engagement; Civic Engagement, University Community Engagement, Community partnerships – meaning, benefits, Reflection – meaning, definition and implications; Critical inquiry - meaning, definition and implications; Engaged Research - meaning, definition and implications.

Module 3: Social Responsibility and Communication Basics (8 hours)
Social Responsibility – meaning, benefits, Socio-economic context – meaning, definition, Social issues – meaning, Understanding of society & social issues; Conflict – meaning, types, Understanding various conflict resolution strategies; Community level partnerships – meaning, significance, types; Social Justice – meaning and implications; Communication – meaning, types, channels of communication, models of communication.

Module 4: Identifying the Partners in the Community (6 hours)
SERVICE LEARNING COURSES

Partners in the community – meaning, types and functions of Community Partners namely, Corporate, Government and PSU Organizations, Panchayats, Community settings, Clinical settings, NGOs, Anganwadi Centres, Self Help Groups, Schools, Business Firms, Community Markets, Weekly Haats

Suggested Readings
6. Farbar Katy, Change the World with Service Learning.

Mapping of COs with Syllabus

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CSBL101P: SERVICE LEARNING: PRACTICE
Credits: 2 – 60 Hours

Objectives
Service Learning will aim to support the development of basic skills among the students namely, critical and creative thinking, reflection, communication, collaboration, information literacy, and social skills. The emphasis will be on active civic participation. As the students will be actively involved in a wide range of experiences, which will benefit both the community at large and the students in particular and in the process the goals of the curriculum shall be achieved.

Course Outcomes
CO 1: Defines the different types of research projects (remembering)
CO 2: Explains the various steps of designing a research project (understanding)
CO 3: Constructs the questionnaire and schedules (applying)
CO 4: Analyses the data for analysis (analysing)
CO 5: Classifies the findings in the report (evaluating)

Instructions and Guidelines for Students
The students should keep in mind the following instruction and guidelines:
1. The fieldwork should be for a minimum duration of 30 hours which can be extended depending upon the convenience and requirement of the student and the organisation respectively. The rest of the hours are allotted for completing the Report. However, the entire duration of the course should not exceed 60 hours.
2. The students have to undergo the fieldwork during the semester break after 2nd semester.
3. After the completion of the fieldwork, the students must submit the Report.
4. The assessment will be done as follows:
5. There would be a Presentation (PPT) and Viva-Voce Examination towards the end of the 3rd Semester based on which the students would be evaluated.

Structure of Report
The Service Learning Field Work Report must be in a spiral bind and should comprise the following:
a. Recommendation Letter from the Department.
b. Certificate of Authentication from a competent authority like Village Headman, GP member or any renowned person from the community where the student has worked.
c. The Contents of the Report must include:
   i. Introduction.
   ii. Need of the study
   iii. Objectives of the study
   iv. Significance of the study
   v. The methodology which was undertaken for the study
   vi. Description of the work done
   vii. Learning Outcomes.
   viii. Feedback from the target audience/community members
   ix. Geo-tagged photographs

The Assessment for the Service Learning Project will have the following Components
a. Report: 40 marks
b. Seminar Presentation: 30 marks
c. Viva-Voce Examination: 30 marks

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VALUE ADDED COURSES

DEPARTMENT OF COMPUTER APPLICATIONS

CARP6051: ROBOTIC PROCESS AUTOMATION (30 HOURS)

COURSE/ LEARNING OUTCOMES
CO1: Explain the RPA Developer enablement journey and an introduce to the role. (Understanding)
CO2: Explain the three constructs that are fundamental in any software process: variables, arguments and control flow. (Understanding)
CO3: Address what selectors are, the UI Explorer, the Property Explorer, Selector types, where to use them and how to fine-tune Selectors when encountering difficult situations. (Remembering)
CO4: Creating UI input and output actions. (Creating)
CO5: Learn about the many email tasks that can be automated to help you save valuable time. Cover an essential aspect of development, identifying and solving bugs in your projects and learn about how to get automation production-ready: how to anticipate, detect and resolve errors in your workflows. (Applying)

Module I: (8 Hours)
RPA Overview: Overview of Robotic Process Automation (RPA), Benefits of RPA in industries and business processes, Introduction to the RPA Developer Role, Variables, Data Types and Control Flow, Version Control, Data Manipulation, Excel and Data Tables, Selectors.

Module II: (22 Hours)
Bot Building: UI Automation, Introduction to Logging in Studio, IMDB Movie Rating, Contact Details, RPA Challenge. Amazon Data Scraping, Recording Demo.
Calculate Client Hash, PDF Automation, Error and Exception Handling, Debugging.
Email Automation, Connecting Robot to Orchestrator, Publishing workflow to Orchestrator, Orchestrator Demos.

Suggested Readings
2. Learning Robotic Process Automation: Create Software Robots and Automate Business Processes with the Leading RPA Tool – UiPath by Alok Mani Tripathi, Publisher: Packt Publishing; 1st edition

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CABC6052: BLOCKCHAIN (30 HOURS)

COURSE/ LEARNING OUTCOMES
CO1: To understand what Blockchain is and why it is used. (Remembering)
CO2: To be able to explain the different components involved within Blockchain. (Understanding)
CO3: To know when and why you may want to use Blockchain within your environment. (Remembering)

Module I: (7 Hours)
Introduction to Blockchain Technology and its Importance; Evolution of the Blockchain Technology,

Module II: (7 Hours)
Elements of a Blockchain, Basic Crypto Primitives – Cryptographic Hash, Digital Signature

Module III: (16 Hours)
Blockchain Consensus I – Permissionless Models, Blockchain Consensus II – Permissioned Models, Smart Contract Hands On I – Ethereum Smart Contracts (Permissionless Model), Blockchain Applications
Suggested Readings

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CAAW6053: ADVANCED WEB APPLICATION DEVELOPMENT TECHNIQUES (30 HOURS)

COURSE/ LEARNING OUTCOMES
CO1: Explain the JavaScript and an introduce to the role in client server architecture. (Understanding)
CO2: Explain the importance of data validation and understand the process of data sanitization. (Understanding)
CO3: Address the threat handling mechanism while development. (Remembering)
CO4: Creating User interface, service design pattern, and remote connection. (Creating)
CO5: Learn about the recent trend in web development architecture based on micro service design pattern. Cover an overview of recent trend in management of load balancing and service scalability. (Applying)

Module I: (18 Hours)
JavaScript Overview: Form events, Client Side Validation (Length check, Numeric field check, Alphanumeric field check, Empty Field, special character, password format, All field entry check), Server Side validation (Data sanitization), SQL Injection, Overview of session management, Cross site scripting, URL validation, Importance of Asynchronous JavaScript and XML (Ajax), loading page content using AJAX, Database connection, Back end data update using AJAX.

Module II: (12 Hours)

Suggested Readings
2. Ajax programming for the absolute beginner, Jerry Lee Ford, Jr. Publisher: Course Technology, 1st Edition
3. Kubernetes Microservices with Docker by Deepak Vohra, Publisher: Apress, 1st Edition

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DEPARTMENT OF COMMERCE

CMII6011: IDEATION TO INNOVATION
(0-0-2) (2 credits – 30 hours)

Objective: The objective of the course is to turn an idea into a start-up by giving students a hands-on, real-life experience creating a start-up with like-minded partners from around the world. The course challenges the students to innovate, overcome obstacles, and grow rapidly with the goal of creating a business worth valuing.

Learning Outcomes
After completing the course, the learners will be able to:
CO1: Articulate the skills and know-how to develop their business idea from the conceptual stage to the marketplace. (Applying)
VALUE ADDED COURSES

CO2: Evaluate and select models for new ventures (Evaluating)
CO3: Apply both quantitative and qualitative customer and market research (Applying)
CO4: Understand the framework of product development (Understanding)
CO5: Design, evaluate, and implement marketing strategies (Creating)
CO6: Design a scalable business model via real-life experiments and tests in a live marketplace with genuine customer feedback (Creating)

Module 1: Team Formation and Ideation (2 Hours)
Ideation activities (problems submission, discussion, down-selection) Team Formation & Ideation, Introduction to Lean Canvas Model

Module 2: Problem – Solution Fit (3 Hours)
How to Find & Assess Ideas - Introduction to Design Thinking Idea validation & online tools, Idea Development

Module 3: Product - Market Fit analysis and development (4 Hours)
Market: Segmentation, Positioning, Market Info Sourcing, Customer Validation Prototyping & Solution Validation

Module 4: Business Model & Marketing Strategy (5 Hours)
Designing & Validating the Business & Revenue Model Marketing Strategy Development & Marketing Tools Business Model Fine Tuning Marketing Campaign Design: Goals, KPIs, Tracking Customer Engagement Campaign & Minimum Viable Product Launch

Module 5: Financial KPIs & Product Sprint (5 Hours)
Financial KPIs: Calculating, Interpreting & Presenting
Start-up Financial Planning & Budgeting Calculating Financial Metrics & Starting Pitch Preparation

Module 6: Start-Up Funding & Pitch Preparation & Product Sprint (4 Hours)
Funding Alternatives for Start-ups, Designing Your Funding Strategy & Start-up Valuation, Investor Presentation Tips & Tricks, Funding Strategy Design & Pitch Deck Preparation, Compulsory exercises: (7 hours), Preparation of the business model, Prototype development, and The Venture Capitalist pitch

Suggested Readings

Mapping of COs with Syllabus

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CMSS6012: STATISTICAL SOFTWARE PACKAGES FOR DATA ANALYSIS (0-0-2)
(2 credits – 30 hours)

Objective: This course is designed to familiarize students with some omnibus software packages commonly utilized for statistical analysis in science and industry. Statistical programs include both proprietary and open-source packages.

Learning Outcomes

Module 1: Data preparation (8 Hours)
Getting familiar with the interface – SPSS, PSPP, MS Excel; Enter, save data - SPSS, PSPP, MS Excel; Import data from Excel to SPSS/PSPP; Carry out different data preparation processes
Module 2: Exploratory Data Analysis (3 Hours)
EDA for one or more variables; Create charts for one variable; Transform data; Transforming scale into categorical variable

Module 3: Inferential Statistics for the mean and the median (6 Hours)
Descriptive statistics for two or more variables; Creating and editing charts for two or more variables Inferential statistics for the mean and the median; One-sample t-test and sign test, T-test ; Paired-difference t-test ; Power Analysis for t-test

Module 4: ANOVA and simple linear regression (4 Hours)
One-way and two-way ANOVA ; Bivariate linear regression; Power Analysis for ANOVA

Module 5: Multiple linear regression (4 Hours)
Multiple linear regression and correlation; Model building and selection; Interpreting regression coefficients and confidence intervals; Power Analysis for linear regression

Module 6: Inferential statistics for the proportion (5 Hours)
Inferential statistics for categorical variables
One-sample Chi-square; Chi-Squared Test of Independence; Power Analysis for the proportion

Suggested Readings

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CMAS6013: ACCOUNTING SOFTWARE PACKAGE

Lectures: 10 Hours, Practical Lab: 20 Hours

CO1: Define the basic accounting concept, computerized accounting system and Data Based Management system (Understanding).

CO2: Understand the Preparation of ledgers, Trial balance and other financial statements with SQL (Understanding).

CO3: Application of accounting software (Tally ERP 9) in Voucher entries, preparation of accounts and other financial statements (Application)

CO4: Application of Tally ERP 9 software in payroll and voucher entries with GST

Module 1: Basics of Accounting Concept. (5 hours)
Basic accounting concept; journal entries; preparation of books of accounts and ledgers; preparation of trial balance and final accounts of corporate entities; Accounting system; benefits of computerized accounting system and challenges associated with computerized accounting system.

Module 2: Application of SQL (5 hours practical Lab)
Preparation of ledgers; Trial Balance and Report with the help of SQL

Module 3: Tally ERP 9 Fundamentals (2 hours, 7 hours Practical Lab)
Introduction to Tally ERP 9; Features of Tally ERP 9; creating, selecting, altering, deleting and shutting up of company; creating, altering and deleting of group and ledgers, voucher entries; integrating accounts and inventory; Displaying the financial report .

Module 4: Application of Tally ERP 9 in advanced level (3 hours, 8 hours Practical lab)
Activating payroll in Tally; understanding of payroll; pay heads and categories; Attendance entries; salary payment example; pay-sheet and pay-slips. Activating Tally in GST; setting up GST (company level, ledger or inventory level); creating GST masters and generating reports.
Suggested Readings
1. SQL For Beginners: SQL Made Easy; A Step-By-Step Guide to SQL Programming for the Beginner, Intermediate and Advanced User (Including Projects and Exercises) Craig berg
2. Tally.ERP 9 with GST in Simple Steps Paperback; Dreamtech press
3. Learning Tally ERP 9 with GST; Sajee Kurian, Blessing Inc
4. Database Management Systems (DBMS) Rajiv Chopra, S.Chand Publishing
5. Learning SQL ; Alan Beaulieu, O’Reilly Media
6. Ashok K Nadhani, GST Accounting with Tally.ERP9, BPB Publications, New Delhi

Mapping of COs to Syllabus

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DEPARTMENT OF MANAGEMENT

MT16011: IDEATION TO INNOVATION
(0-0-2) (2 credits – 30 hours)

Objective: The objective of the course is to turn an idea into a start-up by giving students a hands-on, real-life experience creating a start-up with like-minded partners from around the world. The course challenges the students to innovate, overcome obstacles, and grow rapidly with the goal of creating a business worth valuing.

Learning Outcomes
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CO1: Articulate the skills and know-how to develop their business idea from the conceptual stage to the marketplace (Applying)
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CO5: Design, evaluate, and implement marketing strategies (Creating)
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Suggested Readings

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DEPARTMENT OF CHEMISTRY

CHPC6137: PETROLEUM CHEMISTRY
(1-0-1)

Course Outcomes
1. To gain knowledge about the composition of crude petroleum and the refining process. (Remembering)
2. To correlate the quality of fuels with various parameters. (Understanding)
3. Determination of different types of water testing parameters required in thermal power plant. (Applying)
4. Analysing of chemical impurities and their separation techniques. (Analysing)

Module I: Oil Section (15 Lectures)
Renewable and non-renewable source of energy, Petroleum, Composition of crude petroleum, Hydrocarbon, Distillation (Upper distillation, middle distillation, Residue distillation), crude distillation unit, Fractional distillation, petroleum refining-applications of various fractions, Cracking, Reforming, Petrol, Diesel, viation turbine fuel, Kerocene, LPG, CNG, LNG, clean fuels, Octane number, Cetane number, Flash point, calorific value, knocking and antiknocking, isomerization, smoke point, Lubricants, viscosity index, cloud point, pore point, Density, Gas chromatography, HPLC.

Module II: Water section (15 Lectures)
Thermal power plant station, concept of zero discharge refinery, Oil content, Effluent treatment plant, boiler, demineralization, uses of cationic and anionic resin during neutralization reaction, requirement of pH determination, BOD, COD, TDS, TSS, DO, Microbiological treatment, Scavenger, alkalinity, corrosion monitoring, permanent alkalinity, Total hardness, temporary hardness, silica and phosphate removal process, removal of sulphate, sulphite, ammonia, cyanide, water testing.

Suggested Readings
2. Industrial Chemistry, B. K. Sharma, Goel Publishing House, Meerut

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CHPA6138: PHARMACEUTICAL CHEMISTRY AND ITS APPLICATIONS
(1-0-1)

Course Outcomes
1. Explanation of the preliminary concept of drug and their classification. (Remembering)
2. To understand the mode of action of different kinds of drugs. (Understanding)
3. Synthesis of simple drug molecules and their purification techniques. (Applying)
4. Extraction of the medicinally active component from a plant source and their characterization techniques. (Analysing)
5. To provide knowledge of computational chemistry in designing drug molecules. (Evaluating)

Module I: Introduction and importance of drug Chemistry (15 Lectures)
Definition of drug, pro-drug, host-receptors interactions in connection to biological response, pharmacokinetics and
mechanism of drug action-absorption, distribution, metabolism, and excretion (ADME), Structure activity relationship (SAR and QSAR), drug classification based on mode of action, analgesics and anti-inflammatory drug, COX-2 inhibitors, mode of action of NSAID and SAID, anti-histamine drugs, antidepressants drugs, narcotics, sedative-hypnotics and their mechanism of action, antibiotics, antiviral drugs, anti-bacterial drugs, anti-neoplastic drug, drugs derived from natural origin including plants and bacteria, chemotherapy, nano-drug delivery systems, toxicology, positive and negative aspect of drug chemistry, future scope of drug chemistry.

Module II: Hands on experience on drug chemistry (15 Lectures)
Experimental aspect of drug chemistry: Synthesis of simple drug molecules, various techniques used for purification including crystallization / recrystallization, acid-base purification, column chromatography, quality control / purity determination of drugs using GC-MS, HPLC etc., extraction of active ingredient from various plants in North-eastern region having medicinal importance, procedure for bioactivity test.

Theoretical feature of drug chemistry: Application of computational chemistry in designing of drug molecule, computer simulation to assist in solving chemical problems, drug-DNA interaction study, drug-delivery study.

Suggested Readings
2. Introduction to Medicinal Chemistry, A. Gringauz, Wiley India Pvt Ltd.

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DEPARTMENT OF MATHEMATICS

MAFG0154: FRACTAL GEOMETRY AND APPLICATIONS
(2-0-0)

Course Outcomes
1. Explain the basic concepts of fractals and their mathematical constructions. (understanding)
2. Develop fractal dimensions and study their applications. (Applying)
3. Categorize Mandelbrot set and Julia sets, and classify their graphical representation and geometric properties. (Analysing)
4. Interpret random fractals, and study their applications to Health science and Stock markets. (Evaluating and Applying)
5. Demonstrate various chaos, renormalization, universality of chaos, and their significance. (Understanding and Creating)
6. Elaborate various applications in different fields of science and technology. (Creating)

Module I: Regular Fractals and Self-similarity (5 lectures)

Module II: Natural Fractals and Dimensions (5 lectures)
Ineffective way to measure, Fractal Dimensions and calculation, Hausdorff measure and dimension, Box counting dimension, Similarity dimension, The Moran formula, other dimensions, Area-Perim, Dim Algebra, Natural Fractals, Manufactured Fractals.

Module III: The Mandelbrot Set and Julia Sets (5 lectures)

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Module IV: Random Fractals and the Stock Market (5 lectures)

Module V: Chaos and Fractals (5 lectures)
Doubling, Introduction to Chaos, Test functions, Graphical iterations, Time series, Histograms, Bifurcation diagrams, Return map, Driven IFS, Kelly plot, Fixed points, Cycles, Period doubling bifurcations, Dust in the Tent map, Tent and Logistic bifurcation diagrams, Tangent bifurcations, Intermittency, Discontinuous bifurcations, Scaling, Universality, Renormalization, Control of chaos, Synchronization of chaotic processes.

Module VI: Fractal Applications (5 lectures)
Fractal growth, Singularities of Electrostatic and gravitational potentials, Fractal Antennas, Fractal in Finance, Self-Affine set and dimension, Application to encoding images, Panorama of Fractals and their uses, Animations, application of fractal geometry to Computer science, Telecommunications, and Medicine.

Suggested Readings
3. Fractal Geometry and Applications, Michel L Lapidus, A Jubilee of Benoit Mandelbrot,

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MAML0152: ESSENTIAL MATHEMATICS FOR MACHINE LEARNING
(2-0-0)

COURSE OUTCOMES
1. Comprehend the basic and core concepts of vector space, matrices, matrix decompositions. (Understanding)
2. Apply the concepts statistics and linear algebra in Dimension reductions. (Applying)
3. Gain extensive knowledge of probability and statistics for analysis of data. (Analysing)
4. Apply the fundamentals of calculus to evaluate partial derivatives, gradient and other concepts of vector calculus. (Applying)

Module I: (8 lectures)
Vector Spaces: Definitions and examples, Vector Subspaces: Examples and Properties, Basis and Dimensions, Linear Transformations, MATRIX THEORY- Norms and spaces, eigenvalues and eigenvectors, Special Matrices and their properties, least squared and minimum normed solutions.

Module II: (8 lectures)
Matrix Decomposition Algorithms- SVD: Properties and applications, low rank approximations, Gram Schmidt process, polar decomposition, DIMENSIONS REDUCTION ALGORITHMS and JCF- Principal component analysis, linear discriminant analysis, minimal polynomial and Jordan canonical form

Module III: (8 lectures)
Probability – Basic concepts of probability: conditional probability, Bayes’ theorem, independence, theorem of total probability, expectation and variance, few discrete and continuous distributions, joint distributions and covariance.

Module IV: (6 lectures)
Calculus – Basic concepts of calculus: partial derivatives, gradient, directional derivatives, Jacobean, hessian, convex sets, convex functions and its properties.
Suggested Readings

Mapping COs to Syllabus

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MACS6005: COMPUTATIONAL MATHEMATICS WITH SAGE MATH
(2 Credits - 30 Lectures)

COURSE OUTCOMES
1. Learn and understand the basic Python programming language. (Understanding)
2. Understand how to use Sagemath software and its applications. (Understanding)

Module I (10 lectures)
Installation of Python; Getting Started with Python Python as an advanced calculator; For loop in Python; While loop in Python; Use of SciPy and SymPy in Python; Classes in Python - Part 01; Classes in Python - Part 02;

Module II (12 lectures)
Solving Equations in SageMath; 2d Plotting with SageMath; 3d Plotting with Sage Math; Calculus of one variable with SageMath, Integration with SageMath. Improper Integral using SageMath; Application of integration using SageMath; Partial derivative with sage math, limit and continuity of real valued functions; working with vectors in sagemath; Solving systems of linear equation in sage math, vector space in sagemath, Matrix Spaces with SageMath; Linear Transformations with SageMath, eigenvalues and eigenvectors with sage math;

Module III (8 lectures)
Finding Roots of algebraic and transcendental equations in SageMath; Numerical solutions of linear equations and numerical integration with sagemath; Solving 1st and 2nd order ODE with SageMath; Euler’s Method to solve 1st order ODE with SageMath.

Suggested Readings
1. Computational Mathematics with SageMath, Paul Zimmermann, Siam
2. Mathematical Computational with Sagemath, Paul Zimmermann Alexandre Casamayou Nathann Cohen Guillaume Connan Thierry Dumont

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MACM6004: COMPUTATIONAL SKILL DEVELOPMENT: MATHEMATICA
(2 Credits - 30 Lectures)

COURSE OUTCOMES
1. Learn how to use Mathematica, a powerful coding language in science and engineering computing (Remembering).
2. Apply the application-oriented principle to various real-life problems (Applying)
3. Evaluate simple math computations, modeling and simulation problems, data analysis and processing, as well as visualization techniques. (Evaluating)
Module I (10 Lectures)

Module II (10 Lectures)
Lists, strings, rules, patterns and pattern matching, different programming paradigms (procedural, functional and rule-based), Graphics and image manipulation (the 30+ members of the plot family, pixels and voxels, the built-in image editor).

Module III (10 Lectures)
Linear and polynomial algebra. Exact and numerical optimization. Calculus and differential equations (analytic and numerical solutions of ODEs and PDEs). Plane and solid geometry. Probability and statistics (descriptive statistics, built-in support for 100+ distributions)

Suggested Readings

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DEPARTMENT OF PHYSICS

PSCP6120: COMPUTATIONAL PHYSICS USING PYTHON (2-0-0)

Course Outcomes
1. Outline the fundamental elements of Python computing. (Understanding)
2. Estimate the accuracy and speed of a Python code. (Applying)
3. Develop Python code for solving definite integrals and finding derivatives. (Applying)
4. Solve systems of equations using Python arrays. (Applying)
5. Develop optimized numerical solutions of ordinary differential equations. (Applying)
6. Make use of Monte Carlo methods in random processes for solving physical problems. (Applying)
7. Propose computational solutions to physical problems using Python. (Creating)

Module I: Elements of Python programming (9 lectures)
Data types, basic mathematical operations, variables; lists: indexing, slicing, altering, appending and deleting elements, concatenation; tuples and dictionaries; conditional statements; loops: while and for loops, nested-for loops; Python libraries: installing packages, importing packages; NumPy arrays and matrices, example: eigenvalues and eigenvectors; basics of data handling using Pandas; introduction to SciPy; data visualization using Matplotlib and Seaborn.

Module II: Accuracy and speed (2 lectures)
Variables and data ranges; numerical error; program speed.

Module III: Numerical integrals and derivatives (4 lectures)
Fundamental integral evaluation methods: trapezoidal rule, Simpson’s rule; error estimation of integrals; Romberg integration; Gaussian quadrature; numerical differentiation: forward and backward differences, central differences, second derivatives, partial derivatives, differentiation error estimation.

Module IV: Solving linear and non-linear equations (6 lectures)
Linear equations: Gaussian elimination, back-substitution, pivoting, LU decomposition, matrix inverse, tridiagonal and banded matrices; nonlinear equations: binary search, Newton’s method, secant method.

Module V: Numerical solutions of ordinary differential equations (4 lectures)
First-order differential equations with one variable: Euler’s method, Heun’s method, 4th order Runge-Kutta method; differential equations with multiple variables; second-order differential equations; boundary value problems: shooting method, relaxation method; eigenvalue problems.
Module VI: Random processes (5 lectures)
Random numbers generators and seeds; non-uniform random numbers, Gaussian random numbers; Monte Carlo integration: mean value method, integrals in many dimensions, importance sampling; importance sampling; Markov chain methods.

Suggested Readings

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DEPARTMENT OF EDUCATION

EDES6011: EDUCATION FOR SUSTAINABLE DEVELOPMENT (1-0-1)

COURSE OUTCOMES
1. To create awareness about the concept of Sustainable Development. (Remembering)
2. To create skill among the students to find out the sustainability of any economic activity. (Understanding)
3. To create awareness among students about the concept of Education for Sustainable Development. (Applying)
4. To create an understanding among the students about the role of Education in Sustainable Development. (Analysing)

Module I: Introduction to Sustainable Development (5 Lectures)
Concept of Development; Concept of Sustainability; Sustainable Development: Its 5 Ps (People, planet, prosperity, peace, and partnership); Sustainable Development Goals. 17

Module II: Curricular Framework for Education for Sustainable Development (10 Lectures)
Definition and meaning of Education for Sustainable Development; Principles; Key themes: Climate change, Biodiversity, Sustainable production and consumption, Reduction of poverty; Key Sustainable Competencies to be developed through ESD: Systems thinking Competencies, Anticipatory Competency, normative competency, Strategic competency, Collaboration Competency, Critical thinking competency, Self-awareness Competency and integrated problem Solving Competency; Pedagogical approaches in ESD: Whole- institution approach, Learner centered approach, Action oriented learning, Transformative approach; Teaching techniques for ESD: Simulations, Class discussions, Issue Analysis Techniques, Storytelling.

Module III: Practical Implications of ESD (15 Lectures) (Any two)
Sharing their own stories of struggle/ success with the class
Visiting neighboring areas to collect community related stories/ activities towards the realization of Sustainable Development Goals.
Surveying industries and submitting reports on its sustainability norms. Surveying schools and submitting reports on its sustainability norms.

EVALUATION

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Suggested Readings
After completing the course, students will be able:

1. To acquire the knowledge about health and physical education
2. To acquire the knowledge about health and safety education
3. To understand the nature of injuries and providing first aid  
4. To develop the skills for organising games and sports in educational institution.  
5. To acquire the knowledge about yoga  

**Module-I: concept of Health Education**  
a. Meaning, Definition, objectives of health education  
c. Food and Nutrition: Meaning, classification, constituents of food, vitamins and their deficiency, Balanced Diets, Diets for obesity and under Weight  

**Module-II Introduction to Physical & Yoga Education & Wellness Studies**  
a. Meaning, Definition, Objectives and scope of Physical education  
b. Physical fitness: Meaning, definition, components, and benefits  
c. Games and sports  
d. First Aid: Road Accident, water accident, fire accident  
e. Yoga Education: Meaning, Definition and uses of yoga for focussed mind.  
f. Selected Asanas and Pranayama: Physical exercises  
g. Dimensions of Wellness & Mindfullness.  

**Practicum:**  
a. Preparation of first aid kit  
b. Health awareness programme  
c. Demonstration of Asanas and Pranayama  
d. Organizing games  
e. Writing about the eminent performers in games and sports  

**Suggested Readings**  

**DEPARTMENT OF ENGLISH**  

**EGES0138: EFFECTIVE COMMUNICATION SKILLS (1-0-1) (CREDITS: 02)**  

**Course Outcomes**  
1. Describe the types of communication. (Remembering)  
2. Differentiate from a variety of social functions including greetings, introductions and farewells, making and responding to requests, suggestions, invitations and apologies, conducting simple transactions in shops and offices, asking for and giving directions, etc. (Understanding)  
3. Illustrate the daily routines in a series of simple phrases and sentences. (Applying)  
4. Categorize the form and function of the basic official correspondences. (Analysing)  
5. Evaluate formal and informal writings, preparing reports, letters, memorandum, notices, agenda, minutes etc. (Evaluating)  
6. Formulate the rationale of descriptive, narrative, expository and argumentative writing. (Creating)  

**Module I: Communication and Grammar skills (8 lectures)**  
Language and communication: Differences between speech and writing, Distinct features of speech, Distinct features of writing, Parts of Speech, Person, Gender, Number, Use of Tense, Aspect and Modals, Degrees of comparison, Sentence types, Negation and Relative Clauses, Narration, Voice change, Proverbs, Vocabulary, Proper use of words, Idioms, Accentuation, Intonation, Understanding Various Englishes.  

**Module II: Developing Communicative Skills (7 lectures)**  
Introductory, developmental, transitional and concluding paragraphs: Coherence and cohesion, Descriptive, narrative, expository and argumentative writing, Introduction to soft skills, people and social skills, presentation, interaction and effective communication.  
Official letter, Paragraph writing, Note-making, Topic Sentence, Telephonic Conversation, Group Discussion regarding job interview & C. V. Writing, formal and informal writings, reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes.  

**Module III: Self-Learning (15 lectures)**  
Practice and drill sessions, online learning via tutorials (link to be provided by the teacher in-charge), self- assessment of progress, submission of assessment reports to the teacher.
Suggested Readings

Mapping of Course Outcomes

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EGML0028: MYTH IN LITERATURE (2-0-0) (CREDITS: 02)

Course Outcomes
1. Remember some of the recurrent classical myths in literature (Remembering)
2. Understand that myths have strong metaphoric function (Understanding)
3. Understand how the application of the myth in the select texts throws more light in understanding the complex ideas therein (Applying)
4. Co-relate the original story in the myth to the story in the corresponding literature (Analyzing)
5. Rate the potentiality of the myth in leveraging literary ideas (Evaluating)
6. Adopt the myth as vehicle of thought in creative writings (Creating)

Module I: Myth Concepts (7 lectures)
Myth, mythology, mytheme, archetype, archetypal, archetypal criticism, mythopoeia, myth critics

Module II: Recurring Myths (15 lectures)
Myth of: Zeus (Jupiter/Jove), Venus (Aphrodite), Cupid (Eros), Adonais, Hercules, Odysseus, Achilles, Oedipus, Electra, Helen, Diana, Hera, Orpheus and Eurydice, Hades, Leda and Swan, Trojan War

Module III: Myth in Literature-sigificance of select myth (8 lectures)
Geoffrey Chaucer: Myth of Thisbe and Dido in Legend of Good Women
P.B. Shelley: Myth of Adonais in "Adonais"
W.B. Yeats: Myth of Leda and Swan in "Lead and the Swan"
T.S. Eliot: Myth of Phiomela, Cleopatra and Tiresias The Waste Land

Suggested Readings
1. Frye, Northrop. “Myth, Fiction and Displacement”

Mapping of Course Outcomes

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DEPARTMENT OF MASS COMMUNICATION

MCCS612: COMMUNICATION SKILLS (1-0-1)

Course Objectives
1. Identify the different styles of communication (Remembering)
2. Understand how to develop effective speaking skills (Understanding)
### Module 1: Basics of Communication (5 Lectures)


### Module 2: Oral Communication (13 Lectures)

Language in Communication, Phonetics, Spelling, Pronunciation, and Accent, Speech Drills, Oral Communication Skills: Seeking and giving information/suggestions/advice, Offering and responding to offers, Requesting and responding to requests, Congratulating people, Expressing condolences, Asking questions and responding politely, Apologizing and forgiving, Giving instructions, Seeking and giving permission, Expressing opinions, Group discussion, Seeking explanations, Expressing sympathy, Reading Skills: Skimming and Scanning, Levels of Reading, Reading Comprehension, Academic Reading Tips, Listening and speaking skills, Contextualised speaking.

### Module 3: Written Communication (12 Lectures)

Writing Skills, Elements of Writing: Sentence, Phrases and Clauses, Forms of Written Communication, Formal & Informal Writing, Letter Writing, Notices, Summary, Note-making, Job application, Preparing a CV/Resume and Effective Profiling, Preparation of Cover letters, preparing for and Facing a Job Interview, Preparing a Presentation, Preparing Agenda and Minutes for Meetings, Writing Notices and Memos, Drafting an E-mail, Correspondence with Government Authorities/institutions, Office Orders, Enquiries and Replies, audience analysis.

### Suggested Readings


### Mapping of COs to Syllabus

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### MCCCW6123: CREATIVE WRITING (1-0-1)

#### Course Outcomes

1. Demonstrate understanding on various forms of creative writing (Understanding)
2. Apply the techniques of creative writing for storytelling (Applying)
3. Write contents for various purposes (Creating).

#### Module 1: Introduction to Creative Writing (10 lectures)

Writing as an Art, Types of writing, Principles of writing, Characteristics of Good Writing, Elements of Writing: Form, Content, Audience, Style & Structure, Meaning of creative writing, Creative process and abilities for writing, Challenges in Creative Writing.

#### Module 2: Process and Techniques of Creative Writing (10 lectures)

Finding the ideas, sketching the plot, characterization, conflict, climax, resolution, Action Description, Point of View, Dialogue, setting atmosphere, Using technology in process of writing.

#### Module 3: Writing Exercises (10 Hours)

Content Writing, Reviews writings, Blogging, Feature and Opinion Pieces, Creative Writing, Short Story, Poetry, Fiction, Essay, Adventure Story, Reflective Writing, Persuasive Writing – Commercials, Figurative Writing, Travel Writing.

### Suggested Readings

2. Creative Writing Course Book, Paul Mills, 2006, Routledge
7. Word Power: A guide to creative writing, Julian Birkett, 2016, Bloomsbury Academic India

Mapping of COs to Syllabus

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MCCEM6124: EVENT MANAGEMENT (1-0-1)

COURSE OUTCOMES
1. Understand the relevance of event management as a professional skill and career option (Understanding)
2. Demonstrate an in-depth understanding of the intricacies of managing an event (Applying)
3. Examine individual and team orientation in event planning and management (Analysing)
4. Plan and organise an event (Creating)

Module 1: Introduction to Event Management (6 lectures)
Concepts and types of events, Understanding and Introduction to the events landscape, Idea generation, Conceptualisation: Techniques/Methods.

Module 2: Event Planning and Administration (8 lectures)
Developing event vision/mission, objectives and goals, Event proposal, Strategic planning techniques: Action Plans; Event Group Sustainability methodologies, Logistics and operations: Use of work plan structures; time-plans; worksheets; Gantt Charts, Legal frameworks: Licenses and Permissions, Event administration strategies, Resource Mobilisation and techniques, financial management.

Module 3: Event Marketing (8 lectures)
Target Group Segmentations: Concepts and Strategies, Strategic and Integrated Marketing Communications for events, Event Branding, Digital marketing and audience building for events, Marketing plan creation; strategies and implementation, Skills for event managers and planners: negotiation and networking skills; image management; leadership.

Module 4: Post Event Documentation and Evaluation (8 lectures)
Documentation: aims; methods and techniques, Event evaluation methodologies, Audience feedback and review mechanisms, developing event follow-up strategies and action plans, Developing the Event Planners Journal.

Suggested Readings

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DEPARTMENT OF PSYCHOLOGY

PDSP6117: SCHOOL PSYCHOLOGY
(2 credits - 30 hours)

Course Outcomes
1. Gain knowledge about the concept of School Psychology. (Remembering)
2. Understanding the process of school counseling. (Understanding)
3. Analyze the needs of school children in the new digital world. (Applying)
4. Apply principles and concepts of counseling in school set up. (Analyzing)
5. Evaluate the gaps in the current scenario. (Evaluating)
6. Create a comfortable environment for children in need of intervention. (Creating)

Module 1: Introduction (5 hrs)
Historical background of school psychology, Definition nature and scope of School Psychology, Role of a School Psychologist as a Professional

Module 2: Guidance and Counseling in School setting (15 hrs)
Definitions, Ethics and Legal aspects, Characteristics of an effective counselor, Basic Counseling Skills - Active listening, reflecting, paraphrasing, questioning, confronting, Counseling process - Building, maintaining and terminations counselor’s relationships.

Module 3: Tools and Techniques Practice (10 hrs)
Objective tools: Checklist, rating scales, self report inventories and other standardized tools.
Subjective Tools: Observation, anecdotal records, cumulative Records, Interview and case history
Techniques for group intervention: Group tasks, Group discussion, debriefing and interpretation, summary making.
Techniques for individual intervention: role plays, individual assignments, feedback charts
Importance of Record Keeping

Suggested Readings

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PDCM6118: COMMUNITY MENTAL HEALTH
(2 credits - 30 hours)

Course Outcomes
1. Gain knowledge about the underlying principles of Community Mental Health. (Remembering)
2. Understand current trends of practice and intervention. (Understanding)
3. Apply basic intervention skills in their community projects. (Applying)
4. Analyze gaps in the current functioning of Community Mental Health at regional levels. (Analyzing)
5. Evaluate intervention techniques in multicultural set ups. (Evaluating)
6. Organize awareness programmes for communities. (Creating)

Module 1: Introduction (2 hours)
Basic Principles of Community Mental Health, Counseling Skills, Counseling in Multicultural set up

Module 2: Mental Health Issues (6 hours)
Intellectual disability, Addiction, Developmental disorders, Suicide

Module 3: Identification, Assessment and Intervention (7 hours)
Identification of Mental Health Issues, Assessment of Mental Health Issues, Psycho-education, Evidence Based Practices (Behavior Therapy, Cognitive Behavior Therapy, Rational Emotive Behavior Therapy)

**Module 4: Practical (15 hours)**
Community Mental Health Projects

**Suggested Readings**

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**PCLS6119: LIFE SKILLS EDUCATION**
(2 credits-30 hours)

**Course Outcomes**
1. Choose and gain knowledge about themselves, develop consciousness of self, self-confidence, feelings of mattering, manage personal emotions (Remembering)
2. Able to relate and work with others, practice collaborations, controversy with civility, engage across difference, be committed to ethical action (Understanding)
3. Apply self-knowledge, practice self-worth, congruence, commitment, identify passions and develop common purpose (Applying)
4. Able analyse academic knowledge and integrate into all aspects of living (Analysing)
5. Learn to evaluate and improve upon personal leadership strengths and weaknesses (Evaluating)
6. Create effective change and practice collective efficacy, develop critical thinking/ decision making skills, common purpose and a sense of connectedness within one's communities. (Creating)

**Module –I: Introduction (5 hours)**
- Definition and Importance of Life Skills
- Livelihood Skills, Survival Skills and Life Skills
- Life Skills Education, Life Skills Approach, Life Skills Based Education
- Life Skills Training - Implementation Models
- Life Skills Education in the Indian Context

**Module-II: Social Skills and Negotiation Skills (8 hours)**
Introduction
Life Skills: Generic, Problem Specific and Area Specific Skills
- Self-Awareness
  - Definition, Types of Self
  - Self Concept, Body Image, Self Esteem
  - Techniques used for Self Awareness: Johari Window, SWOT Analysis
- Empathy
  - Sympathy, Empathy & Altruism
- Effective Communication
  - Definition, Functions, Models, Barriers
- Interpersonal Relationship
  - Definition, Factors affecting Relationships

**Module-III: Coping Skills (5 Hours)**
Coping with Emotions
Coping Skills
- Coping & Emotions
VALUE ADDED COURSES

- Definition, Characteristics, Types
- Classification: Wheel Model, Two-Dimensional Approach
- Coping Strategies

• Coping with Stress
  Definition, Stressors
  - Sources of Stress
  - The General Adaptive Syndrome Model of Stress
  - Coping Strategies

Module-IV: Practical (12 hours)
Life Skills in Specialized Areas
  • Peer Education
  • Life Skills for Disaster Preparedness
  • Life Skills for Corporate Sector
  • Life Skills for Special Population
  • Life Skills for Geriatric and Palliative Care
  • Life Skills in Practice in Educational Settings

Suggested Readings

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PCFA0120: PSYCHOLOGICAL FIRST AID
(2 Credits-30 Hours) (L-T-P: 2-0-0)

Course Objective: To acquire the basic knowledge about the crisis management strategies and immediate intervention techniques.

Course Outcome:
1. Explain the nature and core competencies required for Psychological First Aid. (Understanding)
2. Apply the basic techniques for relaxation and stress management. (Applying)
3. Examine the need for psychological first aid. (Analysing)
4. Evaluate the need for multidimensional crisis intervention. (Evaluating)

Module-I: Psychological First Aid (5 Hours)
Definition and History, Defining Psychological First Aid Development of the PFA Concept, PFA -Core Competencies of PFA, Validation of the Johns Hopkins RAPID PFA Model
Module-II: Intervention and Management (10 Hours)

Module-III: Post Traumatic Stress: (7 Hours)
The Need for a Multidimensional Approach, Patient Suicide: Clinical Assessment, Step-Wise Plan for Interventions & Management

Suggested Readings

Mapping of CO's to Syllabus

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DEPARTMENT OF ECONOMICS

ENOS6002: INTRODUCTION TO STOCK MARKET
(2-0-0)

Objectives: The goal of this course is to provide students with a comprehensive understanding of the workings of the stock market, including the market structure, trading and settlement procedures, processes, and related components, as well as the regulations governing the stock market and the emerging challenges it faces.

Course Outcomes
CO1: Get an idea of the capital market in India, its working and the use of various financial Instruments. (Remembering & Understanding)
CO2: Applying the various terminology of stock market in the process of trading of stocks. (Applying)
CO3: Get an exposure to the working of the stock market with of practical touch and develop the ability to analyze the risk and profitability in investing on stock market. (Analyzing)
CO4: Enable the students to evaluate investment instruments of the money market and compare the different types of Financial Securities. (Evaluating)

Module I: The Stock Market and its Operation (12 Hours)
Role and Structure of Money and Capital Market; Instruments of Capital Market –Share, Debentures, Equity and Bond; The Stock Market and its Operation; Stock Market Index – The BSE Sensex and the NSE Nifty; Role and working SEBI; Impact of SEBI on Capital Market in India; IDRA and its role in Financial Markets

Module II: Terminology of Stock Market (10 Hours)
Strike Price, Call Option, Put Option; Bull and Bear market; Beta, Delta, Bid, Blue chip stock; Board Lot, Odd Lot ; Out of the Money (OTM), Stock split

Module III: Trading of Stock (13 Hours)
Recent development of stock exchange; Stock trading on BSE and NSE; Stock market trading mechanism; Online stock trading(practical demonstration);OTC exchange; Stock indices in India and abroad-commodity exchange, overviews of derivatives in financial market, basic derivatives operation and trading
Module IV: Commodity and Currency Markets (10 Hours)

Suggested Readings
5. Fens Termaker, J. V. Readings in Financial Markets & Institutions, Appleton, New York

ENDA6005: DATA ANALYSIS WITH SPSS/STATA
(0-0-2)

Course Outcomes
CO1: Identify the importance of SPSS in economic analysis. (Applying)
CO2: Analyse the uses of statistical packages for accurate analysis of data. (Analyzing)
CO3: Explain the importance of presentation of data. (Evaluating)
CO4: Discuss the various key aspects of statistical relations and its applicability. (Creating)

Module I: Introduction to Statistical Packages (15 Hours)
MS-Word, MS-Excel, SPSS; Basic Operations – File, Edit, View, Data, Data Set Creation and Management; Evaluation of Data Quality and Data Cleaning; Statistical Analysis using SPSS – Summary, Tabulation and Comparison of Summary Statistics

Module II: Presentation of Data (15 Hours)
Diagrammatic Presentation; One Dimensional – Single, Subdivided, Multiple Deviation; Two Dimensional – Histogram, Pie Diagram; Three Dimensional – Rectangular, Cube; Pictograms and Cartograms; Scatter; Line and Radar Diagrams; Tabular Presentation – Single, Double, Multiple

Module III: Basic Statistics and Statistical Relations (15 Hours)
Frequency; Summation; Maximum; Minimum; Mean; Median; Mode; Standard Deviation; Skewness; Covariance; Correlation – Bivariate, Partial, Rank, Correlation Matrix; Simple Linear Regression

Suggested Readings:

ENRC6008: RECENT DEVELOPMENTS IN MONETARY POLICY IN INDIA
(2-0-0)
Objective: This course will examine the influence that monetary policy has on some of the most important aspects of the economy, including interest rates, inflation, and the banking sector, among other topics.

Course Outcome (CO):
CO1: To impart a complete and detailed insight of monetary policy in India. (Remembering & Understanding)
CO2: To educate the students about the contemporary policy reforms taken in to design current monetary policy. (Applying)
CO3: To inform and aware the students about the use of various instruments of monetary policy (Analysing & Evaluating),
CO4: To decipher the knowledge among students about the design, implementation and policy assessment of monetary policy practiced by Reserve Bank of India. (Creating)

Module 1: Overview of Monetary Policy (10 Hours)
Overview: Basic concepts, objectives, advantages and disadvantages, design, instruments and implementation of monetary policy in India; Assessment and Evaluation of monetary policy and the role of monetary policy in economic growth in the context of India economy and problems of monetary policy in India
Module 2: Policy Implication of Monetary policy (10 Hours)
Policy implications of monetary policy: Expansionary and Contractionary monetary policy in the context of India; Working of monetary policy with fiscal policy; Major policy reforms in monetary policy in India after 21st century and their impacts on Indian economy: CRR, SLR, Bank Rate, Base Rate, Repo and Reverse Rate.

Module 3: Monetary policy and Indian Economy (10 Hours)
Impacts on various instruments on monetary policy on Indian economy; other instruments, Liquidity Adjustment Facility (LAF), Marginal Standing Facility (MSF) and Market Stabilisation Scheme (MSS); Assessment and Evaluation of monetary policy and the role of monetary policy in economic growth in the context of India economy and problems of monetary policy in India

Suggested Readings

Mapping of COs to Syllabus

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ENCF6009: CONSUMER DECISIONS AND FINANCIAL LITERACY
(2-0-0)

Course Outcome (CO)
CO1: The course will enable the students to understand the financial instruments and how it performs.
CO2: The course is intended to make sure students will be able to understand the consumer decision over financial matters.
CO3: The course is intended to make the students aware about the different financial services and personal financial management.
CO4: The course will enable the students to be aware about various consumer rights and laws.

Course Content
Module I: Instruments of Finance (10 hrs)
Introduction to Indian financial system; Understanding financial instruments; Types of financial instruments - saving accounts, current account, fixed account, cheques, stocks and mutual funds.

Module II: Consumer Rights and Decision Making (10 hrs)
Financial Decision making; Factors affecting financial decisions; Consumer credit, credit law and Rights; Banking ombudsman law; RTI; Negotiable instrument

Module III: Banking and Consumers (10 hrs)
Different types of banks; Types of bank account; Different types of loans; Personal bankruptcy; Insurance; Digital banking

Suggested Readings
DEPARTMENT OF PUBLIC ADMINISTRATION

PACS0022: CIVIL SERVICE IN INDIA
Credits: 3 (45 lectures) (45 Hours)

Course Outcomes
At the end of this course students are able to:
1. Understand the Concept, Significance and Evolution of Civil Services (Remembering & Understanding)
2. Understand the Concept of Bureaucracy and its historical evolution (Understanding)
3. Analyze the Changing Nature of Public Services (Analyzing)
4. Evaluate the Civil Services in the context of Globalisation (Applying)

Module I (10 hours)
Civil Services: Concept, Significance and Evolution of Civil Services; Classification of Civil Services (All India Services, Central Services, State Services and Local Services); Union Public Service Commission and Other Service Commissions

Module II (10 hours)
Bureaucracy: Concept of Bureaucracy – Historical Evolution; Civil Service: Neutrality and Commitment; Relationship between Politicians and Civil Servants

Module III (10 hours)
Public Personnel Administration: Recruitment; Methods and Significance; Training of Public Servants in India- Promotion System in India; Disciplinary Procedure for Civil Servants

Module IV (10 hours)
Civil Services-Citizennery Interface: Civil Society and Administration; Technology and Changing Nature of Public Services; Ethics and Accountability

Module V (05 hours)
Indian Civil Services: Major Issues - Generalists and Specialists Controversy, Civil Services in the context of Globalisation, Civil Service Reforms- IInd ARC Recommendation

Suggested Readings
1. P. N. Parashar- History and Problems of Civil Services in India
2. Yogendra Narain- Civil Services: Challenges And Resolutions
3. Abhay Prasad Singh & Krishna Murari - Constitutional Government and Democracy in India
4. S.K. Das - The Civil Services in India
5. Lohit Matani, Vishal - An Introduction to Civil Services
6. S.N. Singh - Politician Civil Servant Relationship and Public Administration in India
7. Sandeep Sharma- Indian Civil Service And Public Administration

Mapping of COs to Syllabus

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PAIG0023: INNOVATION IN GOVERNANCE
Credits: 3 (45 lectures) (45 Hours)

Course Outcomes
At the end of this course students are able to:
1. Understand the Institutional Framework for Promoting Innovations (Remembering & Understanding)
2. Understand the Methodological Approach for studying best Practices (Understanding)
3. Analyze the Innovations in Public Services (Analyzing)
4. Evaluate the role of citizen’s participation in governmental innovations (Applying)
Module – I (10 hours)
Innovations in Governance: Meaning of innovation in governance; Perspectives and Challenges; Characteristics and Patterns of Innovations; Institutional Framework for Promoting Innovations; Public Governance and Innovations: Administrative Reform to Innovation Discourse

Module – II (10 hours)
Understanding Innovations: Innovation for Achieving a Quality of Life, Methodological Approach for studying best Practices, Capacities for Innovation and Best Practices

Module – III (10 hours)
Innovations in Public Services: Recent trends; Innovation Capacity in Organizations; Leadership and Innovation; Innovations in different sectors: General Administration, Urban Administration, Health Administration, Private Sector, Agriculture, etc

Module – IV (10 hours)

Module – V (05 hours)
Issue Areas: Originality and Replication of Innovations; Innovation with or Without Improvement; Citizen Participation in Government Innovations; Research in Innovative Governance

Suggested Readings

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DEPARTMENT OF ZOOLOGY

ZGPR6004: PROJECT MANAGEMENT, REPORTING AND DOCUMENTATION (30 HOURS) (P/NP)

Course Outcomes
1. Identify qualities of a successful entrepreneur and develop competencies. (Applying)
2. Construct economically and socially sound business ideas. (Creating)
3. Analyze the potentials of a social catalyst and examine case studies. (Analyzing)
4. Assess plans for effective preparation of Detailed Project Report (DPR) and financials of a DPR. (Analyzing)
5. Develop skills for project implementation and management. (Applying)
6. Define concept of market. (Remembering)
7. Distinguish different methods of Bookkeeping and Accountancy. (Analyzing)
8. Adapt effective plans for preparing accurate project report and practicing positive documentation. (Creating)
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<th>Objective</th>
<th>Help the student to understand Entrepreneurship, identification of qualities of a successful entrepreneur &amp; how to develop it</th>
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| **Module I**: Entrepreneurship: Concept and Functions | • Who is an entrepreneur?  
• Entrepreneurial competencies (Initiative, Creativity and Innovation, Risk Taking and Risk Management, Problem Solving, Leadership, Persistence, Quality Performance)  
• Information Seeking, Systematic Planning, Persuasion and Influencing Others  
• Enterprise Launching Competencies, Enterprise Management Competencies  
• Functions of an entrepreneur (Promotional functions: Innovation, Risk-taking)  
• Organisation Building, Discovery of an idea, Detailed Investigation, Assembling the Requirements, Financing the Proposition. Managerial functions: Planning, Organizing, Staffing, Leadership, Supervision, Communication, Motivation, Controlling.  
• Commercial Functions: Production, Finance, Marketing, Accounting  
• Types of entrepreneur (Innovative Entrepreneur, Imitative Entrepreneur, Fabian Entrepreneurs, Drone Entrepreneurs)  
• Entrepreneurship: meaning and definition; types of entrepreneurship; entrepreneur and entrepreneurship  
• Difference between entrepreneur and employee |
| **Objective** | Help the students to generate various business ideas and link the best one with them |
| **Module II**: Generation of business ideas and linking | • EDP: Meaning, Need, Importance of EDP  
• Necessity of generating ideas  
• Ways to generate ideas, Area Assessment Survey – Modes (Desk Research, Field Work, Market Need Based Opportunities, Ideas from Existing Entrepreneurs)  
• Linking business ideas with the entrepreneur  
• Methodology of Opportunity Identification & Profiling Business Ideas (Preparation of Personal Profile, Development of OS (decision making) Framework, Snap Investigation of ideas generated, Evaluation in terms of OS (decision making) Framework and Short-listing of Ideas, Pre-feasibility Studies, Errors in Selection, Final Opportunity Selection)  
• Preparation of business project plan and business project plan execution (Summary of the Project/Project at a Glance, General Information, Details of the Proposed Project, Market Potential, Manufacturing Process, Production Programme/Sales Revenue, Cost of Manufacturing and Profitability Projections) |
| **Objective** | To impart knowledge on social entrepreneurship |
| **Module III**: Social entrepreneurship | • Who is a social entrepreneur (definition and case study)  
• Difference between entrepreneur and social entrepreneur  
• Characteristics of social entrepreneur (Social Catalysts, Socially aware, Opportunity-seeking, Innovative, Resourceful, Accountable)  
• Examples and case study |
| **Objective** | To impart knowledge on preparation of DPR |
| **Module IV**: Preparation of Detailed Project Report (DPR) and financials of a DPR | • Business plan: key questions  
• Technical arrangement & Production process (Manufacturing process, Sources of technical know how, plant & machinery, Supplier identification & supplier selection, Raw materials, packaging, land requirement, utilities and manpower, financial viability) and Location selection (Layout, built up area etc.)  
• Product and Market (Product description, Capacity, Market study and market demand, Product mix, Branding, Channels of distribution, Advertising and Promotion etc.)  
• Project cost and means of finance (Land, site development, building and civil works, plant and machinery cost, other fixed assets, technical knowhow fees, preliminary and preoperative expenses, working capital margin, contingency and escalation)  
• Income analysis (Capital utilisation and income estimate, Expenditure estimate, Profit estimate, income tax estimate, profitability ratios: TC ratio, cash flow estimate, risk analysis, sensitivity analysis etc.) |
| **Objective** | To impart knowledge on implementing, managing and monitoring the progress of the selected project |
## Module V: Project implementation and management
- Understanding Total Quality Management (Acceptable Quality Level, Benchmarking, Deming Wheel, ISO 9000,Pareto Analysis, Quality Circles, Measures of Central Tendency and Dispersion, Geometric Moving Average, Statistical Process Control etc.)
- Goal Oriented Project Planning (Project Planning Matrix and Product Matrix)
- Project Activity Planning and Implementation (Gantt Charts, the Programme Evaluation and Review Technique (PERT) andCritical Path Method (CPM) of project scheduling)
- Soft skills for launching and managing a project (Creativity and Problem Solving, Interpersonal Communication, Persuasion and Use of Influence Strategy, Negotiation and Networking, Delegation of Authority and Work Effort, Efficiency Orientation As a Trait, Leadership, Concept of risk and risk taking, Legal Requirements, Types of business organisation)
- Managing Business Crisis – Starting and Liquidity Crisis

### Objective
To impart the Knowledge of different component of Market

### Module VI: Concept of market
- Traditional market
- Emerging market: E commerce
- Analysing the market environment
- Researching the market and market survey
- Marketing mix
- Product mix
- Promotion mix
- Price mix, method of pricing

### Objective
To impart knowledge on Book Keeping

### Module VII: Bookkeeping and Accountancy
- Basic concept of Accounting (Management and financial accounting)
- Financial statement: Meaning, Importance
- Profit and loss account
- Balance sheet
- Depreciation and adjustment etc.
- Interpretation of financial Statement (Liquidity, Current ratio, Profitability ratio, Inventory turnover ratio, Debtors turnover ratio, ROI etc)
- Fund flow Analysis

### Objective
To impart knowledge on Documentation and Reporting

### Module VIII: Documentation and Reporting
- Why to Document
- What is a Documentation Report
- When and How to prepare the Documentation Report
- Typical format of a Documentation report
- Layout of the Report
- Writing a Report

## Mapping COs to syllabus

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## ZGWP6011: INTRODUCTION TO WILDLIFE PHOTOGRAPHY (30 HOURS, L-T-P: 2-0-0) (P/NP)

### Course Outcomes
1. Discuss the history of Photography, moving images and Stock photography Creating)
2. Demonstrate a brief understanding of ethics of journalism, photo journalism and sources (Understanding)
3. Assess the importance of digital technology in photography (Evaluating)
4. To define camera basics and different genres of photography (Remembering)
Learning Objective
1. Through theory and practical assignments, this class provides the students with hands on experiences in photography. Lectures, field studies, guest instructors, student presentation and group work will help you develop the analytical basis and insight to reflect upon and assess the impact of photographs on our ideas of the world.
2. By the end of this course, Students will: Be able to start their career in photography. Will be able to create picture story
   / Photo Essays and understand the conventions and challenges of telling stories through images
3. Gain personal leadership through challenging, intercultural assignments

Objective: This module will help to understand the students about photography basics
Module I: Introduction to photography
Camera Basics, Types of Camera, Operating a Camera, Exposure, Aperture & Shutter Speeds Light Meter, Depth of Field, Choosing Lenses, Types of lens, Lighting, Flash Photography, Filters, Steady Shooting, Composition in wildlife Photography.

Objective: This module will help to understand the students about different types of photography in details
Module II: Different genres of photography
Mobile Photography, Microscopic photography, Macro photography, Drone photography, Wildlife Photography

Objective: Post production is an important part of photography student will learn post-production in this module
Module III: Post Processing
Enhancing Photographs, Organizing the Picture, Quality Control, Intermediate/advanced use of post-production software like Adobe Photoshop, Lightroom etc

Objective: How to earn the livelihood from selling your images internationally
Module IV: Stock Photography
Introduction to Stock Photography, How to contribute to various stock photo agencies. Causes of rejections, Submitting Guidelines, Meta Data

Objective: This module focuses on photojournalism.
Module V: Ethics in Wildlife Photography
How to prepare for a photo tour (Dress code in wildlife photography, permissions, water bottle, notebook and other accessories) How to remain safe during shooting (How close is too close, keeping antivenom & antiallergen; leach guard, safety of gears used) Ethics in wildlife photography (knowing Schedules of animals in Wildlife (Protection) Act, 1972, not using any bait, not taking any animal out of its habitat without permission, non use of flash, not altering the habitat)

Mapping of COs to Syllabus

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ZGTMD6010: TEACHING METHODOLOGY AND CLASSROOM MANAGEMENT (30 HOURS: P/NP)

Course Outcome (CO)
1. Define different concepts of teaching skills (Remembering)
2. Create effective teaching instruction (Creating)
3. Evaluate assessments (Evaluate)
4. Make use of ICT (Analyzing)

Module I: Introduction to Core teaching Skills - Micro-teaching
a) Introduction to Methods, Maxims, Devices and techniques of teaching. Practice teaching on Core teaching Skills in Microteaching mode.
b) Approaches and methods of teaching Science - (i) Lecture, demonstration, explanation, Observation. (ii) Ensuring Problem solving, laboratory, Project, Heuristic, Discussion for teaching science. (iii) Learning by discovery, group work and team teaching. (iv) Collaborative strategies, provision in heterogeneous classroom.

Module II: Planning and designing for effective instruction in science
a) Design of unit and lesson planning approaches to lesson planning, format of lesson plans
b) Teaching aids and laboratories in science, their necessity and importance.
c) Museum, field trips and excursion, their relevance to science. Preparation of simple aids of Science teaching.
Module III: Evaluation of Learners Progress
a) Concept and importance of assessment & evaluation.
b) Techniques of evaluation (Theory & Practical)
c) Construction of Unit test: Design and blueprint, Item construction, Question wise analysis, Construction of Science question paper including marking scheme.

Module IV: Information and Communication Technology (ICT) Integration in Science teaching
a) Introduction to ICT
b) Importance of ICT in Science teaching.
c) Exploring various ICT tools for Science teaching.
d) Open Education Resources (OER) and its uses in Science teaching.
e) ICT Integration in Science teaching.
f) Exploring FOSS in Science teaching

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