2018-2019

REGULATIONS AND SYLLABUS

School of Life Sciences
School of Fundamental and Applied Sciences
School of Humanities and Social Sciences

ASSAM
DON BOSCO UNIVERSITY

Tapesia Gardens | Azara, Guwahati - 781017
Sonapur - 782402 | Assam, India

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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.

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REGULATIONS

ASSAM DON BOSCO UNIVERSITY
REGULATIONS - GRADUATE DEGREE PROGRAMMES

The following are the regulations of the Assam Don Bosco University concerning the Graduate Programmes leading to the award of the Bachelor's Degree in various disciplines made subject to the provisions of its Statutes and Ordinances.

1.0 Academic Calendar

1.1. Each academic year is divided into two semesters of approximately 18 weeks duration: 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. The schedule of academic activities approved by the Academic Council for each semester, inclusive of the schedule of continuing 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 Duration of the Programme

2.1. The normal duration of the Graduate Programme shall be as given below:

Programme	Number of Semesters	Number of Years
Bachelor of Technology (BTECH)	8	4
Bachelor of Computer Applications (BCA)	6	3
Bachelor of Commerce (BCOM)	6	3
Bachelor of Arts (BA) Honours	6	3
Bachelor of Science (BSc) Honours	6	3

2.2 However, students who do not fulfil some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to 4 more semesters (2 years) to complete all the requirements of the degree.

2.3 Under exceptional circumstances and depending on the merit of each case, a period of 2 more semesters (1 year) may be allowed for the completion of the programme.

3.0 Course Structure

3.1. The Choice Based Credit System (CBCS) shall be followed for the Graduate Degree Programmes. Credits are allotted to the various courses depending on the number of lecture/tutorial/laboratory hours per five-day cycle (one week) of classes assigned to them using the following general pattern:

3.1.1. Lecture : One hour per cycle/week is assigned 1 credit.

3.1.2. Tutorial : One hour per cycle/week is assigned 1 credit.

3.1.3. Practical : Two hours per cycle/week is assigned 1 credit.

3.2. The courses offered for the Graduate Degree Programmes are divided into two baskets – core courses and elective courses.

3.3. Core Courses: Core courses are those in the curriculum, the knowledge of which is deemed essential for students who are pursuing the said Degree Programme.

3.3.1 A student shall be required to take all the core courses offered for a particular programme.

3.3.2 The number of credits required from core courses shall be as prescribed by the competent academic authority.

3.4. Elective Courses: These are courses in the curriculum which give the student opportunities for specialisation and which cater to his/her interests and career goals. These courses may be selected by the student and/or offered by the department conducting the programme, from those listed in the curriculum according to the norms laid down by the competent academic authority.

3.4.1 The number of credits which may be acquired through elective courses shall be prescribed by the competent academic authority.

3.5. These categories of courses may further be subdivided into departmental, school or institutional, depending on the department which offers the course. The schema of categorisation of courses into baskets is as given below:

Core Courses	
Departmental Core **(DC)**	Core courses which are offered by the department conducting the programme
School Core **(SC)**	Core courses which are offered by a department other than the department conducting the programme, from within the same School
Institutional Core **(IC)**	Core courses which are offered by departments of the University from Schools other than the parent School
Elective Courses	
Departmental Elective **(DE)**	Elective courses which are offered by the department conducting the programme
School Elective**(SE)**	Elective courses which are offered by a department other than the department conducting the programme, from within the same School
Institutional Elective **(IE)**	Elective courses which are offered by departments of the University from Schools other than the parent School

3.6. 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.

3.7. In addition to the prescribed credit requirement a student shall have to complete the requirements of Extra Academic Programmes (EAP) as may be prescribed by the School. Students shall be awarded P/NP grades for the EAP, which shall be recorded in the Grade sheet but not taken into account for computing the SGPA and the CGPA.

3.8. 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 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.

3.9. In addition, students may also opt for additional elective courses in consultation with their mentors. 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.

3.10 It shall be the prerogative of the department to not offer an elective course which has less than 5 students opting for it.

3.11 The medium of instruction shall be English and examinations and project reports shall be in English.

3.12 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 before forwarding the same to the School Board of Studies (SBS). The SBS shall consider the proposals from the departments and make recommendations to the Academic Council for consideration and approval.

3.13 The curriculum may include industry training and /or fieldwork for a specified time. This is to be satisfactorily completed before a student is declared eligible for the degree. There shall be credit allocation for such industrial training or fieldwork. Normally these activities shall be arranged during convenient semester breaks as shall be determined by the School Board of Studies.

3.14 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 groups of students. Generally the faculty advisor/mentor shall be assigned by the concerned department, in consultation with the Director of the School concerned. (For the first year students of the BTECH programme, the Director

of the School of Technology shall assign the faculty advisor/mentor from departments belonging to other Schools teaching at the SOT). 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.

4.0 Admission

4.1 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.

4.2 Eligibility Criteria

4.2.1 To be considered for admission to a Graduate Degree Programme a candidate should have passed the Higher Secondary examination of a recognised Board of Higher Secondary Education or an equivalent examination of any University / Board securing grades/marks as specified in the table below.

4.2.2 A candidate must also obtain qualifying marks required by the University in entrance tests/ personal interview as the case may be. These marks shall be valid only for the academic year for which the test is held.

4.2.3 Admission will be on the basis of performance of the candidate at the qualifying examination, entrance test and/or personal interview.

Programme	**Grade /Marks requirement from qualifying examinations**	**Entrance Examinations / Personal Interview**
BTECH	Passed the qualifying examination in the Science Stream with 45% in the aggregate of all subjects and 45% in the aggregate of Physics, Chemistry and Mathematics	National Entrance Test such as JEE / State level entrance examination such as CEE or the ADBU Entrance Examination for Engineers
BCA, BCOM, BA Honours	Passed the qualifying examination in any stream with 45% marks in the aggregate of all subjects	Satisfactory performance in the Personal Interview
BSc Honours	Passed the qualifying examination in the science stream with 45% marks in the aggregate of Physics, Chemistry and Mathematics	Satisfactory performance in the Personal Interview

4.3 Reservation of seats for the programme shall be as per the guidelines laid out in the Statutes of the University.

4.4 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 semester.

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

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

4.5 All candidates shall be required to satisfy the norms prescribed by the University for medical fitness prior to admission.

4.6 Lateral Entry into the BTECH Programmes

4.6.1 Polytechnic diploma holders in different disciplines and B.Sc. Degree holders having Physics, Chemistry and Mathematics shall be eligible for admission to degree courses in Engineering and Technology in the third semester BTECH Programme against vacancies and/or seats in addition to the sanctioned intake in the first year.

4.6.2 Such diploma holders should have been bonafide students of polytechnics duly approved by the government and should have pursued an AICTE approved three-year diploma curriculum in an appropriate branch of Technology.

4.6.3 Only diploma holders who have secured a minimum of 60% marks in the aggregate in the relevant discipline and B.Sc. students who have secured a minimum of 50% marks in the aggregate shall be eligible for consideration for admission. The students belonging to B.Sc. Stream, would have to clear the subjects: Engineering Graphics/Engineering Drawing and Engineering Mechanics of the First Year Engineering Programme along with the Second year subjects.

4.6.4 Such admissions shall be on the basis of merit in the ADBU entrance test and a personal interview.

5.0 University Registration

5.1 Candidates 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.

6.0 Attendance

6.1. 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.

6.2 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 (submitted at the time of returning to class).

6.3 Some students, due to exceptional situations like their own serious sickness and hospitalization or death of members of 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:

Attendance during the remaining days of the current semester	Bonus percentage available in the current semester
95% or more	5
90% or more but less than 95%	4
85% or more but less than 90%	3
80% or more but less than 85%	2
75% or more but less than 80%	1

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.

6.4 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 in view of clause 10.5 of these Regulations.

6.5 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.

6.6 Leave

6.6.1 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.

6.6.2 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.

6.6.3 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.

6.6.4 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.

6.7 It shall be the responsibility of the student to intimate the concerned teachers regarding his/her absence before availing the leave.

7.0 Grading System

7.1 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/No-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.

7.2 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:

Marks (x) obtained (%)	Grade	Description	Grade Points
90 ≤ x ≤ 100	O	Outstanding	10
80 ≤ x < 90	E	Excellent	9
70 ≤ x < 80	A+	Very Good	8
60 ≤ x < 70	A	Good	7
50 ≤ x < 60	B	Average	6
40 ≤ x < 50	C	Below Average	5
x < 40	F	Failed	0

In addition, a student may be assigned the grades 'P' and 'NP' for pass marks and non-passing marks respectively, for Pass/No-pass courses, or the grade 'X' (not permitted).

7.2.1 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.

7.2.2 A letter grade 'F', 'NP' or 'X' in any course implies failure in that course.

7.2.3 A student is considered to have completed a course successfully and earned the credits if she/he secures a letter grade other than 'F', 'NP', or 'X'.

7.3 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:

7.3.1 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

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

$$CGPA = \frac{\sum_{i=1}^{n} SGP_i \times NSC_i}{\sum_{i=1}^{n} NSC_i}$$

Where SGP_i = Semester Grade point average of i^{th} semester
NSC_i = Number of credits for the i^{th} semester
n = the number of semesters completed

7.3.3 The CGPA may be converted into a percentage, using the following formula:
for CGPA <= 9.0, Percentage marks = (CGPA x 10) – 5
for CGPA > 9.0, Percentage marks = (CGPA x 15) – 50

7.4 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.

7.5 There are academic and non-academic requirements for the Graduate programmes where a student shall be awarded the 'P' and 'NP' grades. Non-credit courses such as Extra Academic Programmes belong to this category. No grade points are associated with these grades and these 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.

7.6 In the case of an audit course, the letters "AU" shall be written alongside the course name in the Grade Sheet. A student is not required to register again for passing failed audit courses.

8.0 Assessment of Performance

8.1. 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.

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

8.2.1. 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.

8.3. Lab Courses: Lab courses (Laboratory, Drawing, Workshop, etc.) 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:

Component	Weightage
Attendance	10
Assessment of Tasks Assigned	50
End-semester test / viva voce	40

8.3.1. 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.

8.3.2. 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 assigned and accuracy of the result
- Extent of completion
- A comprehensive viva-voce which examines the overall grasp of the subject

8.4 End-Semester examinations

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

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

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

8.5 Industry Training/Internship Programme

8.5.1 Departments may require students to undergo industry training/internship programmes. Students of the BTECH Programme are required to undergo an Industry Training/Internship

programme after the sixth semester in any industry or reputed organisation. BCOM students are required to do internship at the end of 4th or 5th semester.

8.5.2 Such programmes shall generally be of duration not less than 70 hours.

8.5.3 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.

8.5.4 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.

8.6 Major Project

8.6.1 Students of the BTECH programme and BCA programme shall undertake a Major Project during the course of their graduate studies. The BTECH major project work is normally conducted in two phases during the seventh and eighth semesters of the programme and is to be done individually or in groups within the campus. A department may substitute this with two independent projects in the seventh and eighth semesters with prior permission from the statutory authority. The BCA major project work is conducted during the sixth semester of the programme, and is to be done individually or in groups within the campus.

8.6.2 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.

8.6.3 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.

In the case of the BTECH project, some of these activities may be performed during semester VII (Phase I) and others during Semester VIII (Phase II) as shall be notified by the DPEC.

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

8.6.5 The Convenor 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.

8.6.6 Each student shall submit to the DPEC three bound, typed copies of the project report, 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.

8.6.7 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.

8.6.8 Phase I of the project shall be evaluated through in-semester assessment only. The modality and components of the assessment and their weightages shall be determined by the School and the same shall be notified at the beginning of each semester.

8.6.9 Phase II of the project shall be evaluated through in-semester and end-semester assessments of equal weightage. The in-semester assessment shall be done by the DPEC and the project supervisor and the end-semester assessment shall be done by the external examiner(s) and the project supervisor, assisted by the DPEC. The modality and components of the in-

semester assessment and their weightages shall be determined by the school and the same shall be notified at the beginning of each semester.

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

8.6.11 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

8.6.12 Independent projects as envisaged in clause 8.6.1 shall be evaluated in the same manner as Phase II of the major project.

8.6.13 Those who obtain an 'F' grade for the major project shall be required to re-enrol for it in the subsequent semesters.

8.7 Minor and Mini Projects

8.7.1 Students may be assigned minor and mini projects by the department from the fourth semester onwards to ensure that their learning becomes a hands-on experience. These projects shall be executed by the students individually or in groups under the guidance of faculty members appointed by the department.

8.7.1.1 BCOM students shall undertake a Project (phase 1 & 2) spread across 5th and 6th semesters.

8.7.2 The mode of evaluation of these projects shall follow the pattern of evaluation of Lab Courses (vide clause 8.3) and the modalities for the conduct of evaluation, its components and the weightages attached to these components shall be published by the department concerned at the beginning of each semester.

8.7.3 The students may be required to submit project reports in the format specified. The evaluation of the Minor and Mini Projects shall take into consideration these project reports.

8.8 The evaluation of performance in Extra Academic Programmes 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.

8.9 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.

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

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

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

8.10.2 He/she has satisfactory attendance during the semester according to the norms laid out in section 6 of these regulations.

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

8.11 Registration for end-semester Examinations

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

8.11.2 Students who have registered with the University (vide clause 5) 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 fulfil the eligibility norms as laid down in clause 8.10.

8.11.3 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.

8.11.4 A student who secures an 'F' or 'X' 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 a period of six years from his/her enrolment for 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.

8.11.5 Similarly, in case of an 'NP' grade in Extra Academic Programmes the student shall have to re-register for it in the appropriate semester of the next academic session.

8.11.6 When a student re-registers for the end semester examination of a course, in accordance with clause 8.11.4 above, the better of the two grades obtained (the old and the new) shall be considered for the calculation of SGPA and CGPA.

8.12 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.

8.13 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.

8.14 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.

8.15 Re-examining of answer scripts

8.15.1 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.

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

8.15.3 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.

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

8.15.5 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.

8.15.6 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.

8.15.7 Without prejudice to any of the clauses of section 8.15, 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.

8.16. Improvement Examination

8.16.1 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.

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

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

Programme	Number of Courses for Improvement Examinations		
	Autumn Semester	Spring Semester	Total
BTECH	6	6	12
BCA	4	4	8
BCOM	4	4	8
BSc	4	4	8
BA	4	4	8

8.16.4 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.

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

8.17. Special Examination

8.17.1 The University shall conduct Special Examinations to benefit the following categories of students:

8.17.1.1 Students who, on the completion of the final semester, have some 'F' graded courses in the two final semesters, but no 'F' or 'X' graded courses in any of the previous semesters

8.17.1.2 Students who have only one 'F' graded course in a semester other than the two final semesters and do not have 'F' or 'X' graded courses in the two final semesters.

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

8.17.3 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 inner family circle (restricted to only father, mother, siblings).

8.17.4 Students who have 'X' graded courses only in the last two semesters shall 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.

8.17.5 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.

9.0 Change of Branch (only for BTECH)

9.1 Normally a student admitted to a particular branch of the BTECH programme shall continue studying in that branch till completion. However, in special cases the university may permit a student to change from one branch of studies to another after the first two semesters.

9.2 Students shall be allowed a change in branch subject to the limitation that the strength of a branch should not fall below the existing strength by more than ten percent and should not go above the sanctioned strength by more than twenty percent.

9.3 Only those students shall be eligible for consideration of a change of branch, who have completed all the credits required in the first two semesters of their studies, in their first attempt.

9.4 Applications for a change of branch 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.

9.5 Students may enlist up to two choices of branch, 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.

9.6 Change of branch 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 to be determined by the Office of the Registrar.

9.7 A committee consisting of the Director and heads 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.

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

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

9.10 All changes of branch 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.

10.0 Enrolment (for semesters other than the first)

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

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

10.3 Only those students shall be permitted to enrol 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.

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

10.5 A student who fails to obtain 50% of the credits offered in a semester shall not be permitted to enrol for the next semester and shall have to re-enrol for and attend all the courses of the said semester in the following academic year.

11.0 Eligibility for the Award of the Graduate Degree

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

11.1.1 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;

11.1.2 satisfactorily completed all the non-credit requirements for the degree viz., Extra Academic Activities, Industry Training, field work, internship programme, etc. (if any);

11.1.3 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;

11.1.4 no dues to the University, School, Department, Hostels; and

11.1.5 no disciplinary action pending against him/her.

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

12.0 Termination from the Programme

12.1 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.

12.2 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.

ASSAM DON BOSCO UNIVERSITY
REGULATIONS - POST GRADUATE DEGREE PROGRAMMES

SCIENCE AND TECHNOLOGY

The following are the regulations of the Assam Don Bosco University concerning the Post-Graduate Programmes leading to the award of the Master's Degree in the disciplines of Science and Technology made subject to the provisions of its Statutes and Ordinances.

1.0 Academic Calendar

1.1 Each academic year is divided into two semesters of approximately 18 weeks duration: 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 The schedule of academic activities approved by the Academic Council for each semester, inclusive of the schedule of continuing 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 Duration of the Programme

2.1 The normal duration of the Post Graduate Programme shall be as per the table given below:

Programme	Number of Semesters	Number of Years
Master of Technology (MTECH)	4	2
Master of Computer Applications (MCA)	6	3
Master of Science (MSc)	4	2

2.2 However, students who do not fulfill some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to 4 more semesters (2 years) to complete all the requirements of the degree.

2.3 Under exceptional circumstances and depending on the merit of each case, a period of 2 more semesters (1 year) may be allowed for the completion of the programme

3.0 Course Structure

3.1 The choice based credit system shall be followed for the Post Graduate Degree Programmes. Credits are allotted to the various courses depending on the number of lecture/tutorial/laboratory hours per five-day cycle (one week) of classes assigned to them using the following general pattern:

3.1.1 Lecture : One hour per cycle/week is assigned 1 credit.

3.1.2 Tutorial : One hour per cycle/week is assigned 1 credit.

3.1.3 Practical : Two hours per cycle/week is assigned 1 credit.

3.2 The courses offered for the Post Graduate Degree Programmes are divided into two baskets – core courses and elective courses.

3.3 **Core Courses:** Core courses are those in the curriculum, the knowledge of which is deemed Essential for students who are pursuing the said Degree Programme.

3.3.1 A student shall be required to take all the core courses offered for a particular programme.

3.3.2 The number of credits required from core courses shall be as prescribed by the competent academic authority.

3.4 **Elective Courses:** These are courses in the curriculum which give the student opportunities for specialisation and which cater to his/her interests and career goals. These courses may be selected by the student and/or offered by the department conducting the programme, from those listed in the curriculum according to the norms laid down by the competent academic authority.

3.4.1 The number of credits which may be acquired through elective courses shall be prescribed by the competent academic authority.

3.5 These categories of courses may further be subdivided into departmental, school or institutional, depending on the department which offers the course. The schema of categorisation of courses into baskets is as given below:

Core Courses	
Departmental Core **(DC)**	Core courses which are offered by the department conducting the programme
School Core **(SC)**	Core courses which are offered by a department other than the department conducting the programme, from within the same School
Institutional Core **(IC)**	Core courses which are offered by departments of the University from Schools other than the parent School
Elective Courses	
Departmental Elective **(DE)**	Elective courses which are offered by the department conducting the programme
School Elective **(SE)**	Elective courses which are offered by a department other than the department conducting the programme, from within the same School
Institutional Elective **(IE)**	Elective courses which are offered by departments of the University from Schools others than the parent School

3.6 In order to qualify for a Post Graduate Degree, a student is required to complete the minimum credit requirements as prescribed by the competent academic authority.

3.7 In addition to the prescribed credit requirements a student shall have to complete the requirements of Extra Academic Programmes (EAP) as may be prescribed by the School. Students shall be awarded P/NP grades for the EAP, which shall be recorded in the Gradesheet but not taken into account for computing the SGPA and the CGPA.

3.8 Students who secure a CGPA of at least 8 at the end of the first semester (third semester, in the case of MCA) may opt to take one audit course per semester from any Department from the second semester onwards (fourth semester, in the case of MCA), 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 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.

3.9 In addition, students may also opt for additional elective courses in consultation with their mentors. Students are required to participate in the evaluation process of such courses. The grades obtained for such courses shall be recorded in the gradesheet, but not taken into account for computing SGPA and CGPA.

3.10 It shall be the prerogative of the department to not offer an elective course which has less than 5 students opting for it.

3.11 The medium of instruction shall be English and examinations and project reports shall be in English.

3.12 The course structure and syllabi of the Post Graduate Degree Programmes shall be approved by the Academic Council of the University. Departmental Boards of Studies (DBOS) shall discuss and recommend the syllabi of all the courses offered by the department from time to time before forwarding the same to the School Board of Studies (SBOS). The SBOS shall consider the proposals from the departments and make recommendations to the Academic Council for consideration and approval.

3.13 The curriculum may include industry training and /or fieldwork for a specified time. This is to be satisfactorily completed before a student is declared eligible for the degree. There shall be credit allocation for such industrial training or fieldwork. Normally these activities shall be arranged during convenient semester breaks as shall be determined by the School Board of Studies.

3.14 Faculty Advisor/Mentor: A faculty advisor/mentor (and a co-mentor to perform the duties of a mentor during the absence of the mentor) to shall be assigned for groups of students. 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.

4.0 Admission

4.1 All admissions to the Post 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.

4.2 **Eligibility Criteria**

4.2.1 To be considered for admission to a Post Graduate Degree Programme a candidate should have passed a Bachelor's Degree (or equivalent) programme of a recognised university securing grades/marks as specified in the table below.

4.2.2 Admission will be on the basis of the performance of the candidate at the graduate level, the Post Graduate Entrance Test conducted by the university and/or a personal interview. Candidates for MTECH who have a valid GATE score may be exempted from the entrance test.

Programme	Grade /Marks requirement from qualifying examinations	Entrance Examinations / Personal Interview
MTECH	Completed a Bachelor's Degree programme in the appropriate stream of technology from a recognised university successfully with a minimum CGPA of 6.5 (or equivalent). The Academic Council may establish other eligibility criteria for M Tech in a particular discipline.	Post Graduate Entrance Test of Assam Don Bosco University
MCA	Completed a Bachelor's Degree programme in any stream of a recognised university successfully with a minimum of 50 % marks in the aggregate. In addition, the candidate must have passed Mathematics or equivalent at the higher secondary level or above.	Post Graduate Entrance Test of Assam Don Bosco University
MSc	Completed a Bachelor's Degree programme in Science of a recognised university successfully with a minimum of 50 % marks in the aggregate, with the relevant discipline as a subject	Satisfactory performance in the Personal Interview

4.3 Reservation of seats for the programme shall be as per the guidelines laid out in the Statutes of the University.

4.4 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 semester.

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

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

4.5 All candidates shall be required to satisfy the norms prescribed by the University for medical fitness prior to admission.

4.6 Candidates may be required to furnish a certificate of good conduct from the institution last attended.

4.7 Lateral Entry into the MCA Programme

Students who have completed the BCA programme of Assam Don Bosco University shall be eligible for admission into the third semester of the MCA programme.

5.0 University Registration

5.1 Candidates 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.

6.0 Attendance

6.1 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.

6.2 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.

6.3 Some students, due to exceptional situations like their own serious sickness and hospitalization or death of members of 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:

Attendance during the remaining days of the current semester	Bonus percentage available in the current semester
95% or more	5
90% or more but less than 95%	4
85% or more but less than 90%	3
80% or more but less than 85%	2
75% or more but less than 80%	1

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.

6.4 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 in view of clause 9.5 of these Regulations.

6.5 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.

6.6 **Leave**

6.6.1 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.

6.6.2 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.

6.6.3 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.

6.6.4 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.

6.7 It shall be the responsibility of the student to intimate the concerned teachers regarding his/her absence before availing the leave.

7.0 Grading System

7.1. Three types of courses are offered in the Post Graduate programmes:

- **Graded courses**: For the majority of the courses, students shall be assessed and given grades.
- **Pass/No-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.

7.2 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:

Marks (x) obtained (%)	Grade	Description	Grade Points
90 ≤ x ≤ 100	O	Outstanding	10
80 ≤ x < 90	E	Excellent	9
70 ≤ x < 80	A+	Very Good	8
60 ≤ x < 70	A	Good	7
50 ≤ x < 60	B	Average	6
40 ≤ x < 50	C	Below Average	5
x < 40	F	Failed	0

In addition, a student may be assigned the grades 'P' and 'NP' for pass marks and non-passing marks respectively, for Pass/No-pass courses, or the grade 'X' (not permitted).

7.2.1 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.

7.2.2 A letter grade 'F', 'NP' or 'X' in any course implies failure in that course.

7.2.3 A student is considered to have completed a course successfully and earned the credits if she/he secures a letter grade other than 'F', 'NP', or 'X'.

7.3. 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:

7.3.1. 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

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

$$CGPA = \frac{\sum_{i=1}^{n} SGP_i \times NSC_i}{\sum_{i=1}^{n} NSC_i}$$

Where SGP_i = Semester Grade point average of i^{th} semester
NSC_i = Number of credits for the i^{th} semester
n = the number of semesters completed

7.3.3. The CGPA may be converted into a percentage, using the following formula:
for CGPA <= 9.0, Percentage marks = (CGPA x 10) – 5
for CGPA > 9.0, Percentage marks = (CGPA x 15) – 50

7.4. 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.

7.5. There are academic and non-academic requirements for the Graduate programmes where a student shall be awarded the 'P' and 'NP' grades. Non-credit courses such as Extra Academic Programmes belong to this category. No grade points are associated with these grades and these

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.

7.6. In the case of an audit course, the letters "AU" shall be written alongside the course name in the Grade Sheet. A student is not required to register again for passing failed audit courses.

8.0 Assessment of Performance

8.1. 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.

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

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

8.3. Lab Courses: Lab courses (Laboratory, Drawing, Workshop, etc.) 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:

Component	Weightage
Assessment of Tasks Assigned	60
End-semester test / Viva voce	40

8.3.1. 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.

8.3.2. 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 program/experiment
- Coding, freedom from logical and syntactical errors, and accuracy of the result obtained / conduct of the experiment assigned and accuracy of the result
- Extent of completion
- A comprehensive viva-voce which examines the overall grasp of the subject

8.4. **End-Semester examinations**

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

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

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

8.5. Research Seminar

8.5.1. During the course of the Post Graduate programme students may be required to conduct research seminars on a regular basis. The purpose of these research seminars is to encourage the students to conduct literature survey on the recent trends and developments in a chosen area of the discipline.

8.5.2. The literature survey conducted in preparation for these seminars may lead the students to the development of a project model to be executed during the final semesters of the programme.

8.5.3. The Research Seminars shall be evaluated on the basis of a presentation, a report and a viva voce examination.

8.6. The Major Project / Research Project / Dissertation

8.6.1 Students of the Post Graduate Programme shall undertake a Major Project / Research Project / Dissertation during the course of their Post Graduate studies. The Major Project / Research Project / Dissertation (to be referred to as Major Project henceforth) is normally conducted in two phases during the last two semesters of the programme.

8.6.2 The Major Project may be a software project, a research oriented project or research work which leads to a dissertation, as may be relevant to the discipline in which the work is

undertaken. If it is a research oriented work, it should expose the students to the current state of research in a chosen area of the discipline and lead to new developments in the area.

8.6.3 The Major Project is to be undertaken individually in the campus or outside as may be specified by the department.

8.6.4 Each department shall constitute a Departmental Project Evaluation Committee (DPEC) consisting of the Director of the School (Chairperson), Head of the Department (Vice Chairperson), 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.

8.6.4. The DPEC will 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 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 end semester evaluation of the project.

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

8.6.6. The project supervisor may be from outside the department or university. Such a supervisor should be approved by the DPEC and jointly supervise a project with a faculty member of the department.

8.6.7. The minimum qualification of a project supervisor shall be laid down by the DPEC in consultation with the Director of the School and authorities of the University.

8.6.8. The Chairperson of the DPEC will submit to the Controller of Examinations a panel of at least three names of external examiners at least three weeks before the end semester examination. The Controller of Examinations will appoint the external examiner(s) from this panel.

8.6.9. Each student shall submit to the DPEC four bound, printed copies of the project report, prepared according to the prescribed format made available, by the due date. The student will submit also three copies of a brief summary of the project that will be forwarded to the concerned examiners.

8.6.10 The DPEC will make the arrangements necessary to conduct the end semester evaluation in consultation with the examiners appointed by the University, during the dates notified.

8.6.11 The project will be evaluated through in-semester and end-semester assessments of equal weightage. The in-semester assessment will be done by the DPEC and the project supervisor. The end-semester assessment will be done by the external examiner(s), the project supervisor and a member of the DPEC appointed by it for the purpose. The weightages attached to their respective evaluations shall be 60:20:20.

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

8.6.13 Given below are the suggested components of Internal assessment and respective marks assigned:

- Synopsis: 15 marks
- Seminar presentation of the synopsis: 15 marks
- Project implementation: 40 marks
- Pre-submission presentation: 15 marks
- Pre-submission viva voce: 15 marks

8.6.14 Given below are the suggested components of External assessment and respective marks assigned:

- Project implementation: 40 marks
- Seminar presentation: 25 marks
- Viva voce examination: 20 marks
- Project documentation: 15 marks

8.6.15 Publication of papers and registering of patents are encouraged during the Post Graduate programme. Papers published or patents obtained may be awarded extra weightage during the evaluation of the project.

8.6.16 Those who obtain an 'F' grade for the major project will be required to re-enrol for it in the subsequent semester and pay the prescribed fees.

8.7. The Director will forward the marks obtained in the in-semester evaluation to the Controller of Examinations within the prescribed time as may be notified.

8.8. All evaluated work in a subject except the end semester answer scripts will be returned to the students promptly.

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

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

8.9.2. He/she has satisfactory attendance during the semester according to the norms laid out in section 6 of these regulations.

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

8.10 Registration for end-semester Examinations

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

8.10.2 Students who have registered with the University (vide clause 5) 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 fulfil the eligibility norms as laid down in clause 8.9.

8.10.3 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.

8.10.4 A student who secures an 'F' or 'X' 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.

8.10.5 Similarly, in case of an 'NP' grade in Extra Academic Programmes the student shall have to re-register for it in the appropriate semester of the next academic session.

8.10.6 When a student re-registers for the end semester examination of a course, in accordance with clause 8.10.4 above, the better of the two grades obtained (the old and the new) shall be considered for the calculation of SGPA and CGPA.

8.11 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.

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

8.13 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.

8.14 Re-examining of answer scripts

8.14.1 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.

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

8.14.3 **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 gradesheet issued in respect of the course under scrutiny.

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

8.14.5 **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.

8.14.6 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.

8.14.7 Without prejudice to any of the clauses of section 8.14, 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.

8.15 **Improvement Examination**

8.15.1 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.

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

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

Programme	Number of Courses for Improvement Examinations		
	Autumn Semester	Spring Semester	Total
MCA	4	4	8
MSc	3	3	6
MTECH	2	2	4

8.15.4 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.

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

8.16 **Special Examination**

8.16.1 The University shall conduct Special Examinations to benefit the following categories of students:

8.16.1.1 Students who, on the completion of the final semester, have some 'F' graded courses in the two final semesters, but no 'F' or 'X' graded courses in any of the previous semesters

8.16.1.2 Students who have only one 'F' graded course in a semester other than the two final semesters and do not have 'F' or 'X' graded courses in the two final semesters.

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

8.16.3 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 9.5 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 inner family circle (restricted to only father, mother, siblings).

8.16.4 Students who have 'X' graded courses only in the last two semesters shall 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.

8.16.5 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.

9.0 Enrolment (for semesters other than the first)

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

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

9.3 Only those students shall be permitted to enrol 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.

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

9.5 A student who fails to obtain 50% of the credits offered in a semester shall not be permitted to enrol for the next semester and shall have to re-enrol for and attend all the courses of the said semester in the following academic year.

10.0 Eligibility for the Award of the Post Graduate Degree

10.1 A student shall be declared to be eligible for the award of the Post Graduate Degree for which he/she has enrolled if he/she has

10.1.1 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.

10.1.2 satisfactorily completed all the non-credit requirements for the degree viz., Extra Academic Activities, Industry Training, field work, internship programme, etc. (if any);

10.1.3 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;

10.1.4 no dues to the University, School, Department, Hostels; and

10.1.5 no disciplinary action pending against him/her.

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

11.0 Termination from the Programme

11.1. 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.

11.2. 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.

ASSAM DON BOSCO UNIVERSITY
REGULATIONS FOR MASTER'S DEGREE PROGRAMMES

HUMANITIES AND SOCIAL SCIENCES
COMMERCE AND MANAGEMENT

The following are the regulations of the Assam Don Bosco University concerning the Post-Graduate Programmes leading to the award of the Master's Degree in the disciplines of Humanities and Social Sciences & Commerce and Management made subject to the provisions of its Statutes and Ordinances:

The Master's Degree Programmes of Assam Don Bosco University consist of theory and practicum components, taught and learned through a combination of lectures, field work/field visit and research projects.

1.0 Academic Calendar

1.1 Each academic year is divided into two semesters of approximately 18 weeks duration: 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 The schedule of academic activities approved by the Academic Council for each semester, inclusive of the schedule of continuing evaluation for the semester, dates for end-semester examinations, the schedule of publication of results, etc., shall be laid down in the Academic Calendar for the semester.

2.0 Duration of the Programme

2.1 The normal duration of the Post Graduate Programme in the disciplines of Humanities and Social Sciences & Commerce and Management shall be 4 semesters (2 years).

2.2 However, students who do not fulfil some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to 4 more semesters (2 years) to complete all the requirements of the degree.

2.3 Under exceptional circumstances and depending on the merit of each case, a period of 2 more semesters (1 year) may be allowed for the completion of the programme

3.0 Course Structure

3.1 The choice based credit system shall be followed for the Masters Degree Programmes. Credits are allotted to the various courses depending on the number of hours of lecture/practicum/Field work assigned to them using the following general pattern:

3.1.1. Lecture : One hour per cycle/week is assigned 1 credit.

3.1.2. Practicum/fieldwork : Two hours per cycle/week is assigned 1 credit.

3.2 The courses are divided into two baskets – core courses and elective courses.

3.3 **Core Courses:** Core courses are those in the curriculum, the knowledge of which is deemed essential for students who are pursuing the programme.

3.3.1 A student shall be required to take all the core courses offered for a particular programme.

3.3.2 The number of credits required from core courses shall be as prescribed by the competent academic authority.

3.4 **Elective Courses:** These are courses in the curriculum which give the student opportunities for specialisation and which cater to his/her interests and career goals. These courses may selected by the student and/or offered by the department conducting the programme, from those listed in the curriculum according to the norms laid down by the competent academic authority.

3.4.1 The number of credits which may be acquired through elective courses shall be prescribed by the Board of studies pertaining to the programme.

3.5 These categories of courses may further be subdivided into departmental, school or institutional, depending on the department which offers the course. The schema of categorisation of courses into baskets is as given below:

Core Courses	
Departmental Core **(DC)**	Core courses which are offered by the department which conducts the programme
School Core **(SC)**	Core courses which are offered by a department other than the department which conducts the programme, from within the same School
Institutional Core **(IC)**	Core courses which are offered by departments of the University from Schools other than the parent School
Elective Courses	
Departmental Elective **(DE)**	Elective courses which are offered by the department which conducts the programme
School Elective **(SE)**	Elective courses which are offered by a department other than the department which conducts the programme, from within the same School
Institutional Elective **(IE)**	Elective courses which are offered by departments of the University from Schools others than the parent School

3.6 In order to qualify for a Masters Degree, a student is required to complete the credit requirement as prescribed in the curriculum.

3.7 In addition to the prescribed credit requirement, a student shall have to complete the requirements of Extra Academic Programmes (EAP) as may be prescribed by the Department. Students shall be awarded P/NP grades for the EAP, which shall be recorded in the Gradesheet, but not taken into account for computing the SGPA and the CGPA.

3.8 Students who secure a CGPA of at least 7.5 at the end of the 2nd semester may opt to take one audit course per semester from any Department from the 3rd 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% percentage is necessary for obtaining a P grade for such courses. When auditing courses 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.

3.9 In addition, students may also opt for additional elective courses in consultation with their mentors. Students are required to participate in the evaluation process of such courses. The grades obtained for such courses shall be recorded in the gradesheet, but not taken into account for computing SGPA and CGPA.

3.10 It shall be the prerogative of the department to not offer an elective course which has less than 5 students opting for it.

3.11 The medium of instruction shall be English and examinations and project reports shall be in English.

3.12 The course structure and syllabi of the Post Graduate Degree Programmes shall be approved by the Academic Council of the University. Departmental Boards of Studies (DBOS) shall discuss and recommend the syllabi of all the courses offered by the department from time to time before forwarding the same to the School Board of Studies (SBOS). The SBOS shall consider the proposals from the departments and make recommendations to the Academic Council for consideration and approval.

3.13 The curriculum may include fieldwork / institutional visits / internship for a specified time. These are to be satisfactorily completed before a student is declared eligible for the degree. There shall be credit allocation for such activities. These activities may be arranged during the semester or during convenient semester breaks as shall be determined by the School Board of Studies.

3.14 Faculty Advisor/Mentor: A faculty advisor/mentor shall be assigned for groups of students. 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.

PROGRAMME SPECIFIC CURRICULAR ASPECTS

4.0 MASTER OF SOCIAL WORK (MSW)

4.1 Area of Concentration: The third and fourth semesters shall have courses from a chosen Area of Concentration (AoC) from among those offered by the department. The AoC is to be opted for at the end of the second semester and will be confirmed by the department depending on the availability of seats and the aptitude and ability of the student. An AoC will be offered by the department only if a minimum of six students opt for it. The fieldwork and research project of the third and fourth semesters will be based on the AoC.

4.2 Concurrent and Continuous Fieldwork

Fieldwork shall be an essential part of the course structure in all the semesters of the programme. The field work practice in the first semester shall consist of orientation visits, sessions for skills training and placement. In the first year, the focus of the field work shall be the community and in the second year the focus shall be based on the specialisation chosen by the students. In the first semester,, students shall be placed in communities, NGOs, service organizations and government agencies working with communities, and in those settings where they can be exposed to the community and community issues. The students get a close feel of the community and community settings, understand the dynamics and issues in the community and become aware of the sensitivities of people while working with them. They also get a firsthand experience of the programmes and projects implemented in the communities by NGOs and government agencies and the impact that these have on the community. They shall also interact with the personnel from organisations and the community members to understand the tension between tradition and change that the communities in the region are likely to experience, and how it is handled. They shall, with the help of the organisation and the field work supervisor, identify an issue and work on it following the principles of community organization. The students are expected to be creative and innovative in assisting the agency and community in whatever way possible.

The field work practice in the second semester will consist of lab sessions for skills training and placement. The focus will be on the practice of social case work and Group works. The students shall be placed in NGOs, and government service organizations and government agencies working with individuals and families, and in those settings where they can be exposed to issues related to individuals and groups. Normally a student spends fifteen hours over two days per week in field work.

4.2.1 Normally a student shall spend fifteen hours over two days per week in field work. However, keeping in mind the peculiar situation of transport and communications in the region and the expenses involved, the field work practice may be arranged in other convenient ways as the institution deems fit.

4.2.2. The student is required to submit the report on the field work and the field work diary to the field work supervisor, before the commencement of classes on the first day of class following the field work days. The supervisor shall conduct regular field work conferences

4.2.3. A student is expected to have 100 percent attendance in field work. Any shortage shall be compensated by him/her.

4.2.4 At the end of the semester the student shall submit a summary report of the field work for the semester and a viva voce examination shall be conducted.

4.3.5 The field work practice in the Third and Fourth Semesters shall focus upon the Area of Concentration chosen by the students. The students shall be placed in the field for twenty five days of consecutive field work. The field work settings shall be communities, NGOs, service organizations, hospitals, clinics and governmental agencies. Those students who are specializing in Community Development will either be placed in an urban or rural

community setting that is identified by the Department. Students who are specializing in Medical and Psychiatric Social Work will be exposed to either a Medical or a Psychiatric setting.

4.3 Rural Camp

Students shall organise and participate in a rural camp during the first / second semester. The duration of the rural camp shall generally be ten days excluding days of travel.

4.3.1 The objectives of the rural camp are:

- To apply the acquired skills of group work and community organisation in communities.
- To understand and assess the problems faced by the rural population.
- To involve oneself positively in the communities to help to remove some of these problems.

4.3.2 At the end of the camp each student shall submit a written report to the department in a specified format. Performance at the Rural Camp shall be considered for the evaluation of the Field Work during the second semester.

4.3.3 The Rural Camp shall be credited along with the fieldwork of the semester along with which it can be conveniently coupled.

4.4 Study Tour

During the programme the students shall undertake a study tour of ten days along with the assigned faculty members to a place approved by the department. The places are to be so chosen as to be of educational benefit to students. During the tour, the focus shall be on visiting and interacting with as many NGOs/ state/national/international organisations involved in developmental work as possible. A report of the learning outcomes shall be submitted to the department at the end of the tour. The Study Tour shall be a Pass/No Pass course.

4.5 Block Placement

After the examinations at the end of the fourth semester, the students shall be placed with an NGO or Agency for a period of not less than one month for practical experience and application of their skills. While the Block Fieldwork is not credited, it is mandatory for the completion of the MSW programme. The student shall contact an agency of his/her choice and get the choice of agency approved by the department. Students shall endeavour to choose an agency that is primarily in tune with their AoC and which has credentials in the concerned field. At the end of every week the student shall send a brief report to the supervisor and at the end of the Block Field Work period a summary report shall be submitted. The summary report shall contain a short description of the Agency, the social service skills applied in his/her work and the student's learning outcomes. The report shall be submitted in a format prescribed by the department and shall be submitted together with a certificate from the agency confirming his/her field work, in a prescribed format.

4.6 Research Project Work

Every student shall undertake a research project work which has bearing on his/her AoC and present a written thesis on the research work under the supervision and guidance of a faculty member. The preliminary work may begin at the end of the second semester. The students are expected to complete the data collection before the fourth semester. The thesis is to be submitted to the department before the date notified. The student shall write a dissertation of the research thesis and appear for a viva voce examination on the research done. The mode and components of evaluation of the research work and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

4.7 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

5.0 MSC PSYCHOLOGY (PSYCHOLOGICAL COUNSELLING)

5.1 Field Work

Students shall take part in concurrent field work during the first three semesters in social service agencies, medical institutions, the criminal justice system, etc., where the student of psychological counselling can get a first hand experience of the application of the learning derived from the classroom. The field work shall be credited and shall be evaluated using norms laid down by the department.

5.2 Study Tour

During the programme the students shall undertake a study tour of ten days with the faculty members, to a place approved by the department. The places are to be so chosen as to be of educational benefit to students. During the tour, the focus shall be to visit and interact with NGOs, hospitals, state/national/international organisations involved in psychological counselling. A report of the learning outcomes shall be submitted to the department at the end of the tour. The Study Tour shall be a Pass/No Pass course.

5.3 Summer Internship

Students are required to undergo a summer internship of two weeks' during the semester break between the second and third semesters. It is a P/NP course and shall be recorded in the third semester. The Summer Internship gives students an opportunity to apply the theories and principles that they have learnt in class room courses to the "real world" of social service agencies, medical institutions, the criminal justice system, business, and industry. During the internship, students can explore career interests, develop professional skills, learn how community organizations work and expand their clinical and interpersonal skills. The summer internship enriches the students' academic experience while making a valuable contribution to the community and utilizing the vacation optimally.

5.4 Supervised Internship

Each student shall perform a supervised internship for a period of one semester in an organisation which offers counselling help to clients. The supervised internship shall ordinarily be organised during the last semester of the programme. It shall be the prerogative of the department to propose the number of institutions where a student is expected to perform supervised internship. Supervision shall be provided for by the university in collaboration with the organisation where the student performs the internship. Evaluation of the internship shall be based on the documentation, reports from the organisation, report of the supervisor and the presentation and the viva voce examination of the student at the end of the period of Internship.

5.5 Research Project Work

A research project shall be undertaken during the course of the third and the fourth semesters. The topic of the research shall be so chosen that it will be possible for the student to pursue and complete the research work in the institution/hospital where the student is placed for internship. The preliminary work may begin at the end of the second semester. The students are expected to complete the data collection before the fourth semester. The thesis is to be submitted to the department before the date notified. The student shall write a dissertation of the research thesis and appear for a viva voce examination on the research done. The mode and components of evaluation of the research work and the weightages attached to them shall be published by the Department/ Institute at the beginning of the semester.

5.6 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

6.0 MA EDUCATION

6.1 Specialisations

The Masters Degree Programme in Education offers a number of specialisations, of which a student shall be required to choose a specialisation after the completion of the first semester. The department shall have the prerogative of not offering a specialisation if a sufficient number of students do not opt for it.

6.2 Educational Seminar

During the course of the programme, students are expected to present a series of seminars which will address fundamental intellectual, conceptual and practical issues in current educational philosophy and application. They may also deal with other relevant topics which may be suggested by the department. Students shall be assisted through guest lectures, discussions, field work in education related institutions and active engagement with faculty members. During these interactions students shall be provided with an opportunity to explore how best to bring new interdisciplinary scholarship, technology and critical thinking into the development of the chosen seminar area. They shall also consider alternative pedagogic strategies, teaching techniques and technologies. Students shall prepare and present a final paper based on these seminars. Students shall be evaluated on the basis of the seminars and the final paper.

6.3 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

6.4 Research Project Work

Every student shall undertake a research project work which has bearing on his/her field of specialisation and present a written thesis on the research work under the supervision and guidance of a faculty member. The Research Project shall be undertaken individually, in two phases during the third and fourth semesters. Students are expected to make presentations to the department at different stages of the research work. The student shall write a dissertation of the research thesis, submit it to the department and appear for a viva voce examination at times to be notified by the department. The mode and components of evaluation of the research work and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

6.5 School Visits and Audit

The students of the Masters Programme in Education shall be engaged in regular school visits with the purpose of understanding and evaluating the process of teaching, learning and evaluation as well as the exigencies of administration of the school. The students shall be trained in the principles and practice of performing a school audit and they shall undertake the audit of a school in groups during the course of the programme.

6.6 Internship

During the final semester of the programme, a student is required to undergo an internship for a period of one month. The internship provides an opportunity for students to experience the ground reality and connect it with the theoretical and methodological perspectives the student has studied and interiorized. During the internship the student will be monitored and guided by his/her supervisor and faculty members. The student will be required to maintain a journal and at the end of the period of internship, submit a written report and to make a presentation of his/her experiences and learnings at the internship. The student will be required also to submit a report from the head of the institution regarding his/her performance there.

The evaluation of the student shall be based on the level of his/her engagement during the internship in addition to his/her ability to communicate this engagement in the journal, the report and the presentation. The journal and the report are to be submitted within a month of the completion of the internship. The department shall specify the criteria for evaluating the journal, the report and the presentation.

7.0 MA MASS COMMUNICATION

7.1 Specialisations

The Master's Degree Programme in Mass Communication offers a number of specialisations, of which a student shall be required to choose a specialisation after the completion of the first semester. The department shall have the prerogative of not offering a specialisation if a sufficient number of students do not opt for it.

7.2 Media House Visits

During the course of the programme, students shall be required to visit a variety of Media Houses in small groups constituted by the department. The purpose of these Media House Visits shall be to gain exposure to the best practices among the day-to-day activities of the media house. A report of the visit is to be submitted in the format specified within two days of the visit. The Media House visit shall be a graded course and grades shall be awarded on the basis of the written reports of the media house visits.

7.3 Research Project Work

Every student shall undertake a research project work which has a bearing on his/her field of specialisation and present a written thesis on the research work under the supervision and guidance of a faculty member. The Research Project shall be undertaken individually, in two phases during the course of two semesters as shall be laid down in the course structure of the programme. Students are expected to make presentations to the department at different stages of the research work. The student shall write a dissertation of the research thesis, submit it to the department and appear for a viva voce examination at times to be notified by the department. The mode and components of evaluation of the research work and the weightages attached to them shall be published by the Department/Institute at the beginning of the semester.

7.4 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

7.5 Internship

All students shall undergo an internship involving media related activities of four weeks' duration. 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.

7.6 Final Project

As a Final Project the students are required to create a Social Awareness and Community Development oriented multi-media project which shall culminate in a Media Event. The purpose of the final project is to showcase all the skills that the students have acquired during the course of the programme as well as demonstrate their Media and Event Management, and Media Entrepreneurship abilities and at the same time use these skills for the service and upliftment of the community. The Final Project shall essentially be a group project and the number of groups shall be specified by the department. The groups shall perform their activities under the guidance of faculty members who shall be assigned to guide each group. The last dates for the submission of the project proposal and

the conduct of the event shall be notified by the Department well in advance. The components of evaluation of the Final Project and their weightages shall be as notified by the department at the beginning of the semester.

8.0 MASTER OF ARTS (MA) ENGLISH

8.1 Specialisations

The Master's Degree Programme in English offers a number of specialisations, of which a student shall be required to choose a specialisation after the completion of the second semester. The department shall have the prerogative of not offering a specialisation if a sufficient number of students do not opt for it.

8.2 Educational Seminar

During the course of the programme, students are expected to present a series of seminars related to English literature.They may also deal with other relevant topics which may be suggested by the department. Students shall prepare and present a final paper based on these seminars. Students shall be evaluated on the basis of the seminars and the final paper.

8.3 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

8.4 Dissertation

Students will be required to write a dissertation in the 4th semester.

9.0 MASTER OF COMMERCE (MCOM)

9.1 Specialisations

The Master's Degree Programme in Commerce offers a number of specialisations, of which a student shall be required to choose a specialisation after the completion of the second semester. The department shall have the prerogative of not offering a specialisation if a sufficient number of students do not opt for it.

9.2 Project Work/Dissertation

The Master's Degree Programme in Commerce will require students to do Project work in the 3rd and 4th semesters. The mode and components of evaluation of the project work and the weightages attached to them shall be published by the department at the beginning of the semester.

9.3 Assignments

Assignments are an essential part of learning. The faculty shall engage students in a minimum of one individual and one group assignment per course, per semester. A group assignment shall be accompanied by a common presentation.

10.0 Admission

10.1 All admissions to the Post 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.

10.2 Eligibility Criteria

10.2.1. To be considered for admission to a Post Graduate Degree Programme a candidate should have passed a Bachelor's Degree (or equivalent) programme of a recognised university securing 50% of the grades/marks.

10.2.2. Admission will be on the basis of the academic records of the candidate, and taking into consideration his/her performance in any or all of the following:

- Written test
- Group Discussion
- Personal Interview

10.3 Candidates whose results for the qualifying examination are not yet declared may be provisionally admitted provided she/he submits proof of fulfilment of the eligibility criteria by 31 October of the year of provisional admission.

11.0 University Registration

Candidates 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.

12.0 Attendance

12.1 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.

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

12.3 Some students, due to exceptional situations like their own serious sickness and hospitalization or death of members of inner family circle, 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:

Attendance during the remaining days of the current semester	Bonus percentage available in the current semester
95% or more	5
90% or more but less than 95%	4
85% or more but less than 90%	3
80% or more but less than 85%	2
75% or more but less than 80%	1

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.

12.4 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 in view of clause 13.5 of these Regulations.

12.5 The School may decide 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.

12.6 Leave

12.6.1 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 School on prescribed forms, through the Head of the Department, stating fully the reasons for the leave requested along with supporting documents.

12.6.2 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 inform the office of the Director promptly.

12.6.3 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 to the Registrar with supporting documents in each case; the decision to grant leave shall be taken by the Registrar on the recommendation of the Director.

12.6.4 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.

12.6.5 It shall be the responsibility of the student to intimate the concerned teachers regarding his/her absence before availing of the leave.

13.0 Grading System

13.1 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:

Marks (x) obtained (%)	Grade	Description	Grade Points
90 ≤ x ≤ 100	O	Outstanding	10
80 ≤ x < 90	E	Excellent	9
70 ≤ x < 80	A+	Very Good	8
60 ≤ x < 70	A	Good	7
50 ≤ x < 60	B	Average	6
40 ≤ x < 50	C	Below Average	5
x < 40	F	Failed	0

In addition, a student may be assigned the grades 'P' and 'NP' for pass marks and non-passing marks respectively, for Pass/No-pass courses, or the grade 'X' (not permitted).

13.1.1 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.

13.1.2 A letter grade 'F', 'NP' or 'X' in any course implies a failure in that course.

13.1.3 A student is considered to have completed a course successfully and earned the credits if she/he secures a letter grade other than 'F', 'NP', or 'X'.

13.2 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:

13.2.1 **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

13.2.2 **The Cumulative Grade Point Average (CGPA)** : From the SGPAs obtained by a student in the completed semesters, the CGPA will be calculated using the following formula:

$$CGPA = \frac{\sum_{i=1}^{n} SGP_i \times NSC_i}{\sum_{i=1}^{n} NSC_i}$$

Where SGP_i = Semester Grade point average of i^{th} semester
NSC_i = Number of credits for the i^{th} semester
n = the number of semesters completed

13.2.3 The CGPA may be converted into a percentage, using the following formula:
for CGPA <= 9.0, Percentage marks = (CGPA x 10) – 5.
for CGPA > 9.0, Percentage marks = (CGPA x 15) – 50

13.3 Both the SGPA and CGPA will 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 will be used.

13.4 There are academic and non-academic requirements for the programme where a student will be awarded the 'P' and 'NP' grades. All non-credit courses (such as Study Tour and Extra Academic Activities) belong to this category. No grade points are associated with these grades and these 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.

14.0 Assessment of Performance

14.1 A student's performance is evaluated through a continuous system of evaluation comprising tests, quizzes, assignments, seminars, projects, research work, concurrent and block field work performance and end-semester examinations.

14.2 **Theory Courses**: Theory courses will 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 conduct of in-semester evaluation, its components and the weightages attached to its various components shall be published by the department concerned at the beginning of each semester.

14.3 **Practicum/Field Work/Lab:** These courses shall be evaluated on the basis of attendance, performance of tasks assigned and an end semester test/viva voce examination. The weightage assigned to these components of the evaluation is given in the following table:

Component	Weightage
Attendance	10
Performance of tasks assigned	50
end-semester test / viva voce examination	40

14.4 End-Semester examinations

14.4.1. End-semester examinations, generally of three hours' duration, shall be conducted by the University for the theory courses. However, the Director of the Institute shall make the arrangements necessary for holding the examinations.

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

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

14.5 The evaluation of performance in Co-curricular Activities will be done by the authorities conducting them and they will communicate the grades to the Director who will forward them to the Controller of Examinations of the University.

14.6 The Director will forward the marks obtained in the in-semester evaluation to the Controller of Examinations within the prescribed time as may be notified.

14.7 All evaluated work in a subject except the end semester answer scripts will be returned to the students promptly. They should be collected back after the students have examined them, and preserved for a period of one semester.

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

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

12.8.2 He/she has satisfactory attendance during the semester according to the norms laid out in section 9 of these regulations.

12.8.3 He/she has paid the prescribed fees or any other dues of the university, institute and department within the date specified.

14.9 Registration for end-semester Examinations

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

14.9.2 Students who have registered with the University 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 fulfil the eligibility norms as laid down in clause 14.8.

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

14.9.4 A student who secures an 'F' or 'X' 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 a period of four years from his/her enrolment for 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.

14.9.5 Similarly, in case of an 'NP' grade in Extra Academic Programmes the student shall have to re-register for it in the appropriate semester of the next academic session.

14.9.6 When a student re-registers for the end semester examination of a course, in accordance with clause 14.9.4 above, the better of the two grades obtained (the old and the new) shall be considered for the calculation of SGPA and CGPA.

14.10 **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.

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

14.11.1 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 6 of these Regulations.

14.12 **Re-examining of answer scripts**

14.12.1 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.

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

14.12.3 **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 gradesheet issued in respect of the course under scrutiny.

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

14.12.5 **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 Institute.

14.12.6 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.

14.12.7 Without prejudice to any of the clauses of section 14.12, 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.

14.13 **Improvement Examination**

14.13.1 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 the programme.

14.13.2 A student may choose no more than six courses (three in the Autumn semester and three in the Spring semester) for improvement examinations.

14.13.3 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.

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

14.14 **Special Examination**

14.14.1 The University shall conduct Special Examinations to benefit the following categories of students:

14.14.1.1 Students who, on the completion of the final semester, have some 'F' graded courses in the two final semesters, but no 'F' or 'X' graded courses in any of the previous semesters

14.14.1.2 Students who have only one 'F' graded course in a semester other than the two final semesters and do not have 'F' or 'X' graded courses in the two final semesters.

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

14.14.3 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 15.5 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 inner family circle (restricted to only father, mother, siblings).

14.14.4 Students who have 'X' graded courses only in the last two semesters shall 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.

14.14.5 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.

15.0 Enrolment (for semesters other than the first)

15.1 Every student is required to enrol for the programme through the designated officer at the commencement of each semester on the days fixed for such enrolment and notified in the Academic Calendar.

15.2 Students who do not enrol on the days announced for the purpose may be permitted late enrolment up to the notified day in the Academic Calendar on payment of a late fee.

15.3 Only those students will be permitted to enrol who have

15.3.1 cleared all University, Institute, Department, Hostel and Library dues and fines (if any) of the previous semester,

15.3.2 paid all required University, Institute, Department and Hostel fees for the current semester, and

15.3.3 not been debarred from enrolling on any specific ground.

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

15.5 A student who fails to obtain 50% of the credits offered in a semester shall not be permitted to enrol for the next semester and shall have to re-enrol for and attend all the courses of the said semester in the following academic year.

16.0 Eligibility for the Award of Degree

16.1 A student shall be declared to be eligible for the award of the degree if he/she has

16.1.1 completed all the credit requirements for the degree with grade 'C' or higher grade in each of the graded courses and grade 'P' in all the non-graded courses.

16.1.2 satisfactorily completed all the non-credit requirements for the degree (if any);

16.1.3 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;

16.1.4 no dues to the University, Institute, Department, Hostels; and

16.1.5 no disciplinary action pending against him/her.

16.2 The award of the degree must be recommended by the Academic Council and approved by the Board of Management of the University.

17.0 Termination from the Programme

17.1 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.

17.2 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: BACHELOR'S DEGREE PROGRAMMES

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:

Component	Weightage	Remarks
Class Test (Two Class tests of one and a half hour duration)	20	Average of the two marks shall be considered
Assignment (Individual and Group)	10	Group assignments for two courses and individual assignments for the remaining courses
Non-formal evaluation	5	Based on response and interaction in class, quizzes, open book tests, etc.
Attendance	5	For norms regarding attendance cfr. clause 6 of the Regulations for Undergraduate Programmes

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:

Attendance Percent (x)	Marks Allotted	
	Theory	Lab
75 <= x < 80	2	4
80 <= x < 90	3	6
90 <= x < 95	4	8
95 <= x 100	5	10

EVALUATION OF LABORATORY COURSES, DRAWING AND WORKSHOP

All Laboratory courses 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:

Component	Weightage
Attendance	10
assessment of tasks assigned	50
End Semester Test and/or Viva-Voce Examination	40
Total	100

In-Semester Evaluation of Minor and Mini 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:

In Semester Evaluation	Marks	End Semester Evaluation (weightage 40)	Marks
Synopsis	10	Project Implementation	16
Seminar presentation of synopsis (Analysis and Design)	15	Seminar Presentation	8
Progress Seminar (Implementation)	15	Viva Voce Examination	16
Project Documentation	10		
Attendance	10		
Total	**60**		**40**

In-Semester Evaluation of BTECH Major Project Phase I and Phase II

The in-semester evaluation of Major Project Phase I and Phase II shall have 60% weightage. The modality and conduct of the in-semester evaluation of the Major Project Phase I, and their weightages shall be declared by the DPEC of each department at the beginning of the semester. The following aspects are to be assessed, among others:

- Synopsis presentation
- Progress seminars
- Progress reports
- Weekly activity reports

In-Semester BCOM Project Evaluation

The scheme of in-semester evaluation and the modalities along with the weightages will be specified by the department at the beginning of the semester.

SCHEME OF IN-SEMESTER EVALUATION - MASTER'S DEGREE PROGRAMMES

MCA, MSW, MSC (Psychology), MA English, MA Education, MCOM

Theory Courses

The different components of the scheme of in-semester Assessment and the weightages attached to them for the theory courses offered in the MSW, MSc-PC and MA-HR programmes are given in the table below:

Component	Weightage
Class Test (Two class tests of equal weightage)	20
Assignments, Group Presentations/Seminar	10
Non-formal evaluation	5
Attendance	5
Total	**40**

Non-formal Evaluation

Non-formal evaluation may be done using a combination of quizzes, unannounced tests, open book tests, library work reports, class room interaction and participation, etc. The scheme of non-formal evaluation shall be announced by every teacher in the beginning of the semester.

Attendance

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

Attendance Percent (x)	Marks Allotted
75 <= x < 80	2
80 <= x < 90	3
90 <= x < 95	4
95 <= x 100	5

NB

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.

MCA Minor Project

The guidelines for the conduct and evaluation of the MCA Minor Project shall be laid down by the Department . The components of evaluation and allotment of marks will be as follows:

In Semester Evaluation	Marks	End Semester Evaluation (weightage 40)	Marks
Synopsis	10	Project Implementation	16
Seminar presentation of synopsis (Analysis and Design)	15	Seminar Presentation	8
Progress Seminar (Implementation)	15	Viva Voce Examination	16
Project Documentation	10		
Attendance	10		
Total	**60**		**40**

In-Semester Evaluation of MCA Major Project

The in-semester evaluation of the MCA Major Project shall have 60% weightage. The Internal Evaluation of the Major project will be done through two seminar sessions:

Synopsis	:	20
Seminar Presentation of Synopsis (Analysis and Design)	:	30
Progress Seminar (Implementation)	:	30
Project Documentation	:	20

External Evaluation of all Major projects will follow the guidelines laid down in the Regulations.

MSW, MSc Psychology Field Work

The components of evaluation and their weightages for the concurrent/continuous field work are as follows:

Component	Weightage
Field Work Diary	10
Agency Evaluation	15
Faculty Evaluation	20
Attendance	5
Viva Voce Examination	50
Total	**100**

Practicum

Field Report : 15
Presentation : 15
Administration of tests : 10
Faculty Evaluation : 10
Viva Voce Examination : 50

MSW, MSc Psychology Research Project

Phase I

Literature Survey Presentation : 40
Synopsis Presentation : 60

Phase II

Examination of Thesis : 50
Presentation and Viva Voce Exam : 50

MTECH, MSC (Physics, Chemistry, Mathematics, Life Sciences, Zoology)

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:

Component	Weightage	Remarks
Class Test (Two Class tests of one and a half hour duration)	20	Average of the two marks shall be considered
Assignments	15	Written Assignments/Seminar on course Topics/ Technical Paper Review
Non-formal evaluation	5	Based on response and interaction in class, quizzes, open book tests, etc.
Total	40	

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.

In-Semester Evaluation of Project (Phase I) / Research Project (Phase I) / Dissertation (Phase I)

The in-semester evaluation of Project Phase I / Research Project (Phase I) / Dissertation (Phase I) shall have 60% weightage. It shall be evaluated in the following seminar sessions having equal weightage:

Seminar 1: Presentation of the synopsis

Synopsis : 30%
Seminar presentation of the synopsis : 50%
Viva voce examination : 20%

Seminar 2: Progress Seminar

Progress report	:	30%
Progress seminar	:	50%
Viva voce Examination	:	20%

In-Semester Evaluation of Project (Phase II) / Research Project (Phase II) / Dissertation (Phase II)

The in-semester evaluation of Project Phase II / Research Project (Phase II) / Dissertation (Phase II)shall have 60% weightage. The in-semester evaluation will be done through two seminar sessions having equal weightage. Each seminar will be evaluated using the following components.

Progress Report	:	30
Progress Seminar	:	50
Viva Voce Examination	:	20

External Evaluation of the project / Research Project / Dissertation shall follow the guidelines laid down in the Regulations.

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) Salvar, kurta and duppatta of the prescribed colour and material may also be used. 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 8:55 am. 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 9:00 am. Immediately after assembly all should proceed to the classroom to start class at 9:10 am. 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 enter the university before 8:55 am. At the Azara campus, the University gates shall remain closed from 9:05 am to 9:20 am. Anybody entering the University after the gates open at 9:20 am shall not be given attendance for the first hour of class although he/she may be permitted to attend the class.

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 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 condonement 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.

7.0 **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.

8.0 **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. Three of the most important activities are D'VERVE & BOSCOSIADE (intra-University sports and cultural festival), PRAJYUKTTAM (the inter-University technical festival) and CREAZONE (the University magazine). 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 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.

DEPARTMENT OF LIFE SCIENCES

MASTER OF SCIENCE
IN BIOCHEMISTRY, BIOTECHNOLOGY AND MICROBIOLOGY

Semester 1

Type	Course Code	Course Name	Category	Credits	Page
Theory	BCBM0008	Biomolecules	SC/DC	4	60
	BTPE0009	Thermodynamics and Enzymology	SC/DC	3	72
	MBCG0001	Cell Biology and Genetics	SC/DC	4	77
	BCAT0002	Analytical Techniques for Biological Sciences	SC/DC	3	53
Lab	BCBM6001	Biomolecules Lab	SC/DC	1	62
	BCAT6002	Analytical Techniques Lab	SC/DC	1	62
	BTPE6009	Thermodynamics and Enzymology Lab	SC/DC	1	76
	MBCG6001	Cell Biology and Genetics Lab	SC/DC	1	84
Total Credits				**18**	

Semester 2

Type	Course Code	Course Name	Category	Credits	Page
Theory	BTCA0010	Computer Applications and Bioinformatics	SC/DC	3	73
	BCMB0003	Molecular Biology	SC/DC	4	54
	BTRM0003	Research Methodology and Biostatistics	SC/DC	4	65
	MBBM0007	Basic Microbiology	SC/DC	3	83
Lab	BTCA6010	Computer Applications and Bioinformatics Lab	SC/DC	2	76
	BCMB6003	Molecular Biology Lab	SC/DC	2	63
	MBBM6002	Basic Microbiology Lab	SC/DC	1	84
Total Credits				**19**	

Semester 3: BIOTECHNOLOGY

Type	Course Code	Course Name	Category	Credits	Page
Theory	BTAP0004	Animal and Plant Biotechnology	DC	4	66
	BTGE0005	Genetic Engineering	DC	3	67
	BTIM0006	Immunology	DC	3	68
	BTBE0007	Bioprocess Engineering	DC	3	70
Lab	BTAP6003	Animal and Plant Biotechnology Lab	DC	2	74
	BTGE6004	Genetic Engineering Lab	DC	1	74
	BTIM6005	Immunology Lab	DC	1	75
	BTBE6006	Bioprocess Engineering Lab	DC	1	75
	BTDI6007	Dissertation Phase I	DC	2	75
Total Credits				**20**	

Semester 4: BIOTECHNOLOGY

Type	Course Code	Course Name	Category	Credits	Page
Theory	BTAB0008	Advances in Biotechnology	DC	4	71
Lab	BTDI6008	Dissertation Phase II	DC	16	76
Total Credits				**20**	

Semester 3: BIOCHEMISTRY

Type	Course Code	Course Name	Category	Credits	Page
Theory	BCIM0004	Immunology and Medical Biochemistry	DC	4	55
	BTGE0005	Genetic Engineering	DC	3	67
	BCPY0005	Physiology	DC	3	56
	BCBM0006	Bioenergetics and Metabolism	DC	3	58
Lab	BCIM6004	Immunology and Medical Biochemistry Lab	DC	2	63
	BTGE6004	Genetic Engineering Lab	DC	1	74
	BCPY6005	Physiology lab	DC	1	63
	BCBM6006	Bioenergetics and Metabolism Lab	DC	1	64
	BCDI6007	Dissertation Phase I	DC	2	64
Total Credits				**20**	

Semester 4: BIOCHEMISTRY

Type	Course Code	Course Name	Category	Credits	Page
Theory	BCAC0007	Advances in Biochemistry	DC	4	59
Lab	BCDI6008	Dissertation Phase II	DC	16	65
Total Credits				**20**	

Semester 3: MICROBIOLOGY

Type	Course Code	Course Name	Category	Credits	Page
Theory	MBVB0003	Virology, Bacteriology and Mycology	DC	5	78
	MBDE0004	Microbial Diversity and Ecology	DC	2	79
	BTGE0005	Genetic Engineering	DC	3	67
	MBIM0005	Immunology and Medical Microbiology	DC	3	80
Lab	MBMT6003	Microbiology Techniques Lab	DC	2	84
	MBDE6004	Microbial Diversity and Ecology Lab	DC	1	85
	BTGE6004	Genetic Engineering lab	DC	1	74
	MBIM6005	Immunology and Medical Microbiology Lab	DC	1	85
	MBDI6006	Dissertation Phase I	DC	2	86
Total Credits				**20**	

Semester 4: MICROBIOLOGY

Type	Course Code	Course Name	Category	Credits	Page
Theory	MBAM0006	Advances in Microbiology	DC	4	82
Lab	MBDI6007	Dissertation Phase II	DC	16	86
Total Credits				**20**	

DEPARTMENT OF ZOOLOGY

MASTER OF SCIENCE IN ZOOLOGY

Semester 1

Type	Course Code	Course Name	Category	Credits	Page
Theory	ZGBT0001	Biosystematics, Taxonomy and Evolution	DC	4	87
	ZGBG0002	Cell Biology and Genetics – Theory and Applications	DC	4	88
	ZGBC0003	Molecular Biology and Biochemistry	DC	4	89
	ZGPE0004	Animal Physiology and Endocrinology	DC	4	90
	BCAT0002	Analytical Techniques for Biological Sciences	SC	3	
Lab	ZGBT6001	Biosystematics and Taxonomy Lab	DC	2	112
	ZGBG6002	Cell Biology, Genetics, Physiology and Biochemistry Lab	DC	2	112
Total Credits				**23**	

Semester 2

Type	Course Code	Course Name	Category	Credits	Page
Theory	BTCA0010	Computer Applications and Bioinformatics	SC	3	73
	BTRM0003	Research Methodology and Biostatistics	SC	4	
	ZGDB0005	Developmental Biology	DC	4	91
	ZGEE0006	Ecology, Environmental Biology and Ethology	DC	4	93
Lab	BTCA6010	Computer Applications and Bioinformatics Lab	SC	2	76
	ZGDB6003	Developmental and Environmental Biology Lab	DC	2	112
	ZGPR6004	Project Management, Reporting and Documentation	IC	2	113
Total Credits				**21**	

Semester 3

Type	Course Code	Course Name	Category	Credits	Page
Theory	ZGAZ0007	Applied Zoology I	DC	4	94
	Specialization 1: Entomology and Environmental Biology				
	ZGIF0008	Insects- Structure & Function	DE	4	95
	ZGIP0009	Insect Physiology	DE	4	96
	Specialization 2: Cell and Molecular Biology				
	ZGCB0010	Cell and Molecular Biology –I	DE	4	97
	ZGIY0011	Immunology I	DE	4	98
	Specialization 3: Fish and Fishery Biology				
	ZGTF0012	Taxonomy and Functional Anatomy	DE	4	99
	ZGAF0013	Aquaculture and Fish Genetics	DE	4	100
	Specialization 4: Animal Ecology and Wildlife Biology				
	ZGEB0014	Animal Ecology and Biogeography	DE	4	102
	ZGWM0015	Wildlife Conservation and Management	DE	4	103
Lab	ZGSL6005	Specialization Lab I	DC	2	115
Project	ZGDI6006	Dissertation (Phase I)	DC	4	
	ZGJP6007	Introduction to Journalism and Photography	IC	2	
Total Credits				**20**	

Semester 4

Type	Course Code	Course Name	Category	Credits	Page
Theory	ZGAZ0016	Applied Zoology II	DC	4	103
	Specialization 1: Entomology and Environmental Biology				
	ZGIG0017	Insect Ecology	DE	4	105
	ZGPM0018	Principles of Pest Management	DE	4	105
	Specialization 2: Cell and Molecular Biology				
	ZBMB0019	Cell and Molecular Biology –II	DE	4	106
	ZGIM0020	Immunology II	DE	4	107
	Specialization 3: Fish and Fishery Biology				
	ZGCP0021	Capture fishery and Post-harvest Technology	DE	4	108
	ZGLF0022	Limnology, Fishery economics, Ornamental fishery and Fish pathology	DE	4	109
	Specialization 4: Animal Ecology and Wildlife Biology				
	ZGRE0023	Wildlife Resource Management and Economics	DE	4	110
	ZGWC0024	Wildlife Health, Forensics and Conflict	DE	4	111
Lab	ZGPL6008	Specialization Lab II	DC	2	116
Project	ZGDS6009	Dissertation (Phase II)	DC	8	
	ZGTM6010	Teaching Methodology and Class room Management	IC	2	117
Total Credits				**24**	

SCHOOL OF LIFE SCIENCES

DEPARTMENT OF LIFE SCIENCES

PROGRAMME: MASTER OF SCIENCE IN BIOCHEMISTRY, BIOTECHNOLOGY AND MICROBIOLOGY

DETAILED SYLLABUS

BIOCHEMISTRY

BCAT0002: ANALYTICAL TECHNIQUES FOR BIOLOGICAL SCIENCES

(3 credits - 45 hours)

Objective: *The aim of this course is to expose students to the basic principles of modern analytical techniques and their recent applications in biological sciences.*

Module I: Basic laboratory Instruments (9 Hours)

a) Review of concepts of acids and bases, Principle and working of pH meter, Buffer preparation, principle of Laminar-air flow chamber
b) Principles and applications of centrifugation techniques: Introduction to hydrodynamics, Types of centrifuges, preparative and analytical centrifugation, differential centrifugation, sedimentation velocity, sedimentation equilibrium, density gradient methods

Module II: Microscopy and Autoradiography (9 Hours)

a) Review of principles of light microscopy; principles and applications of phase contrast and fluorescence microscopy
b) Principles and applications of Transmission and Scanning Electron microscopy
c) Principle and applications of Autoradiography
d) Theories of Tissue fixation and staining techniques

Module III: Spectroscopy (9 Hours)

a) Basic principles of Spectroscopy, UV, IR, Raman, ESR, ORD
b) CD and structure of proteins using NMR and ESR
c) Neutron and X-Ray diffraction for elucidation of 3D structure
d) Molecular modelling, Mass Spectrometry

Module IV: Chromatographic techniques (9 Hours)

a) Principles, types and applications of Chromatography
b) Gas Chromatography, GC-MS, LC – MS / MS, MALDI TOF mass spectrometer
c) Ion Exchange Chromatography, gel permeation, Affinity and reverse phase chromatography
d) HPLC and FPLC

Module V: Electrophoretic Techniques (9 Hours)

a) Basic principles of Electrophoresis, Agarose gel, native and SDS-PAGE
b) Isoelectric focusing, 2D-PAGE and their uses in protein research
c) Fractionation and Blotting Techniques

COURSE/LEARNING OUTCOMES

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

CO1: Understand the basic principles of modern analytical techniques
CO2: Understand recent applications in biological sciences
CO3: Prepare protocol for separation and analysis of biological sample

Suggested Readings

1. H.H. Willard, L.L. Merritt Jr. and others, Instrumental Methods of Analysis. 6th Edition, 1986, CBS Publishers and Distributors.
2. Chatwal G and Anand, S., Instrumental Methods of Chemical Analysis, 1989, Himalaya Publishing House, Mumbai.
3. Williams, B.L. and Wilson, K., A Biologist's Guide to Principles and Techniques of Practical Biochemistry, 1975
4. B.B. Straughan and S. Walker Eds., Spectroscopy, Volume 1, Chapman and Hall Ltd.
5. Hanes, Gel Electrophoresis of Proteins - A Practical Approach
6. James Miller, Chromatography: Concepts and Contrasts, 1988, John Wiley and Sons Inc., New York.
7. Holme, Analytical Biochemistry
8. R.J. Hamilton and P.A. Sewell, Introduction to High Performance Liquid Chromatography
9. B.P. Straughan and S. Walker, Spectroscopy
10. Gordon M. Message, Practical aspects of Gas Chromatography and Mass Spectrometry, 1984, John Wiley and Sons, New York.
11. Tibor Kremmery, Gel Chromatography, Wiley Publications.
12. C.C. Thornburn, Isotopes and radiations in Biology, Butterworth and Co. Ltd., London.
13. J.M. Chapman and G. Ayrey, The Use of Radioactive Isotopes in the Life Sciences, George Allen and Unwin Ltd., London.

BCMB0003: MOLECULAR BIOLOGY

(4 Credits – 60 hours)

Objective: *Molecular biology is the study of biological macromolecules and the processes in which they are involved. It includes the molecular structure, chemistry and physics of DNA, RNA, and protein to understand their functions in the living system.*

Module I: Replication Biology (15 Hours)

Nucleic acid as genetic material: it's proof; Different modes of replication (conservative, semi-conservative and dispersive); DNA replication in prokaryotes, eukaryotes and virus (rolling circle model): General features and enzymology; detailed mechanisms of initiation, elongation and termination; experiments underlying each step and role of individual factors; proofreading and processivity of DNA polymerase; telomerases: mechanism of replication, maintenance of integrity and role in cancer; effect of different inhibitors on replication.

Module II: Transcription Biology (15 Hours)

Basic concepts of promoter, operator, terminator, enhancer; RNA polymerases and its sub Modules; different sigma factors and their relation to stress, viral infections etc; initiation, elongation and termination (rho-dependent and independent) mechanism of RNA synthesis; post transcriptional modification of RNA - capping, splicing and poly A tailing; effect of different inhibitors on prokaryotic and eukaryotic transcription.

Module III: Translation Biology (20 Hours)

The genetic code and its nature; structure of t-RNA, ribosomal structure; activation of amino acids; initiation, elongation and termination mechanism of polypeptide chain synthesis; role of r-RNA in polypeptide chain synthesis; differences between prokaryotic and eukaryotic translational processes; post-translational modification of peptide, its transportation; non- ribosomal peptide synthesis with special reference to cyclic polypeptide antibiotics synthesis in bacteria; effect of different inhibitors on protein synthesis in both prokaryotes and eukaryotes.

Module IV: Gene regulation (10 Hours)

Positive and negative control; catabolite regulation-definition and mechanism; effect of anti-termination and attenuation on the process of gene regulation; various protein motifs involved in DNA-protein interactions during gene regulation. Epigenetics - definition and mechanism.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the structural and functional properties of biological macromolecules
CO2: Central dogma from Replication of DNA till Translation of protein
CO3: Regulation of gene action

Suggested Readings

1. Krebs JE, Kilpatrick ST, Goldstein ES. Lewin's Genes,Jones and Bartlett Learning.
2. Watson JD, Baker TA, Bell SP, Gann AAF, Levine M, Losick RM. Molecular Biology of the Gene, Benjamin Cummings.
3. Weaver RF. Molecular Biology, McGraw-Hill Higher Education.
4. Clark DP. Molecular Biology, Academic Press Inc.
5. Freifelder D. Molecular Biology, Narosa.

BCIM0004: IMMUNOLOGY AND MEDICAL BIOCHEMISTRY

(4 Credits - 60 hours)

Objectives: *This course is designed to equip students with the theoretical knowledge and understanding of practical applications of immunology and medical biochemistry. The course includes immune system of the body and various disorders of the metabolism and chronic diseases.*

PART A: Immunology

Module I: General Immunology (15 hours)

History and scope of immunology, hematopoietic stem cells, stromal cells, haematopoiesis, lymphoid tissues and organs (primary and secondary), B-lymphocytes and their activation, Thymus derived lymphocytes and their activation, antigen presenting cells, natural killer cells, dendritic cells, macrophages, structure and functions of Class I and II Major Histocompatibility complex (MHC) molecules, types of immunity: innate and acquired, active and passive, humoral and cell mediated, immunoglobulin: structure and function, clonal selection theory, generation of antibody diversity, organization and expression of immunoglobulin genes, antigens: T dependent and T independent antigens, adjuvant (definition, examples, function), antigen antibody reactions, cross reactivity, cytokines-definition, types, antigenic processing and presentation, circulation and homing of immune cells, regulation of immune response.

Module II: Advanced Immunology (10 hours)

The complement systems: definition, function, activation of complement, complements receptors and classical and alternate pathway, transplantation: organ transplantation and HLA tissue typing, autoimmunity, hypersensitivity reactions, immunological tolerance, immune suppression and immunotherapy, vaccine: definition, classification and function.

PART B: Medical Biochemistry

Module III: Metabolic disorders (15 hours)

a) Introduction of Medical Biochemistry;
b) Disorders of Carbohydrate Metabolism: Diabetes mellitus, glucose tolerance tests, sugar levels in blood, factors influencing blood glucose level, glycogen storage diseases, pentosuria, galactosemia.
c) Disorders of Lipids metabolism: Plasma lipoproteins, cholesterol, triglycerides and phospholipids in health and disease, hyperlipidemia, hyperlipoproteinemia, Gaucher's disease, Tay-Sach's and Niemann-Pick disease, ketone bodies.
d) Abnormalities in Nitrogen Metabolism: Uremia, hyperuricemia, porphyria and factors affecting nitrogen balance. Disorders of liver and kidney: Jaundice, fatty liver.

Module IV (10 hours)

a) Digestive diseases: Maldigestion, malabsorption, creatorrhoea, diarrhoea and steatorrhoea.
b) Diagnostic Enzymes: Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays – SGOT, SGPT, CPK, cholinesterase, LDH.
c) Water-Electrolytes and acid-base balance: Distribution of body water and electrolyte in the body,

normal water and electrolyte balance, regulatory mechanisms, abnormal water and electrolyte metabolism, Acid base balance in normal health, acidosis, alkalosis.

Module V (10 hours)

a) Biochemistry of cancer: Cancer causative agents and control of cancer and carcinogenesis, viral etiology.
b) Biochemistry of AIDS: Structure and molecular features of HIV, Retroviral background, diagnosis of AIDS modes of transmission, immunological response in AIDS, Anti-retroviral therapy.
c) Biochemistry of Ageing: Definition of ageing, Life span and life expectancy, oxygen radicals, antioxidants and ageing, DNA repair, Heat shock proteins, role of dopamine receptors in ageing.

COURSE/LEARNING OUTCOMES

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

CO1: Explain the properties, structural and functional aspects of the different kinds of stem cells involved in the defense mechanism of immune cells
CO2: Understand the mechanism of complement systems, organ transplantation, hypersensitivity reactions, immunosuppression and immunotherapy
CO3: Understand and describe the different disorders of the body related to carbohydrate metabolism, lipid metabolism, Nitrogen metabolism and digestive disorders
C04: Explain biochemistry, causative agents, mechanisms involved behind the working of AIDS, Cancer and Aging

Suggested Readings

1. Kuby, J. Immunology. W. H. Freeman and Co.
2. Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I. M. Roitt's Essential Immunology. Wiley-Blackwell
3. Abbas, A. K., Lichtman, A. H. H., Pillai, S. Cellular and Molecular Immunology. Elsevier
4. Franklin, T. J. and Snow, G. A. Biochemistry of Antimicrobial Action. Chapman and Hall, London
5. Pelczar, M. J., Chan, E. C. S. and Krieg, N. R. Microbiology. Tata McGraw Hill
6. Chatterjee, M. N., Shinde, R. Medical Biochemistry JAYPEE Publications
7. Stryer, L. Biochemistry Freeman and Co.
8. Elkeles, R., and Tavill, A. Biochemical aspects of human diseases Blackwell Science Ltd
9. Devlin, T. M. Text-book of Biochemistry with clinical correlations J. Wiley and Sons.
10. Guyton. A.C. and Hall, J. E. Textbook of Medical Physiology Elsevier Health Sciences

BCPY0005: PHYSIOLOGY

(3 Credits - 45 hours)

Objective: *To teach students the basic concepts of plant and human physiology. At the end of the course the students will have a thorough understanding of the mechanisms of plant and human physiology.*

Part A: Plant Physiology

Module I: Cell Structure, Photosynthesis, Respiration and Photorespiration (8.5 hours)

Cell organelles and their physiological functions, structure and physiological functions of cell wall, cell inclusions; cell membrane structure and functions. Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO2 fixation-C3, C4 and CAM pathways; Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway. Calvin Cycle: synthesis of hexoses from carbon dioxide and water, role of environmental conditions. The Pentose phosphate pathway: coordination of metabolism of glucose-6-phosphate with glycolysis, role of glucose-6-phosphate dehydrogenase in protection against reactive oxygen species.

Module II: Solute transport, photoassimilate translocation and stress physiology (7 hours)

Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates. Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses

Part B: Human Physiology

Module III: Homeostasis (2.5 hours)

The scope of human physiology, organization of the body – cells, tissues, organs and organ systems; homeostasis, characteristics of homeostatic control systems, components of homeostatic control systems, intercellular chemical messengers, processes related to homeostasis.

Module IV: The muscles, nervous system and brain (7.5 hours)

a) Muscles, Nervous System and Sensory Physiology: Muscle proteins, molecular mechanisms of muscle contraction (skeletal and smooth), nerve conduction, chemical regulation of synapses, neurotransmitters, neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture, primary sensory coding, sensory receptors, neural pathways in sensory systems, Somatic sensation, biochemistry of vision, chemical senses.

b) **Consciousness, the Brain and Behavior:** States of consciousness, conscious experiences, motivation and emotion, altered states of consciousness, learning and memory.

Module V: Cardiac and Respiratory Physiology (9 hours)

a) **Cardiovascular Physiology, Blood and Circulation:** Blood corpuscles, haemopoiesis and formed elements, plasma proteins and their functions, blood groups, clotting factors, extrinsic and intrinsic pathways of blood coagulation, mechanism of blood coagulation, fibrinolysis, Role of hemoglobin in transport of gases; Anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.

b) Respiratory Physiology: Organization of the respiratory system, ventilation and lung mechanics, exchange of gases, transport of gases, waste elimination, neural and chemical regulation of respiration

Module VI: Physiology of the endocrine system and reproduction (5 hours)

Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation

Module VII: The physiology of digestion and absorption of food, regulation of water and inorganic ions (5.5 hours)

a) **The Digestion and Absorption of Food:** Digestion, absorption, energy balance, Basal Metabolic Rate

b) **The Kidneys and Regulation of Water and Inorganic ions:** Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination regulation of water balance, acid-base balance. Components of body fluids, role of vasopressin, renin-angiotensin-aldosterone system and atrial natriuretic factor in water and electrolyte balance.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the cell structure, photosynthesis, respiration, the different mechanisms of respiration, light harvesting and the different molecules involved, solute transport, translocation, stress physiology of higher plants

CO2: Have a sound understanding of homeostasis, the structural and functional organization, components of chemical messengers, organ systems of humans

CO3: Understand the anatomy, physiology and mechanism of the cardiovascular, respiratory, endocrine, reproductive and the digestive system

Suggested Readings

1. Murray R.K. et al., Harper's Illustrated Biochemistry, McGraw Hill Lange Med. Publ.
2. Devlin T. M. Textbook of Biochemistry with clinical correlations, Wiley-Liss Publ.
3. Barrett, K.E. et al Ganong's Review of Medical Physiology, Tata McGraw-Hill. Ed.
4. Guyton, A.C. and Hall, J.E. Textbook of Medical Physiology, Saunders, Elsevier.
5. Voet D. et al Principles of Biochemistry, John Wiley and Sons Inc.
6. Nelson D.L. and Cox M.M. Lehninger's Principles of Biochemistry, Freeman and Co, New York
7. Bhagavan N. V. Medical Biochemistry, Jones and Bartlett Publ.
8. Garret R.H. and Grisham C.M. Biochemistry, Saunders College Publ.

BCBM0006: BIOGENETICS AND METABOLISM

(3 Credits - 45 hours)

Objectives: *To introduce students to (i) concepts of energy transformation in living systems and (ii) principles of biochemical processes essential for the sustenance of life*

Module I: Overview of metabolism and membrane lipids (4 hours)

Metabolism is composed of many coupled interacting reactions, oxidation of carbon fuels is an important source of cellular energy, recurring motifs in metabolic pathways; common features underlying the diversity of biological membranes, fatty acids as key constituents of lipids, three common types of membrane lipids, formation of bimolecular vesicles (sheets) in aqueous media, role of proteins in membrane processes, in-plane membrane diffusion of lipids and membrane proteins, internal membranes compartmentalize eukaryotic cells

Module II: Glycolysis and Gluconeogenesis, Citric Acid Cycle (5 hours)

Glycolysis as an energy conversion pathway in many organisms, tight control of glycolytic pathway, synthesis of glucose from non-carbohydrate precursors, reciprocal regulation of gluconeogenesis and glycolysis; oxidation of two carbon Modules, controlled entry to the citric acid cycle and metabolism through it, citric acid as a source of biosynthetic precursors, the glyoxylate cycle.

Module III: Oxidative phosphorylation (5 hours)

The site of oxidative phosphorylation in eukaryotes, dependence on electron transfer, the respiratory chain, ATP synthesis, movement across mitochondrial membranes by shuttles, regulation of cellular respiration

Module IV: Detailed nutrient metabolism (8.5 hours)

a) **Glycogen metabolism:** Interplay of enzymes in glycogen breakdown, regulation of phosphorylase by allosteric interaction and reversible phosphorylation, role of epinephrine and glucagon, pathways and reciprocal regulation of glycogen synthesis and breakdown;

b) Fatty acid metabolism: triacylglycerols, utilization of fatty acids as fuels-steps involved, different pathways are involved in fatty acid synthesis and breakdown, the role of acetyl-CoA carboxylase in fatty acid metabolism, elongation and unsaturation of fatty acids;

c) Protein turnover and amino acid catabolism: Introduction, tight regulation of protein turnover, steps involved in amino acid degradation, disruption of amino acid degradation

Module V: Membrane Transport (5 hours)

Active and passive transport of molecules across membranes, use of ATP hydrolysis to pump ions across membranes, membrane proteins with ATP-binding cassette domains, secondary transporters, rapid movement of ions across membranes, gap junctions

Module VI: Signal transduction pathways (5 hours)

Activation of G-proteins by seven-transmembrane-helix receptors, hydrolysis of phosphatidylinositol bisphosphate by phospholipase C, Calcium as a ubiquitous cytosolic messenger, receptor signalling, defects in signalling pathways-leading to cancer and other diseases, recurring features of signal-transduction pathways reveal evolutionary relationships

Module VII: Nutrient biosynthesis (7.5 hours)

a) **Biosynthesis of amino acids:** Nitrogen fixation, amino acids are made from intermediates of the citric acid cycle and other major pathways, regulation of amino acid synthesis by feedback inhibition, amino acids as precursors of many biomolecules;

b) Nucleotide biosynthesis: de novo syntheses of pyrimidine and purine bases, deoxyribonucleotide synthesis, feedback inhibition, formation of NAD^+, FAD and coenzyme A from ATP, pathological conditions arising from disruption in nucleotide metabolism;

c) Biosynthesis of membrane lipids and steroids: phosphatidate –a common intermediate in synthesis of phospholipids and triacylglycerols, synthesis of cholesterol, complex regulation of cholesterol biosynthesis, important derivatives of cholesterol

Module VIII: Integration of metabolism (5 hours)

Metabolism consists of highly interconnected pathways, unique metabolic profile of organs, food intake and starvation induce metabolic changes, fuel choice during exercise is determined by intensity and duration of activity, ethanol alters energy metabolism in the liver.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the working, mechanism of metabolism and the membrane lipids, glycolysis, gluconeogenesis, citric acid cycle and oxidative phosphorylation

CO2: Understand the nutrient metabolism in detail: glycogen metabolism, fatty acid metabolism, protein turnover and amino acid catabolism

CO3: Have an understanding of membrane transport systems and signal transduction pathways

CO4: Understand the biosynthesis of amino acids, nucleotide, membrane lipids, steroids and the different pathways integrated in metabolism

Suggested Readings

1. M. Berg, J. L. Tymoczko, L. Stryer, Biochemistry, Freeman Publication
2. Voet and Voet, Biochemistry John Wiley and Sons
3. Nicholls and Ferguson, Bioenergetics, Elsevier
4. Lowen, Alexander, Bioenergetics Penguin Books
5. Brown and Cooper, Bioenergetics: A practical approach, paperback, Oxford University Press

BCAC0007: ADVANCES IN BIOCHEMISTRY

(4 credits - 60 hours)

Objectives: *This paper will review principles and procedures of advanced techniques in Biochemistry. In this course students will be taught principles, applications and advances of techniques that are widely used in the field of biochemistry. They will also be required to do presentations and submit an assignment on the most recent developments in the field of biochemistry from the latest peer-reviewed journals.*

Module I: Genomics (10 hours)

Mapping and sequencing genomes: Genetic and physical mapping, Sequencing genomes different strategies, High-throughput sequencing, next-generation sequencing technologies, comparative genomics, population genomics, epigenetics, Human genome project, pharmacogenomics, genomic medicine, applications of genomics to improve public health, drug discovery and agriculture

Module II: Transcriptomics (10 hours)

The analysis of global gene expression and transcription factor regulation, global approaches to alternative splicing and its regulation, long noncoding RNAs, gene expression models of signalling pathways, from gene expression to disease phenotypes, introduction to isoform sequencing, systematic and integrative analysis of gene expression to identify feature genes underlying human diseases

Module III: Proteomics (10 hours)

Introduction to proteomics, techniques to study proteomics such as protein electrophoresis, chromatography and mass spectrometry and protein database analysis, case studies derived from scientific literature including comparisons between healthy and diseased tissues, new approaches to analyse metabolic pathways, comprehensive analysis of protein-protein interactions in different cell types

Module IV: Metabolomics (10 hours)

Metabolites and metabolism, structural diversity of metabolites, number of metabolites in biological systems, controlling rates and levels of metabolites, metabolite channelling or metabolons, networks of metabolites, sampling, sample preparation, analytical tools such as chromatographic systems, mass spectrometry, case studies: yeast metabolomics, plant metabolomics, microbial metabolomics, metabolomics in humans and mammals

Module V: Intellectual Property Rights (20 hours)

a) Introduction to intellectual property: patents, types, trademarks, copyright and related rights,
b) industrial design and rights, traditional knowledge, geographical indications, patentable and non patentables issues, patenting life, legal protection of biotechnological inventions, world intellectual property rights organization (WIPO), Indian Patent Act 1970 and recent amendments, entrepreneurship in bioscience.

COURSE/LEARNING OUTCOMES

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

CO1: Understand mapping and sequencing of genomes, sequencing techniques and its applications
CO2: Understand transcriptomics and proteomics
CO3: Explain the different aspects and techniques of metabolomics
CO4: Understand bioactive natural products and drug discovery
CO5: Understand the basic concepts of intellectual property rights and their significance in research

Suggested Readings

1. Twyman, R. M., Principles of Proteomics, 2004
2. Villas-Boas, S. G., Roessner, U., Hansen, M. A. E., Smedsgaard, J., Nielsen, J. Metabolome Analysis: An introduction
3. Langauer, T., Mannhold, R., Kubinyi, H., Timmerman, H. Bioinformatics - From genomes to drugs
4. Primrose, S. B., Twyman, R. M., Old, R. W. Principles of gene manipulation
5. Tringali, C. (ed.), Natural products as lead compounds in drug discovery CRC Press
6. Bare Act, 2007. Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., New Delhi
7. Kankanala C. (2007). Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd. New Delhi.
8. Goel D., Prashar S.. IPR, Biosafety and Bioethics. (2013).Pearson

BCBM0008: BIOMOLECULES

(4 credits - 60 hours)

Objective: *The objective of the course is to give the students a sound understanding of the structural and functional aspects of biomolecules.*

Module I: Basic concepts (6 Hours)

Ionization of water, pH and pK, buffers, weak acids and weak bases. General concepts on: Plane of symmetry, centre and axis of symmetry; Concepts of chirality; optical isomerism; geometrical isomerism; DL, RS nomenclature; Projection formula (Fischer and Howarth); Isomers: anomers, epimers.

Module II: Carbohydrates (12 Hours)

a) Classification, basic chemical structure, general reactions and properties, biological significance, Sugar derivatives, deoxy sugars, amino sugars, and sugar acids. Mutarotation of sugar. Anomeric effect of sugar (Methylation effect).Inversion (hydrolysis) of cane sugar.

b) Polysaccharides - occurrence, structure, isolation, properties and functions of homoglycans - starch, glycogen, cellulose, dextrin, inulin, chitins, xylans, arabinans, galactans.
c) Occurrence, structure, properties, and functions of heteroglycans - bacterial cell wall polysaccharides, glycoaminoglycans, agar, alginic acid,pectins, amino sugars and deoxy sugars, blood group substances and sialic acids.Glycoprotein and their biological applications.Lectins structure and functions.

Module III: Lipids (12 Hours)

Definition and Classification - (simple, complex, derived lipids - structure and example). Saturated and unsaturated fatty acids, Nomenclature of fatty acids, General chemical reactions of fatty acids – esterification, hydrogenation and halogenations, Phospholipids - classification, structure and functions, Ceramides and Sphingomyelins, Eicosanoids, structure and functions of prostaglandins, thromboxanes, leukotrienes, Types and functions of plasma lipoproteins. Amphipathic lipids - membranes, micelles, emulsions and liposomes.Steroids - cholesterol structure and biological role - bile acids, bile salts. General chemical reactions of fats: Hydrolysis, Saponification number, I_2 number, acetylation, acetyl number, and volatile fatty acid number - definition and related problems.Rancidity of fat.

Module IV: Vitamins and Porphyrins (8 Hours)

a) Vitamins - water soluble - thiamine, riboflavin, niacin, pyridoxine, folic acid, ascorbic acid- sources, structure, biochemical functions, deficiency diseases, daily requirements; fat soluble - vitamin A, vitamin D2, vitamin E and vitamin K - sources, structure, biochemical functions, deficiency diseases, daily requirements.
b) Porphyrins: the porphyrin ring system, chlorophyll, hemoglobin, myoglobin and cytochrome.

Module V: Nucleic acids (10 Hours)

Watson-Crick Model of DNA structure: A, B and Z – DNA. Chemical Properties: Hydrolysis (acid, alkali), enzymatic hydrolysis of DNA. Cruciform structure in DNA, formation and stability of cruciform, miscellaneous alternative conformation of DNA, HDNA, slipped mispaired DNA, parallel stranded, anisomorphic DNA, palindrome, secondary and tertiary structure of RNA, hnRNA, si RNA, methods for nucleic acid sequence determination, denaturation, strand separation, fractionation, isolation and purification of DNA, mRNA, rRNA and tRNA, molecular hybridization, Cot value curve, hypochromic and hyperchromic effect, DNA-protein interactions, Viscosity, Buoyant density, Tm.

Module VI: Proteins (12 Hours)

Definition, classification, structure, stereochemistry and reactions of amino acids;Classification of proteins on the basis of solubility and shape, structure, and biological functions. Isolation, fractionation and purification of proteins.Denaturation and renaturation of proteins. Primary structure - determination of amino acid sequences of proteins, the peptide bond.Ramachandran plot. Secondary structure - weak interactions involved - alpha helix and beta sheet and beta turns structure. Pauling and Corey model for fibrous proteins. Collagen triple helix.Super secondary structures - helix-loop-helix. Tertiary structure - alpha and beta domains. Quaternary structure - structure of hemoglobin. Solid state synthesis of peptides. Protein-Protein interactions, Concept of chaperones

COURSE/LEARNING OUTCOMES

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

CO1: Have a sound understanding of the structural and functional aspects of biomolecules (*Knowledge*)
CO2: Describe and draw the chemical structures of different biomolecules *(Comprehension)*
CO3: Estimate the different concentrations of biomolecules for biological applications (*Application*)
CO4: Analyze the interaction and importance of equilibrium maintenance of different biomolecules for health related issues (*Analysis*)

Suggested Readings

1. L. Stryer, Biochemistry, W.H. Freeman and Co.
2. Voet and Voet, Fundamentals of Biochemistry, John Wiley and sons NY.
3. David L. Nelson and Michael M. Cox, Lehninger's Principle of Biochemistry, W. H. Freeman and Co.

4. Thomas M. Devlin, John Wiley-Liss, Hobokhen, Text Book of Biochemistry with Clinical Correlation, NJ publishers
5. Zubey GL, Biochemistry, WCB Publishers

BCBM6001: BIOMOLECULES LAB

(1 Credit)

1. Preparation of buffers
2. Determination of pKa and pI of acidic, basic, and neutral amino acids
3. Estimation of amino acids by Ninhydrin method
4. Estimation of DNA by DPA method
5. Estimation of RNA by Orcinol method
6. Estimation of proteins by Bradford method
7. Estimation of proteins by Lowry method
8. Isolation and estimation of lipids from seeds
9. TLC of plant pigments
10. TLC of lipids

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Estimate and prepare buffer solutions for different experiments
CO2: Quantify various biomolecules at different concentrations for future research experiments
CO3: Apply the technique based on spectrophotometer for analysis of various biomolecules

Suggested Reading

1. Walker, J. H. (Ed.) The Protein Protocols Handbook, Humana Press
2. Sadasivam and Manickam Biochemical methods, New Age International

BCAT6002: ANALYTICAL TECHNIQUES LAB

(1 Credit)

1. SDS-PAGE separation of proteins
2. Study of serum proteins by horizontal submerged gel electrophoresis
3. Study of UV absorption spectra of biological macromolecules-proteins, nucleic acids
4. Separation of bacterial lipids/amino acids/sugars/organic acids by TLC
5. Separation of bacterial lipids/amino acids/sugars/organic acids by Paper Chromatography
6. Separation of haeomoglobin or blue dextran by gel filtration
7. Quantitative estimation of hydrocarbons/pesticides/organic solvents/methane by gas chromatography
8. Demonstration of PCR, DNA sequencer and fermenter
9. Fricke Dosimetry
10. Optical characterization of liposomes by turbidimetry

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Apply the theoretical concepts learnt in the theory class for Analytical techniques lab

Suggested Readings

1. Walker, J. H. (Ed.) The Protein Protocols Handbook, Humana Press
2. Wilson K. and Walker, J. Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press

BCMB6003: MOLECULAR BIOLOGY LAB
(2 Credits)

1. Isolation of plasmid DNA from bacteria.
2. Isolation of chromosomal DNA from bacteria.
3. Competent cell preparation of bacteria.
4. Bacterial transformation of exogenous DNA.
5. Polymerase chain reaction analysis
6. Restriction digestion of DNA

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Perform extraction of genomic and plasmic DNA from bacteria
CO2: Understand various steps of PCR and observe the amplicons in agarose gel electrophoresis
CO3: Carry out various steps involved in transformation and cloning

BCIM6004: IMMUNOLOGY AND MEDICAL BIOCHEMISTRY LAB
(2 Credits)

Immunology

1. Single radial immune diffusion
2. Double diffusion method of Ouchterlony
3. Electrophoretic separation of bovine protein
4. Agglutination reaction

Medical Biochemistry

1. Estimation of Lipoproteins.
2. Glucose tolerance test
3. Estimation of bilirubin
4. Estimation of blood urea
5. Estimation of creatine phosphokinase
6. Normal and abnormal constituents of urine

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand the principle and mechanism of single radial immune diffusion, double diffusion method of Ouchterlony, Agglutination reaction, electrophoretic separation of bovine protein
CO2: Practically estimate lipoprotein, bilirubin, blood urea, creatine phiosphokinase from a serum sample
CO3: Perform glucose tolerance tests and understand the normal and abnormal constituents of urine

Suggested Readings

1. Turgeon, M. L. Immunology and Serology in Laboratory Medicine Elsevier
2. Detrick, B., Hamilton, R. G., Folds, J. D. Manual of Molecular and Clinical Laboratory Immunology American Society of Microbiology Press
3. Talwar, G. P., Gupta, S. K. Hand Book of Practical and Clinical Immunology CBS Publishers and Distributors

BCPY6005: PHYSIOLOGY LAB
(1 credit)

(A minimum of 10 experiments to be performed)

1. Estimation of urea in serum
2. Estimation of cholesterol in serum.
3. Estimation of calcium in serum.
4. Assay of Serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT)
5. Assay of alkaline phosphatase

6. Assay of amylase in serum
7. Estimation of glucose in serum by glucose oxidase-peroxidase method.
8. Assay of LDH activity in serum
9. Separation of plasma proteins by electrophoresis
10. Estimation of glycosylated hemoglobin
11. Measuring the electrical activity of the heart
12. Measuring Basal Metabolic Rate using a respirometer
13. Counting white blood cells, red blood cells, platelets

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Estimate urea, cholesterol, calcium, glucose, glycosylated haemoglobin in serum
CO2: Perform an assay of SGOT, SGPT, alkaline phosphatase, amylase in serum, LDH activity in serum
CO3: Measure the electrical activity of heart, basal metabolic rate using a respirometer and count the number of red blood cells, white blood cells, platelets

BCBM6006: BIOENERGETICS AND METABOLISM LAB

(1 credit)

Bioenergetics

1. Cellular respiration in yeast
2. Photosynthesis and cellular respiration in plants
3. Deciphering how cells make energy (light driven ATP generation in chloroplasts causing pH change, also subjecting chloroplasts to pH changes resulting in ATP production-chemiosmosis theory)

Metabolism

1. Determining the specificity of lactase
2. Effect of pH on trypsin activity
3. Effect of temperature on amylase activity
4. Effect of bile on lipase activity

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand the mechanism of cellular respiration in yeast, photosynthesis and cellular respiration in plants
CO2: Decipher how cells manufacture energy-ATP generation
CO3: Understand the effect of pH on trypsin activity, temperature on amylase activity, bile on lipase activity

Suggested Reading

1. Brown, G. C. and Cooper, C. E. Bioenergetics: A Practical Approach Oxford University Press

BCDI6007: DISSERTATION PHASE I

(2 credits)

Objective: *Dissertation phase I is designed to familiarize the students with the research topics and methodologies by a thorough literature review.*
During dissertation phase I each student chooses a topic in consultation with the assigned supervisor and the student is asked to do thorough literature review under the guidance of the supervisor. At the end of the semester the student submits literature review report and students presents the matter at a school level seminar.

COURSE/LEARNING OUTCOMES

At the end of Dissertation phase I students will be able to:

CO1: Design experiment, prepare work plan and learn how to test hypothesis in research work

CO2: Present scientific information in a succinct manner and learn the process of scientific writing
CO3: Carry out literature survey and carry out the initial study required before designing their dissertation project.

BCDI6008: DISSERTATION PHASE II
(16 credits)

Objective: *Dissertation phase II involves execution of the research work decided in phase I leading to the preparation, submission and evaluation of the dissertation.*

During the course of the Master's Degree the student is expected to undertake a research work leading to a dissertation. The work will be divided into two phases spread over two semesters. During the research work the student shall study and incorporate recent trends in the area chosen by him/her, and develop a scientific dissertation based on the research and actual bench work. The student shall be required to make presentations and reports at various stages of the research work. The format for the final dissertation shall be as prescribed by the Department. There shall be a viva voce examination on the dissertation by an expert committee comprising external and internal members. The mode and components of the evaluation and the weightages attached to them shall be published by the Department at the beginning of the semester.

BIOTECHNOLOGY

BTRM0003: RESEARCH METHODOLOGY AND BIOSTATISTICS
(4 Credits – 60 hours)

Objectives: *To introduce students to a few aspects of doing research and to provide them with the statistical tools necessary for analysing and interpreting experimentally acquired data*

Module I: Introduction to Scientific Research (15 hours)

a) Definition, basic and applied research, interdisciplinary research,
b) Discriminative reading, reading and reviewing scientific literature – consulting source material, primary and secondary literature, biological abstract, current content, review, monograph, peer-reviewed journals, e-resources; research and review articles
c) Introduction on scientific problems, your scientific problem, methods and techniques, research conditions, data types, techniques, repeatability, reproducibility and reliability, validity, effect measure and choice of statistical test, experimental protocol, experimental routine
d) Scientific communication - scientific paper, scientific posters

Module II: Ethics and Scientific Conduct (5 hours)

Brief introduction to ethics, scientific conduct and misconduct-plagiarism, authorship issues, investigation and punishment of scientific misconduct, ethics of animal and human research

Module III: (15 hours)

a) Introduction to Biostatistics: definition and applications of biostatistics;
b) Data-types and presentation: types of biological data, accuracy and significant figures;
c) Populations and samples: populations, samples from populations, random sampling, variables and attributes, statistical errors
d) Frequency distributions
e) Graphical representation of data: line diagram, bar diagram, pie chart, histogram
f) Measures of central tendency: the arithmetic mean, median and mode
g) Measures of dispersion: range, mean deviation, variance, standard deviation, standard error of mean, standard score

Module IV: (6 hours)

a) Permutations and combinations, sets
b) Probability: introduction, counting possible outcomes, probability of an event, adding and multiplying probabilities
c) Probability distributions: Binomial, Poisson and Normal distribution

Module V: (19 hours)

a) Testing of hypothesis and goodness of fit: Null hypothesis, level of significance, errors of influence, Student's t-test, paired t-test, Fischer's test, Chi-square test, linear correlation and linear regression
b) Analysis of variance: variances of samples and their means, F-distribution, partitioning of the total sum of squares and degrees of freedom, models and types of ANOVA

COURSE/LEARNING OUTCOMES

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

CO1: Know the forms of research – basic, applied, interdisciplinary, etc.
CO2: Explain Ethical conduct of research and its communication
CO3: Perform Statistical methods of data analysis and interpretation

Suggested Readings

1. Creswell JW. Educational Research-Planning, conducting and evaluating quantitative and qualitative research, Pearson.
2. Laake P, Benestad HB and Olsen BR. Research Methodology in the medical and biological sciences Academic Press, Elsevier.
3. Kothari CR. Research Methodology: Methods and techniques, New Age International [Available online].
4. Gurumani N. Research Methodology for Biological sciences. MJP Publishers (753 pp).
5. Banerjee PK. Introduction to Biostatistics. S. Chand [Available in Guwahati].
6. Sokal RR and Rohlf FJ. Biometry: The principles and practices of statistics in biological research, W. H. Freeman and Company.
7. Zar JH. Biostatistical Analysis, Pearson Prentice Hall.
8. Bailey NTJ. Statistical Methods in Biology, Cambridge University Press.

BTAP0004: ANIMAL AND PLANT BIOTECHNOLOGY

(4 Credits – 60 hours)

Objective: *In this course students will be introduced to the techniques and underlying theories of both plant and animal biotechnology and their application in agriculture, veterinary sciences, medical sciences and reproductive technology. Ethical issues related to biotechnological research will also be addressed in this course.*

Part A: Animal Biotechnology

Module I: Animal cell culture (10 Hours)

General considerations of cell culture: Aseptic condition, Media, Balanced salt solution, Carbon dioxide incubator, feeder layer, serum, growth factors; Types of culture media (defined and undefined media), culture media composition; role of different media. Types of cell culture –organ, Organotypic, single cell, Histotypic/3D, primary cells, cell lines, adherent and suspension cell cultures; Characteristics of cells in culture; measurement of cell viability, apoptosis,senescence; Scaling up of animal cell culture, stem cell culture, embryonic stem cell and their applications.

Module II: Animal improvement (8 Hours)

Embryology: Collection and preservation of embryos; culturing of embryos; micromanipulation technology and fertilization in animals; Equipment used in micromanipulation; Assisted reproductive biotechnology in human and animal; Sperm sorting; Enrichment of semen for x (female) or y (male) sperm; Biotechnology Techniques in Animal Breeding: Artificial Insemination, In Vitro Fertilization and embryo transfer.

Module III:Transgenic animals and application (12 Hours)

Transgenic animal: methods of production and application; transgenic animals as models for human diseases; transgenic animals in livestock improvement; industry, biomedicine, bioreactors; chimera production; Gene knockouts, production of human antibodies in animals; vaccines and their applications; gene therapy for animal diseases; Knockout mice and mice of human (genetic) disease(s); Animal cloning and ethical issues in animal biotechnology.

Part B: Plant Biotechnology

Module IV: Plant tissue culture and Micropropagation (10 Hours)

Definition, brief history, principle and significance of tissue culture; Cellular totipotency: Cytodifferentiation: Organogenic Differentiation: induction, factors affecting shoot bud differentiation; Cell suspension Culture, Callus Culture, Embryo Culture, Haploid Culture: microspore and macrospore culture. Triploid culture: Endosperm Culture, Protoplast: isolation, Culture and Fusion; Somatic hybridization and cybridization; Somatic Embryogenesis and Synthetic Seed Production; Androgenesis and its applications in genetics and plant breeding; Germplasm conservation and cryopreservation.

Module V: Methods of gene transfer and Markers (8 Hours)

Introduction to transgenic plants, methods of gene transfer – Agrobacterium tumefaciens mediated, Agrobacterium rhizogenes mediated; Direct gene transfer methods – Chemical, Physical and alternative methods. Selectable markers, reporter gene and promoter in plant vectors.

Module VI: Transgenic plants and Medicinal Plant biotechnology (12 Hours)

Transgenic plants: Herbicide resistance; Drought, Salinity, thermal stress, flooding and submergence tolerance. Seed storage proteins; Protein engineering; Vitamins and other value addition compounds; Metabolic engineering of lipids, flavonoids, vitamin E biosynthesis, flavoring agents (monoterpenes and sesquiterpene), Carotenoid biosynthesis, secondary metabolites; Production of pharmaceutically important compounds; Bioenergy generation; Medicinal plants: different secondary metabolites, application of biotechnology in medicinal plants.

COURSE/LEARNING OUTCOMES

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

CO1: Have a basic understanding on increasing use of modern molecular genetics for genetic mapping and rapid development of new strains of improved crops, livestock, fish, and trees.

CO2: Understand the applications of tissue culture and micro-propagation for the rapid multiplication of horticultural crops and trees

CO3: Know the importance of Genetic engineering and transformation techniques for production of transgenic plants and animals carrying desirable traits

Suggested Readings

1. Ranga MM. Animal Biotechnology. Agrobios India Limited
2. Ramadass P, Meera Rani S. Text Book Of Animal Biotechnology. Akshara Printers.
3. Freshney IR, R. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications.
4. Barnes D, Mather JP, Animal cell culture methods, Academic press.
5. Heldt HW. Plant Biochemistry and Molecular Biology, Oxford University Press.
6. Ignacimuthu S, Applied Plant Biotechnology, Tata McGraw-Hill.
7. Gamburg OL, Philips GC. Plant tissue and Organ culture fundamental methods, Narosa publications.
8. Slater A, Scott N and Flower M, Plant Biotechnology. The genetic manipulation of plants, Oxford University Press.
9. Singh BD.Text book of Biotechnology, Kalyani publishers.

BTGE0005: GENETIC ENGINEERING

(3 Credits – 45 hours)

Objective: *In this course students will learn the basics of genetic engineering and the principles of gene manipulation. Students will be exposed to modern tools and techniques used in various areas of biotechnological/microbiological/biochemistry research.*

Module I: Enzymes in Genetic Engineering (6 Hours)

Restriction nucleases: Exo and Endo nucleases: History, Restriction endonuclease nomenclature, classification of restriction endonuclease – type I, type II, and type III, cleavage patterns – sticky ends, blunt ends, applications; Modifying enzymes – ligases, kinases, RNAse, polymerases, phosphatases and methylases, RNA dependent DNA polymerase,Terminal Deoxynucleotidyl transferase.

Module II: Plasmids and Vectors (10 Hours)

Cloning vectors: Plasmids and plasmid vectors, phagemids, cosmids, artificial chromosome vectors (YAC, BAC), E.Coli plasmid vectors – pBR322, pUC18, pET21,Bacterio-phage vectors – λ and M13, Cosmids, phagemids and Phasmids, Shuttle vectors - Yeast vectors, Baculo virus vector. Intein-based vectors; Inclusion bodies; Plant based vectors, Ti and Ri as vectors, Yeast vectors, Insertion and Replacement vectors, Expression vectors; Strategies for production of foreign proteins in E. coli, Yeast, animal cell, pMal; GST; pET-based vectors; Protein purification; His-tag; GST-tag; MBP-tag.

Module III: Molecular Cloning and Hybridization techniques (12 hours)

Isolation of genomic and plasmid DNA, DNA cloning; Strategies for construction of genomic and cDNA libraries, chromosome walking; screening of libraries; Oligonucleotide, cDNA and antibody probes; The Southern, Northern, Western, North-Western, Zoo blots, South western, Far western blotting and Colony hybridization, yeast-two hybrid system, c-DNA synthesis and cloning: mRNA enrichment, reverse transcription, DNA primers, linkers, adaptors and their chemical synthesis; Cloning interacting genes two-hybrid systems, cloning differentially expressed genes. Site directed mutagenesis and protein engineering.

Module IV: PCR and its applications (9 Hours)

Primer design, thermostable enzymes, Types of PCR – multiplex, nested, reverse transcription PCR, quantitative real time PCR, touchdown PCR, colony PCR, cloning of PCR products; PCR in gene recombination: Deletion, recombination, addition, and Site-specific mutagenesis, PCR in molecular diagnostics – mutation detection, mismatch amplification mutation assay (MAMA), Oligonucleotide Ligation Assay (OLA), Single-strand conformation polymorphism (SSCP), Allele-specific amplification (ASA).

Module V: DNA Sequencing and applications of genetic engineering (8 Hours)

Maxam and Gilbert method and Sanger's method, Next generation sequencing, Applications of genetic engineering: Transgenic animals and plants, production of recombinant pharmaceuticals, gene therapy, disease diagnosis, Transgenic and gene knockout technologies: Vector engineering, strategies of gene delivery, gene replacement/augmentation, gene correction, gene editing, gene regulation and silencing.

COURSE/LEARNING OUTCOMES

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

CO1: Get an insight about the different cloning vectors and plasmids used in the recent genetic engineering procedures

CO2: Understand the concepts regarding different hybridization techniques and applications of different types of Polymerase Chain Reaction (PCR)

CO3: Understand the different generation in sequencing research and its applications in genetic engineering

Suggested Readings

1. S.B. Primrose, R.M. Twyman and R.W. Old; Principles of Gene Manipulation. S.B.University Press.
2. Brown TA, Genomes, Garland Science.
3. J. Sambrook and D.W. Russel; Molecular Cloning: A Laboratory Manual, Vols 1-3, CSHL.
4. Glover DM, Hames BD, Cloming I & II. IRL Press
5. Innis MA, Gelfant MA, Sni skey JJ, PCR Strategies, IRL Press.

BTIM0006: IMMUNOLOGY

(3 Credits – 45 hours)

Objective: *This course is designed to provide a foundation in the basic concepts of immunology and immunotechnology. Students will acquire a sound working knowledge of the basic elements of the immune system and the techniques employed in immunodiagnostics, therapeutic techniques and research.*

Module I (16 Hours)

a) History and scope of immunology, hematopoietic stem cells, stromal cells, hematopoiesis, lymphoid tissues and organs (primary and secondary), B-lymphocytes and their activation, Thymus derived lymphocytes and their activation, antigen presenting cells, natural killer cells, dendritic cells, macrophages, structure and functions of Class I and II Major Histocompatibility complex (MHC) molecules;
b) Types of immunity: innate and acquired, active and passive, humoral and cell mediated, immune globulin: definition, structure and function, clonal selection theory, monoclonal antibody synthesis, generation of antibody diversity, organization and expression of immunoglobulin genes, antigens: T dependent and T independent antigens, adjuvant (definition, examples, function), antigen antibody reactions, cross reactivity, cytokines-definition: definition, types and functions.

Module II (7 Hours)

The complement systems: definition, function, classical and alternate pathway, transplantation: organ transplantation and HLA tissue typing, autoimmunity, hypersensitivity reactions, immunological tolerance, immune suppression and immunotherapy, vaccine: definition, classification and function.

Module III (10 Hours)

Purification of mononuclear cells from peripheral blood, isolation and characterization of T cells subsets; B cells and macrophages; mitogen and antigen induced lympho-proliferation assay; mixed lymphocyte reaction - assessment of delayed hypersensitivity reactions; macrophage cultures - assay of macrophage activation - isolation of dendritic cells; *In situ* and *In vivo* characterization of cells from tissues; generation of T cell clones.

Module IV (12 Hours)

a) Disease diagnostics and Immunotechnology: DNA diagnostics, array-based diagnostics and nucleotide polymorphisms; Immuno screening of recombinant library; Tumour immunity, Immunodeficiency disease - SCID, AIDS.
b) Immunoelectrophoresis, immunofluorescence, Immunohistochemistry; Fluorescent Activated Cell Sorter (FACS); Single and double immunodiffusion, Immunofluorescence, RIA, RID, ELISA, Western blot, Agglutination tests; Vaccine technology including DNA vaccines; identification of T and B epitopes for vaccine development.

COURSE/LEARNING OUTCOMES

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

CO1: Get an insight into the physical, chemical and physiological characteristics of the components of the immune system
CO2: Understand the molecular basis of immunity and the complex genetics that underlies the diversity of the immune system
CO3: Understand the basis of autoimmunity, hypersentivities and immune deficiencies

Suggested Readings

1. Kindt TJ, Goldsby RA, Osborne BA, Kuby J. Kuby Immunology. WH Freeman and company, New York.
2. Abbas AK, Lichtman AK and Pober JS (Eds). Cellular and Molecular Immunology. WB Saunders.
3. Delves P, Martin S, Burton D, Roitt I. Roitt's Essential Immunology. Wiley-Blackwell.
4. Weir DM and Steward J. Immunology. Churchill Livingstone, New York
5. Goding. Monoclonal antibodies. Academic Press.
6. Hay FC, Westwood OMR. Practical Immunology. Blackwell Publishing.
7. Price CP, Newman DJ. Principles And Practices of Immunoassay. Nature Publishing Group.

BTBE0007: BIOPROCESS ENGINEERING

(3 Credits – 45 hours)

Objective: *The course aims to present the students the basic principles of bioengineering in large-scale cultivation of microorganisms for production of industrially important products. Students will be introduced to different aspects in the field of Bioprocess Engineering including bioreactors and fermentors, food biotechnology and environmental biotechnology.*

Module I (8 Hours)

Introduction to bioprocess engineering, bioreactors, bioprocess kinetics, kinetic modeling, cell immobilization, production of biomass and applications; Isolation, preservation and maintenance of industrial microorganisms, kinetics of microbial growth, media formulation for industrial fermentation, Air and media sterilization; Designing of a fermenter/Bioreactor.

Module II (8 Hours)

Types of fermentation process, analysis of batch: fed batch and continuous bioreactor, biotransformation, stability of microbial reactors, analysis of mixed microbial populations, specialized bioreactors (pulsed, fluidized, photo bioreactors etc.) Measurement and control of bioprocess parameters

Module III (12 Hours)

Downstream processing: introduction, removal of microbial cells and solid matters, foam separation, precipitation, filtration, centrifugation, cell disruption, liquid-liquid extraction, chromatography, membrane process, drying and crystallization, effluent treatment; Industrial production of chemicals using biological aid: alcohols, acids (citric, acetic and gluconic), solvents (glycerols, acetone, butanol), antibiotics (penicillin, streptomycin, tetracycline) amino acids (lysine, glutamic acid), single cell proteins.

Module IV (10 Hours)

Food Biotechnology: Food spoilage and preservation process, dairy products, wine, beer and other alcoholic Beverages and formulated plant products, petro crops, food from water, fungal protein food from yeast, hybrid seeds, conventional breeding of plant for food production. Transformation of steroids and non-steroid compounds; Mushroom: types, isolation and culture.

Module V (12 Hours)

Bioremediation: Concept (in situ and ex situ bioremediation) and role of bioremediation in controlling various pollution problems (industrial and medical effluents,). Basic concept of phyto-remediation and myco-remediation; Bioremediation of heavy metals, oil spills, plastics, cellulose and paper, xenobiotics; Radioactive waste: Sources, half-life of radioactive elements and mode of decay.

COURSE/LEARNING OUTCOMES

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

CO1: Describe the design and development of equipment and processes for the manufacturing of products

CO2: Understand biochemical and physiological studies of metabolism and enzymes as relevant to product formation

C03: Understand transport phenomena, reaction kinetics, design of reactors and downstream operations

Suggested Readings

1. Stanbury PF, Whitaker A, Hall SJ. Principles of Fermentation Technology. Butterwoth Heinemann. (Available online).
2. Glazer AN. and Nikaldo H. Microbial Biotechnology, WH Freeman and company network.
3. Prescott LM, Harley JP and Klein DA. Microbiology. McGraw Hill.
4. Stainer RY, Ingrtham JL, Wheels ML and Painter PR. General Microbiology. Macmillan.
5. Casida LE. Industrial Microbiology, John Wiley and Sons.
6. Flickinger MC, Drew SW. Encyclopedia of Bioprocess Technology. John Wiley and Sons.
7. Demian AL and Davis. JE. Industrial Microbiology and Biotechnology, ASM Press.

BTAB0008: ADVANCES IN BIOTECHNOLOGY

(4 Credits - 60 hours)

Objective: *This course will review the principles of advanced Biotechnology. The students will be exposed to the frontiers of research and latest techniques in Biotechnology and their applications. This will keep them abreast of the most recent developments in the area.The students will be required to make presentations and submit assignments on the latest developments in the field of Biotechnology with the help of reputed national and international journals.*

Module I: Genomics (10 hours)

Genome organisation, prokaryotic and eukaryotic genomes, chromosomal and extra-chromosomal genomes, model organisms, Next Generation Sequencing (NGS), whole genome sequencing, genome projects, microarrays; epigenetics, pharmacogenomics, comparative genomics, applications of genomics in health, agriculture and industry

Module II: Transcriptomics and proteomics (15 hours):

a) Transcriptome, analysis of gene expression - ESTs, SAGE, recent developments in RNA sequencing; metatranscriptomics, applications in gene regulation: alternative splicing, non-coding RNA
b) Proteins and their structure, proteome, 1D and 2D PAGE, X-ray crystallography, Mass spectrometry including MALDI-TOF, protein microarrays, recent developments in secretomics, interactomics; applications of proteomics in drug discovery

Module III: Metabolomics, bioinformatics and systems biology (15 hours):

a) Metabolome and its significance, recent advancements using high throughput analytical techniques like chromatography coupled with mass spectroscopy (GC-MS, LC-MS), NMR; data analysis (PCA, PLSDA)
b) Databases, sequence alignments, phylogenetic tree, analysis of -omics data using advanced tools of bioinformatics
c) Systems biology – complex biological data, computational and mathematical models, recent developments in network analysis

Module IV: Commercial biotechnology (10 hours)

Isolation of industrially important enzymes, commercial production of industrial bio-molecules in bioreactors; drug discovery from both natural and synthetic source, recombinant vaccines; commercial plant tissue culture including automation, strategies for environment cleanup using biotechnological tools

Module V: Intellectual Property Rights (10 hours)

Introduction to intellectual property: patents, types, trademarks, copyright and related rights, industrial design and rights, traditional knowledge, geographical indications, patentables and non-patentables, patenting life, legal protection of biotechnological inventions, world intellectual property rights organization (WIPO), Indian Patent Act 1970 and recent amendments, entrepreneurship in bioscience.

Suggested Readings

1. Primrose, S.B. and Twyman, R., Principles of Gene Manipulation and Genomics, Wiley - Blackwell Publishers.
2. Bernot, A., Genome, Trascriptome and Proteome Analysis. John Wiley & Sons Ltd.
3. Stumpf, M., Balding, D.J. and Girolami, M., Handbook of Statistical Systems Biology, Wiley Publishers.
4. Singh, K.K., Biotechnology and Intellectual Property Rights: Legal and Social Implications, Springer, India.

BTPE0009: THERMODYNAMICS AND ENZYMOLOGY

(3 Credits - 45 hours)

Objective: *The objective of the course is to give the students an in-depth knowledge of the properties and kinetics of enzyme catalyzed reactions in biological systems*

Module I (5 hours)

Laws of thermodynamics, reversible and irreversible processes, entropy, enthalpy, internal energy, free energy and equilibrium constant, Gibbs free energy equation, determination of free energy change of under standard and non-standard conditions, high energy compounds, coupled reactions, determination of feasibility of reactions.

Module II (5 hours)

Isolation and purification of enzymes, Salting out of protiens, Isoelectric point, Electrophoresis of protein. Classification, nomenclature and general properties like effects of pH, substrate and temperature on enzyme catalyzed reactions.

Module III (7 hours)

Kinetics of enzyme catalyzed reaction: Single substrate reactions, bi-substrate reactions, concept of Michaelis-Menten, Briggs Haldane relationship, Determination and significance of kinetic constants, Limitations of Michaelis-Menten Kinetics.

Module IV (10 hours)

Activation energy and Arrhenius concept. Binding energy, Enzyme catalysis: enzyme specificity and the concept of active site, determination of active site. Stereospecificity of enzymes. Mechanism of catalysis: Proximity and orientation effects, general acid-base catalysis, concerted acid - base catalysis, nucleophilic and electrophilic attacks, catalysis by distortion, metal ion catalysis. Theories on mechanism of catalysis. Inhibition of enzyme activity: Competitive-cite: succinate on Malonate dehydrogenase as example, Non-competitive-cite: lodoacetamide on triose phosphate dehydrogenase and EDTA as example: Suicide inactivation-action of penicillin on bacterial cell wall biosynthesis as an example.

Module V (9 hours)

Mechanism of enzymes action: mechanism of action of lysozyme, chymotrypsin, carboxypeptidase and DNA polymease. Multienzymes system, Mechanism of action and regulation of pyruvate dehydrogenase and fatty acid synthetase complex. Coenzyme action.

Module VI (9 Hours)

Enzyme regulation: General mechanisms of enzyme regulation, Allosteric enzymes, Feedback Regulation, Sigmoidal kinetics and their physiological significance, Symmetric and sequential modes for action of Allosteric enzymes. Reversible and irreversible covalent modification of enzymes, cascade systems. Immobilised enzymes and their industrial applications. Ribozyme (catalytic RNA) and Abzyme (use of antibody as enzyme) - definition only.

COURSE/LEARNING OUTCOMES

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

CO1: Comprehend the properties and kinetics of enzyme catalyzed reactions in biological systems (*Comprehension*)
CO2: Explain the chemical reactions and determine the various variables (*Comprehension, Application*)
CO3: Analyze the relationship of an enzyme and substrate specificity for product formation (*Analysis*)
CO4: Explain and Analyze the essential role of enzymes in metabolism (*Comprehension, Analysis*)

Suggested Readings

1. R. S. Berry, S. A. Rice and J. Ross; Physical Chemistry; Oxford University Press publisher
2. P. C. Rakshit; Physical Chemistry; Sarat Book House publisher
3. Jeremy M. Berg (Editor), John L. Tymoczko (Editor), Lubert Stryer (Editor); Biochemistry; W.H.Freeman & Co Ltd publisher
4. Donald Voet, Judith G. Voet, Charlotte W. Pratt; Fundamentals of Biochemistry; John Wiley & Sons Inc publisher

5. David L. Nelson, Michael M. Cox; Lehninger Principles of Biochemistry; W H Freeman & Co (Sd) publisher
6. Thomas .M. Devlin; Textbook of Biochemistry With Clinical Correlations; John Wiley & Sons publishers publisher

BTCA0010: COMPUTER APPLICATIONS AND BIOINFORMATICS

(3 Credits – 45 hours)

Objective: *This course is designed to equip students with a foundation for developing basic programming skills and a sound knowledge of computer applications in biological sciences. Students will learn how to effectively and independently use the available bioinformatics tools and resources. Using bioinformatics tools, students will have the opportunity to apply the concepts of genetics, cell and molecular biology to learn how to retrieve, analyze and process biological data.*

Module I (10 Hours)

a) Basic computer organization, Processor and memory, secondary storage devices, Input-Output devices.
b) Computer software, Computer language; Basic Ideas in Programming in C: Variables, Constants, Keywords, Input/output, Control Statements, Functions, Structures; Operating system –Basic commands in Linux.

Module II (5 Hours)

a) Introduction to Spreadsheet, presentation software, document and word processing.
b) World Wide Web, Client - server organization; Internet Protocols - FTP, HTTP, Telnet; Search engines - search concepts

Module III (12 Hours)

a) Concept of databases: Biological databases - Primary, secondary, composite databases; Databases for Literature, Sequence and structure; Searching and their retrieval.
b) DNA and Protein sequence alignments - Pairwise alignment, dot plot, global and local alignment algorithms - Needleman and Wunsch algorithm, Smith-Waterman algorithm; Multiple sequence alignment - progressive alignment and Iterative alignment algorithms; PAM and Blosum scoring matrices; Multiple sequence alignment based database searching – PSI-Blast; Bioinformatics for phylogenetic analysis.

Module IV (9 Hours)

a) Gene Prediction- Finding genes in prokaryotic and eukaryotic genomes, Regulatory sequence analysis; Genome maps and markers, Genome variation.Oligo design and analysis tool.
b) Human genome project; Concept and Software used in Gene expression analysis and Microarray.

Module V (9 Hours)

a) Structural biology - Protein structure prediction and classification; Homology modeling, Threading and Abinitio methods, Molecular visualization tools-Rasmol, Chime and Swiss pdb viewer. Structure analysis tools - VAST and DALI.
b) Drug Design and discovery, steps in drug discovery, ADME, Lead identification, QSAR. Proteomic research, metabolic reconstruction.

Suggested Readings

1. Sedgewick R and Wayne K. An Introduction to Computer Science, Princeton University [available online].
2. Blum R and LeBlanc Dee-Ann. Linux for Dummies, WILEY [available online].
3. Kanetkar YP. Let Us C [available online].
4. Rajaraman V. Fundamentals of Computers, Prentice-Hill India.
5. Rajaram R. Computer Concepts and C Programming, SCITECH INDIA.
6. Baxevanis DA, Francis BFO. Bioinformatics: a practical guide to the analysis of genes and proteins, John Wiley and Sons [available online].
7. Krane DE,Raymen, M. L. Fundamental Concepts of Bioinformatics, Benjamin Cummings.
8. Mount DW. Bioinformatics: Sequence and genome Analysis, CHSL Press [available online].

9. Bourne PE and Weissig H. Structural Bioinformatics, WILEY.
10. Ghosh Z and Mallick B. Bioinformatics Principles and Applications, Oxford University Press.
11. Attwood TK and Parry-Smith DJ. Introduction to Bioinformatics, Pearson Education.
12. Elmasr R and Navathe SB. Fundamentals of Database Systems, Pearson Education [available online].
13. Campbell AM and Heyer LJ. Discovering Genomics, Proteomics and Bioinformatics, Benjamin Cummings.

BTAP6003: ANIMAL AND PLANT BIOTECHNOLOGY LAB

(2 Credits)

(A) Animal Biotechnology

1. Isolation of genomic DNA from animal cells
2. Preparation of animal cell culture media and Filter sterilization
3. Subculturing / passaging cell lines
4. Preparation of single cell suspension from spleen/liver/thymus
5. Staining of the monolayer cells with Giemsa stain.
6. Quantitation of animals cells using hemocytometer
7. Cell viability test

(B) Plant Biotechnology

1. Isolation of plant genomic DNA, Chloroplast and Mitochondrial DNA
2. Preparation of Plant tissue culture media and Stock solutions
3. Callus induction
4. Shoot/ Root induction - organogenesis
5. Haploid production – Anther and ovule culture
6. Protoplast fusion by PEG
7. Agrobacterium mediated transformation
8. Gus assay/ GFP cloning

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Learn the techniques for isolation of DNA
CO2: Learn preparation of culture medias for cell cultures

BTGE6004: GENETIC ENGINEERING LAB

(1 Credit)

1. Isolation of genomic DNA from animals/plants
2. DNA amplification using polymerase chain reaction
3. Cloning in plasmid/ Phagemid vectors
4. Gene expression in E. coli and analysis of gene product
5. Agarose gel electrophoresis
6. Ligation of DNA
7. Silver staining of gels
8. Methylene Blue Staining
9. RAPD (Random Amplification of Polymorphic DNA)

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Learn isolation of genomic DNA and amplification using polymerase chain reaction (PCR)
CO2: Perform ligation of DNA molecule
CO3: Analyze gene expression
CO4: Learn RAPD technique

BTIM6005: IMMUNOLOGY LAB
(1 Credit)

1. Isolation of WBC and RBCs
2. Differential counting of WBC
3. Single radial immune diffusion
4. Double diffusion method of Ouchterlony
5. Immunoelectrophoresis
6. Rocket electrophoresis
7. Agglutination reactions
8. Separation of peripheral blood mononuclear cells by Ficoll-Hypaque
9. Immunodiagnostics (Demonstration using commercial kits)
10. DOT ELISA for the presence of specific antigen.

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand antigen-antibody interaction
CO2: Determine the concentration of known antigens
CO3: Understand the immunodiagnostics application

BTBE6006: BIOPROCESS ENGINEERING LAB
(1 Credit)

(A minimum of 10 experiments to be conducted)

1. Parts and design of fermenter
2. Solid state fermentation
3. Submerged fermentation
4. Conservation of Bacteria by Lyophilization
5. Production and estimation of protease
6. Production and estimation of amylase
7. Isolation, Preservation and Maintenance of Industrial Microorganisms
8. Growth kinetics for batch culture
9. Media for Industrial Fermentation
10. Immobilization of bacterial cells
11. Scale up fermentation process
12. Production and quantification of alcohol using yeast
13. Lactic acid fermentation process

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand the parts, design and different fermentation processes
CO2: Perform the production and estimation of enzymes
CO3: Understand the scale up fermentation process

BTDI6007: DISSERTATION PHASE I
(2 Credits)

Objective: *Dissertation phase I is designed to familiarize the students with the research topics and methodologies by a thorough literature review.*

During dissertation phase I each student chooses a topic in consultation with the assigned supervisor and the student is asked to do thorough literature review under the guidance of the supervisor. At the end of the semester the student submits literature review report and students presents the matter at a school level seminar.

COURSE/LEARNING OUTCOMES

At the end of Dissertation phase I students will be able to:

CO1: Undertake a research work leading to a dissertation
CO2: Incorporate recent trends in the chosen area and develop research work

BTDI6008: DISSERTATION PHASE II
(16 Credits)

Objective: *Dissertation phase II involves execution of the research work decided in phase I leading to the preparation, submission and evaluation of the dissertation.*

During the course of the Master's Degree the student is expected to undertake a research work leading to a dissertation. The work will be divided into two phases spread over two semesters. During the research work the student shall study and incorporate recent trends in the area chosen by him/her, and develop a scientific dissertation based on the research and actual bench work. The student shall be required to make presentations and reports at various stages of the research work. The format for the final dissertation shall be as prescribed by the Department. There shall be a viva voce examination on the dissertation by an expert committee comprising external and internal members. The mode and components of the evaluation and the weightages attached to them shall be published by the Department at the beginning of the semester.

BTPE6009: THERMODYNAMICS AND ENZYMOLOGY LAB
(1 Credit)

1. Determination of Km and optimum pH and temperature of amylase from sweet potatoes
2. Determination of Km and Vmax of urease from bean.
3. Determination of Km of Lipase from moong seeds.
4. Assessment of inhibitor on enzyme activity.
5. Assessment of activator on enzyme activity.

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand and determine the factors affecting enzyme activity, Km and Vmax for different samples

BTCA6010: COMPUTER APPLICATIONS AND BIOINFORMATICS LAB
(2 Credits)

1. Basic Programing in C
2. Running basic LINUX commands
3. Usage of NCBI resources
4. Usage/Retrieval of sequence/structure from databases
5. Visualization of structures
6. Protein Docking and Docking of ligand receptors
7. Sequence alignments, Blastn, Blastp, Psi-Blast, Clustal Omega
8. Homology modeling
9. Primer designing and analysis
10. Phylogenetic Analysis using MEGA5.0

MICROBIOLOGY

MBCG0001: CELL BIOLOGY AND GENETICS

(4 Credits - 60 hours)

Objective: *This course is designed to give a better understanding of cellular biology with complicated biochemical and physiological processes. The course also focuses on genetics as it relates to the function and structures of cells. It will also serve as a foundation for further studies in advanced molecular biology and biochemistry.*

Module I (9 Hours)

Structural organization and function of intracellular organelles: Cell wall, nucleus, mitochondria, ribosomes, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure function of cytoskeleton and its role in motility. Membrane structure and function: Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of sorting; Protein synthesis on free and bound polysomes, golgi sorting, post- translational modifications.

Module II (12 Hours)

Organization of genes and chromosomes: Operon, interrupted genes, gene families, structure of chromatin and chromosomes, unique and repetitive DNA, heterochromatin, euchromatin, transposons. Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle. Uncontrolled cell growth – cell cycle in cancer; oncogenes, tumor suppressor genes; Programmed cell death, aging and senescence

Module III (15 Hours)

Cellular communication: Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation. Cell signaling: Hormones and their receptors, cell surface receptor, signal transduction pathways: GCPR, RTK etc., second messengers and their roles in signal transduction, regulation of signaling pathways, bacterial and plant two-component signaling systems, bacterial chemotaxis and quorum sensing.

Module IV (15 Hours)

a) Mendelian principles and extension: Dominance, segregation, independent assortment, deviation from Mendelian inheritance. Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests. Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. Extra chromosomal inheritance: Inheritance of mitochondrial and chloroplast genes, maternal inheritance.
b) Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers mapping by using somatic cell hybrids, development of mapping population in plants. mapping, electron microscope heteroduplex mapping; Fine structure of genes and complex loci in eukaryotes Human genetics: Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.
c) Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Module VI (9 Hours)

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis. Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications. Transposable Genetic Elements: Transposable elements in bacteria, transposable elements in eukaryotes. Recombination: Homologous and non-homologous recombination, including transposition, site-specific recombination.

COURSE/LEARNING OUTCOMES

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

CO1: Explain cellular biology with complicated biochemical and physiological processes
CO2: Relate the cellular process in genetic level
CO3: Explain genetics as it relates to the function and structures of cells

Suggested Readings

1. Cooper, G. M., Cell (A Molecular Approach)
2. Karp, G., Cell and Molecular Biology (1996)
3. Sadava D. E., Cell Biology (1993)
4. Kish V. M. and Kleinsmith L. J., Cell and Molecular Biology (1995)
5. deRobertis and deRobertis, Cell and Molecular Biology
6. Gardner, Principles of Genetics
7. Strickberger, Genetics
8. Ram Mahabal, Fundamentals of Cytogenetics and Genetics

MBVB0003: VIROLOGY, BACTERIOLOGY AND MYCOLOGY

(5 Credits - 75 Hours)

Objective: *The contents of this course will help students to understand the evolution, growth, life cycle and applications of virus, bacteria and fungus which will lead the students towards progressive advancement of the subject.*

Module I (8 hours)

History and perspective of virology, distinctive properties of virus, variation in morphology of virus, capsid arrangement, envelope composition, viral nomenclature, classification of virus including Baltimore's classification, assay of plant virus, animal virus and bacteriophage, multiplication of viruses inside the host: infection of host cells, synthesis of viral macromolecules, regulation of the expression of phage genes, viral DNA replication, role of DNA modification, maturation and release of viral particle, isolation and purification of phage.

Module II (17 hours)

Bacterial viruses: classification and nomenclature, lytic and lysogenic phage, regulation in switching between lytic and lysogenic mode, lysogenic conversion, replication of bacterial phage, plant viruses: classification and nomenclature, structure and life cycle of plant viruses, replication of the genetic material of plant viruses, plant diseases caused by virus and their control, animal viruses: classification and nomenclature, structure and lifecycle of animal viruses, replicative strategies employed by DNA and RNA viruses, epidemiology, pathogenesity, diagnosis, prevention and treatment of animal viruses including HIV, viral vaccines, interferon, and antiviral drugs.

Module III (25 hours)

History and development of mycology in the scientific development, general characteristics of fungi, fungal structure and organization, criteria for fungal classification, colony communication and signaling, nutrition requirement of fungi, saprophytic, parasitic, obligatory and facultative, biotrophic, semi-biotrophic and necrotrophic mode of growth, fungal cell differentiation, reproduction in fungi - vegetative, asexual and sexual with special reference to their significance, homothallism and heterothallism, sex hormones in fungi, ecto-mycorrhizae, endo mycorrhizae and vesicular arbuscular mycorrhizae, fungal-plant interactions: symbiotic and antagonistic interactions, use of endophytic fungi as biocontrol agents against plant diseases caused by fungi, fungi and animal diseases - Dermatophytes and agents of superficial mycoses, significance of fungi in biotechnology and industrial application, fungal metabolites and their economic significance - mycotoxins, medicinal uses of fungi (antibiotics), fungi as food - mushrooms, mushroom poisoning.

Module IV (10 hours)

History and development of bacteriology in the scientific development, general features of eubacteria and archaebacteria, morphology of bacteria, bacterial cell wall composition and synthesis, plasma membrane, cytoplasmic matrix, nucleoid, inclusion bodies, ribosomes, flagella, Pilli, endospore and exospores, plasmids and episomes, staining techniques: basic and acidic dyes, simple and differential staining, Grams staining, acid fast staining, flagella and spore staining.

Module V (15 hours)

Bacterial growth curve, effect of physical and chemical factors on bacterial growth, measuring bacterial growth-spectrophotometric method, microscopic counting, serial dilution and viable cell count, most probable number, and filtration technique, bacterial reproduction, bacterial culture media: chemically defined, complex, differential and special selective media, nutritional types: photoautotroph, photoorganotroph, chemolithotroph (ammonia, nitrite, sulfur, hydrogen, iron oxidizing bacteria), chemoorganotroph, effect of oxygen on growth, classification on the basis of oxygen requirement and tolerance, bacterial two component signaling system, application of bacteria in agriculture (nitrogen fixing organisms; bioremediation of hydrocarbons and biopesticides), antibiotics and chemotherapeutic drugs, antibiotic sensitivity assays, sterilization, physical and chemical control of bacteria.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the growth and life cycles of virus, bacteria and fungus
CO2: Explain evolution in the study and development of microbial life forms
CO3: Apply the information toward development of strategies in using microbes for biochemical reactions, bioremediation, agriculture and in the study of disease progression
CO4: Explain role of micro-molecules with regard to cellular communication, sexual development of microbes, and plant-microbe interaction.
CO5: Understand the role and patterns in epidemiology, pathogenecity, diagnosis, prevention and treatment

Suggested Readings

1. S. E. Luria, J. E. Darnell; General Virology; John Wiley and Sons publisher
2. A.J. Rhodes, C.E. Van Rooyen; Text book of Virology; 5th revised edition
3. Kerry F. Harris, Oney P. Smith, James E. Duffus; Virus-insect-plant Interactions; Academic Press Inc
4. S. J. Flint, Lynn W. Enquist, Robert M. Krug, Vincent R. Racaniello; Principles of Virology: Molecular Biology, Pathogenesis, and Control; American Society for Microbiology
5. Constantine J. Alexopoulos, Charles W. Mims, Meredith M. Blackwell; Introductory Mycology; 4th Edition edition
6. A. H. S. Onions, D. Allsopp, H. O. W. Eggins; Smith's Introduction to Industrial Mycology; 1st edition
7. Jr., Michael Pelczar; Microbiology; 5th edition
8. Joanne Willey, Linda Sherwood, Chris Woolverton; Microbiology; 8th edition
9. R Y, J L Ingraham et. al. Stanier; General Microbiology; 5th edition
10. Schlegel; General microbiology; Cambridge University Press

MBDE0004: MICROBIAL DIVERSITY AND ECOLOGY

(2 Credits - 30 Hours)

Objective: *To provide students with an introduction and in depth knowledge to microbial diversity and microbial ecology with emphasis on recent molecular, biological and genomics developments in these fields.*

Module I (8 hours)

Prokaryotic taxonomy: classical and modern (polyphasic approach), prokaryote and eukaryote species concept, biodiversity: definition and classification, molecular chronometers, molecular phylogeny, chemotaxonomy, estimation of diversity of microbial community by different methods including both metabolic and molecular, culture dependent and culture independent microbial community, metagenomics studies and its applications.

Module II (6 hours)

Microbial biodiversity analysis and documentation, major drivers of biodiversity change, biodiversity management approaches, extremophiles-definition, classification and survival strategies in hostile environment, importance and applications of extremophiles.

Module III (7 hours)

Microbial ecology vs. macroecology, concept of habitat and niche, fundamental and realized niche, resource partitioning, character displacement, microbial community structure, microbial interactions within community, characteristics of microbial population growth curves, microbial population regulation, r and K selected strategies, microbial community succession, microbial biofilm: definition, development and importance.

Module IV (9 hours)

Structure and function of ecosystems-terrestrial (forest, grassland) and aquatic (freshwater, marine, estuarine), microbial role in biogeochemical cycles (C,N,P), primary production and decomposition, environmental pollution and greenhouse gases, several sustainable approaches for remediation of xenobiotic compounds, wastewater remediation, genetically modified organism: definition and applications.

COURSE/LEARNING OUTCOMES

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

CO1: Understand phylogenetic relationship, construction of trees, chemotaxonomic relationship among various microbial taxon, its metagenomic profiling and both classical and modern approaches in prokaryotic taxonomy.

CO2: Understand biochemical and molecular mechanisms extremophiles evolved to adapt to the surrounding and different environmental conditions and its applications in industry

CO3: Perform quorum sensing and biofilm production and detection; microbial population growth profiles and community succession

C04: Have basic information in the structure, anatomy, function of an ecosystem, the role of microbes in the sustenance of the ecosystem

C05: Develop interest to know the role of microbes in bioremediation and apply their knowledge in environment pollution to apply microbes in bioremediation process (using the information gathered in the theory of the previous course: Virology, Bacteriology, Mycology)

Suggested Readings

1. Prescott, Harley and Klein; Microbiology; McGraw Hill Education publisher
2. S.C. Tiwari, G.D. Sharma; Microbial Diversity: Status and Potential Applications; Scientific Book Centre publisher
3. D.J. Bagyaraj, K. V. B. R. Tilak, H.K. Kehri; Microbial Diversity and Functions; New India Publishing Agency
4. James T. Staley, Anna-Louise Reysenbach; Biodiversity of Microbial Life: Foundation of Earth's Biosphere; Wiley-Blackwell publisher
5. Michael T. Madigan, John M. Martinko, Paul V. Dunlap; Brock biology of the microorganisms; Pearson publisher
6. Ronald M. Atlas; Microbial ecology-Fundamentals and applications; Pearson Education publisher
7. Heinz Stolp; Microbial Ecology: Organisms, Habitats, Activities; Cambridge University Press 8. Morris A. Levin; Microbial Ecology: Principles, methods and applications (Environmental Biotechnology); McGraw Hill Higher education publisher.
8. Frank R. Spellman; Handbook of Environmental Engineering; CRC Press
9. J. McArthur; Microbial Ecology: An Evolutionary Approach; Academic Press Inc publisher

MBIM0005: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

(3 Credits - 45 Hours)

Objective: *This course is designed to provide students with an in depth knowledge in two complementary disciplines; the immune system and how they interact with the challenges posed by pathogens.*

Module I (16 hours)

History and scope of immunology, hematopoietic stem cells, stromal cells, hematopoiesis, lymphoid tissues and organs (primary and secondary), B-lymphocytes and their activation, Thymus derived lymphocytes and their activation, antigen presenting cells, natural killer cells, dendritic cells,

macrophages, structure and functions of Class I and II Major Histocompatibility complex (MHC) molecules, types of immunity: innate and acquired, active and passive, humoral and cell mediated, immunoglobulin: definition, structure and function, clonal selection theory, monoclonal antibody synthesis, generation of antibody diversity, organization and expression of immunoglobulin genes, antigens: T dependent and T independent antigens, adjuvant (definition, examples, function), antigen-antibody reactions, cross reactivity, cytokines: definition, types and functions.

Module II (7 hours)

The complement systems: definition, function, classical and alternate pathway, transplantation: organ transplantation and HLA tissue typing, autoimmunity, hypersensitivity reactions, immunological tolerance, immune suppression and immunotherapy, vaccine: definition, classification and function.

Module III (12 hours)

History of medical microbiology, normal microflora of human body, role of resident microbial flora, host parasite interactions, microbial infection steps: colonization, association, adhesion and invasion of host tissue and toxigenesis with details account of several virulence factors, pathogenesity islands, endo-toxins and exo-toxin, water and food born pathogenic microorganisms, laboratory diagnosis, epidemiology, prevention and treatment.

Module IV (10 hours)

Principles of chemotherapy, antimicrobial agents (synthetic compounds and antibiotics): mechanism of work, drug discovery: historical perspective and current approaches, phases of drug discovery, toxicity evaluation of drug (LD50, acute, sub-acute and chronic toxicity), drug trial, drug metabolism, microbial drug resistance.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the working of the immune system in humans; explain the role of every defense barrier in avoiding infection and the genetic role in diversity in antibody development

CO2: Understand the processes involved in immunotherapy, vaccine development, monoclonal antibody production

CO3: Understand the mechanism of host-parasite interaction, the stages in disease progression, the differences in pathogenicity, virulence and toxicity owing to microbes

CO4: Design diagnostic strategies to study disease prognosis

CO5: Understand mechanism of antibiotic resistance – both molecular and physiological, the economic design in discovery of novel antibiotic candidates, the phases in drug discovery and clinical trials

Suggested Readings

1. Stewart Sell, Ira Berkower; Immunology and immunopathology and immunity; 5th Edition
2. Abul K. Abbas, Andrew H. H. Lichtman, Shiv Pillai; Cellular and molecular immunology; 8th Edition
3. Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt; Essential Immunology; 12th Edition
4. Thomas J Kindt, Barbara A. Osborne, Richard Goldsby; Immunology; 6th Edition
5. Jawitz, Melnick and Adelberg; Review of Medical Microbiology; 27th Edition; Mc Graw Hill education LANGE
6. Mark Gladwin, Trattler William, C. Scott, M.D. Mahan; Clinical Microbiology Made Ridiculously Simple; 6th Edition
7. Bailey, Scott; Diagnostic Microbiology; 13th Edition
8. Dennis L. Kasper, Anthony S. Fauci; Harrison's Infectious Diseases; 2nd Edition
9. Ananthanarayan, Paniker; Textbook of Microbiology; 8th Edition
10. WWC Topley, Sir Graham S; Topley and Wilson's Principles of Bacteriology, Virology and Immunity: Bacterial Diseases; Volume 3

MBAM0006: ADVANCES IN MICROBIOLOGY

(4 Credits - 60 Hours)

Objective: This course deals with the principles, procedures and applications of advanced techniques in Microbiology. This course will introduce students to the current tools and processes in Microbiology which will make them competent to pursue research in cutting-edge areas in Microbiology. Students will be required to make presentations and submit an assignment on the most recent developments in the field of Microbiology from reputed peer-reviewed national and international journals and books.

Module I: Industrial microbiology (20 hours)

Microbial strain improvement, production of industrially important enzymes, production of recombinant molecules and therapeutic compounds through bioreactors, microbial production of bioplastic, biopesticides, biofuel; biological weapons - definition and applications; microbial biosensors, downstream processing strategies.

Module II: Food and Dairy microbiology (10 hours)

Food spoilage and preservation, fermented foods, probiotics, genetically modified foods, biosensors in food, applications of important microbial enzymes in food and dairy industry, food sanitation and control; quality assurances in foods, Government regulatory practices and policies - FDA, EPA, HACCP, ISI and BIS.

Module III: Advanced molecular studies (10 hours)

Microbial biodiversity analysis using different advanced sequencing strategies including pyrosequencing and next gen sequencing, metatranscriptomics, metaproteomics and metabolomics.

Module IV: Microbial diagnosis and measures (10 hours)

Biochemical, serological and molecular methods - agglutination, ELISA, immuno-fluorescence, nucleic acid based methods - PCR, nucleic acid probes; recent outbreaks of human microbial diseases (SARS/ Swine flu/Ebola) – causes, spread and control; microbial mediated cancers and nosocomial infections, emergence of antibiotic resistance, current issues of MDR/XDR microbial strains, concept of DOTS; vaccines: importance, types, and applications.

Module V: Intellectual Property Rights (IPR) (10 hours)

Introduction to intellectual property: patents, types, trademarks, copyright and related rights, industrial design and rights, traditional knowledge, geographical indications, patentable and non patentability issues, patenting life, legal protection of biotechnological inventions, world intellectual property rights organization (WIPO), Indian Patent Act 1970 and recent amendments, entrepreneurship in bioscience.

COURSE/LEARNING OUTCOMES

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

CO1: Learn the principles, procedures and applications in recent techniques in microbiology in different levels such as industry, food and dairy and diagnosis

CO2: Have thorough understanding in the recent developments in microbiology research

CO3: Understand the protocol in ethical research, filing of patents, trademarks and copyrights, and what is novelty in microbiology research.

Suggested Readings

1. Adams MR. Food Microbiology. New Age International Private Limited
2. Joshi VK. Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology. (Volume 2) Educational Publishers & Distributors.
3. Patel AH. Industrial Microbiology. Macmillan India Limited.
4. Casida LE. Industrial Microbiology. Wiley Eastern
5. Davis JE, Demain AL. Manual of industrial Microbiology and Biotechnology. 2nd edition. ASM publications.
6. Fraser CM, Read TD, Nelson KE. Microbial Genomes, Humana Press.2.
7. Miller RV, Day MJ. Microbial Evolution-Gene establishment, survival and exchange, ASM Press.

8. Bare Act, 2007. Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., New Delhi.
9. Kankanala C (2007). Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd. New Delhi.
10. Goel D, Prashar S. IPR, Biosafety and Bioethics. (2013).Pearson
11. Collee JG, Fraser, AG, Marmion, BP, Simmons A. Practical Medical Microbiology. (2007) 14th edition, Elsevier.
12. Bailey's and Scott's Diagnostic Microbiology. Tille P (2013), 13th edition, Mosby

MBBM0007: BASIC MICROBIOLOGY

(3 Credits – 45 hours)

Objective: *The course is designed to impart a general knowledge on the different aspects of microbiology on the basis of various microorganisms like virus, bacteria etc. with modern microbial techniques.*

Module I: (10 Hours)

a) Historical Perspective: Discovery of microbial world; Landmark discoveries relevant to the field of microbiology; Controversy over spontaneous generation; Role of microorganisms in transformation of organic matter and in the causation of diseases.
b) Microbial Taxonomy and Diversity: Bacteria, Archea, Virus and their broad classification;
c) Staining of microorganisms: simple, differential, negative and positive staining, Gram staining, acid fast staining.

Module II: (10 Hours)

a) Microbial Growth: Definition of growth; Growth curve; Mathematical expression of exponential growth phase; Measurement of growth and growth yields; Synchronous growth; Continuous culture; Effect of environmental factors on growth.
b) Principles of microbial nutrition: nutritional groups of bacteria.
c) Microbial cultures: Concept of pure culture, Methods of pure culture isolation, Enrichment culturing techniques, single cell isolation, and pure culture development.

Module III: (10 Hours)

a) Microbial Metabolism: An overview of metabolism; Glycolysis; Pentose-phosphate pathway; Entner-Doudoroff pathway; Glyoxalate pathway; The citric acid cycle; Fermentation; Aerobic and anaerobic respiration.
b) Photosynthesis: classification of photosynthetic bacteria, photosynthetic electron transport systems.

Module IV: (5 Hours)

Microbial Diseases and Host Pathogen Interaction: Normal microbiota; Classification of infectious diseases; Reservoirs of infection; Nosocomial infection; emerging infectious diseases.

Module V: (10 Hours)

a) Microbial ecology: Physiology, molecular adaptation and applications of acidophiles, alkalophiles, halophiles, thermophiles and hyperthermophiles, psychrophiles, barophiles.
b) Antimicrobial Antibiotics: General characteristics of antimicrobial drugs; Antibiotics: classification, mode of action and resistance; Antifungal and antiviral drugs, mode of action, resistance to antibiotics.

COURSE/LEARNING OUTCOMES

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

CO1: Understand microbial diversity and taxonomy
CO2: Microbial culture, metabolism and host pathogen interactions
CO3: Microbial ecology- survival strategies like antibiotics, extremophiles

Suggested Readings

1. Pelczar MJ, Ried RD and Chan, ECS, Microbiology
2. Prescot and Dunn, Industrial Microbiology
3. Ananthanarayanan and JayaramPaniker, Text Book of Microbiology
4. Gerard J Tortora, Berdell R Funke, Microbiology: An Introduction Christine L Case Benjamin-Cummings Publishing Company.
5. The Prokaryotes. A handbook on the biology of bacteria: ecophysiology, isolation, identification, applications. Volumes I-IV by Balows, A., Truper, H. G., Dworkin, M., Harder, W., Schleifer, K. H.Springer-Verlag, New York.
6. Albert G. Moat and John W. Foster. Microbial Physiology, John Wiley and Sons. Gopal Reddy et al., Laboratory Experiments in Microbiology

MBCG6001: CELL BIOLOGY AND GENETICS LAB

(1 Credit)

1. Subcellular fractionation: mitochondria and chloroplast and their characteristics
2. Study of mitosis and meiosis in plants/cultured cells
3. Isolation of DNA from animal and plant sources
4. Agarose gel electrophoresis of isolated genomic DNA
5. Determination of Tm of DNA
6. Isolation of auxotrophic mutants by replica plating

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand and identify different stages of cell division
CO2: Learn the technique of extraction of DNA from both plant and animal tissues
CO3: Determine the Tm of the melt curve of DNA

MBBM6002: BASIC MICROBIOLOGY LAB

(1 Credit)

1. Growth curve: Effect of temperature, pH and carbon and nitrogen source on growth
2. Microscopic examination and study of bacteria, yeast and molds by Gram stain, acid fast stain and staining of spores
3. Assay of antibiotics
4. Isolation and maintenance of organisms by plating, streaking and serial dilution methods
5. Observation of specimen and permanent slides

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Isolate and maintain bacteria as pure culture
CO2: Study microbial growth and nutrition and factors affecting growth (temperature, pH, etc.)
CO3: Measure the Minimum Inhibition Concentration against a bacterial isolate using different antibiotic discs.

MBMT6003: MICROBIOLOGY TECHNIQUES LAB

(2 Credits - 60 hours)

1. Isolation of bacteriophage from natural sources
2. Cultivation and quantification of phages
3. phage induction
4. Isolation of fungi from soil
5. Staining of fungus
6. Pure culture preparation and preservation of microorganism
7. Microbial growth measurement by direct cell count method, serial dilution method, turbidity method

8. Staining technique-simple, Gram's staining, negative staining, spore staining, acid fast staining of bacteria
9. Determination of bacterial motility
10. Microbial biofilm detection

COURSE/LEARNING OUTCOMES

At the end of the lab experiments students will be able to:

CO1: Isolate and identify coliphages, bacteria, fungi and algae from various natural environment sources, its enumeration by serial dilution and turbidity analysis, infer from the colony and cell morphology, and motility

CO2: Prepare single colonies and preserve the cultures

CO3: Produce and detect bacterial biofilms

Suggested Readings

1. S. E. Luria, J. E. Darnell; General Virology; John Wiley & Sons publisher
2. A.J. Rhodes, C.E. Van Rooyen; Textbook of Virology;
3. Kerry F. Harris, Oney P. Smith, James E. Duffus; Virus-insect-plant Interactions; Academic Press Inc
4. S. J. Flint, Lynn W. Enquist, Robert M. Krug, Vincent R. Racaniello; Principles of Virology: Molecular Biology, Pathogenesis, and Control; American Society for Microbiology
5. Constantine J. Alexopoulos, Charles W. Mims, Meredith M. Blackwell; Introductory Mycology
6. A. H. S. Onions, D. Allsopp, H. O. W. Eggins; Smith's Introduction to Industrial Mycology
7. Jr., Michael Pelczar; Microbiology
8. Joanne Willey, Linda Sherwood, Chris Woolverton; Microbiology
9. R Y, J L Ingraham et al. Stanier; General Microbiology
10. Schlegel; General microbiology; Cambridge University Press

MBDE6004: MICROBIAL DIVERSITY AND ECOLOGY LAB

(1 Credit)

1. Isolation of thermophilic microorganisms
2. Isolation of Cyanobacteria from natural sample
3. Isolation of halophiles
4. Isolation of anaerobic microorganisms
5. Isolation of nitrogen fixing bacteria from soil
6. Isolation of protease secreting bacteria from soil
7. Effect of stress (temperature/pH/salt concentration) on microbial community
8. Determination of DO, COD and BOD of water sample

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Evaluate different strategies in isolation and identification of extremophiles and nitrogen fixers and normal skin microbiota

CO2: Determine level of pollution in water by both chemical and microbial processes

CO3: Identify industrially important protease secreting bacteria growing in varied environmental conditions

MBIM6005: IMMUNOLOGY AND MEDICAL MICROBIOLOGY LAB

(1 Credit)

1. Single radial immunodiffusion
2. Double diffusion method of Ouchterlony
3. Electrophoretic separation of bovine protein
4. Agglutination reaction
5. Minimum inhibitory concentration (MIC) determination of antimicrobial compound against microorganism

6. Antibiotic assay using standard curve
7. Study of natural microflora of skin
8. Isolation of hemolytic bacteria using blood agar media

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Understand antigen-antibody interaction (based on zone of equivalence)
CO2: Study and understand bacterial growth patterns in normal and antibiotic stressed conditions and hence design epidemiological study of antibiotic resistance pattern
CO3: Evaluate different strategies in isolation and identification of normal skin microbiota and understand their response to antibiotics
CO3: Differentiate between haemolytic and non-haemolytic bacteria

MBDI6006: DISSERTATION PHASE I
(2 credits)

Objective: *Dissertation phase I is designed to familiarize the students with the research topics and methodologies by a thorough literature review.*

During dissertation phase I each student chooses a topic in consultation with the assigned supervisor and the student is asked to do thorough literature review under the guidance of the supervisor. At the end of the semester the student submits literature review report and students presents the matter at a school level seminar.

COURSE/LEARNING OUTCOMES

At the end of Dissertation phase I students will be able to:

CO1: Design experiment, prepare work plan and learn how to test hypothesis in research work
CO2: Present scientific information in a succinct manner and learn the process of scientific writing
CO3: Carry out literature survey and carry out the initial study required before designing their dissertation project

MBDI6007: DISSERTATION PHASE II
(16 credits)

Objective: *Dissertation phase II involves execution of the research work decided in phase I leading to the preparation, submission and evaluation of the dissertation.*

During the course of the Master's Degree the student is expected to undertake a research work leading to a dissertation. The work will be divided into two phases spread over two semesters. During the research work the student shall study and incorporate recent trends in the area chosen by him/her, and develop a scientific dissertation based on the research and actual bench work. The student shall be required to make presentations and reports at various stages of the research work. The format for the final dissertation shall be as prescribed by the Department. There shall be a viva voce examination on the dissertation by an expert committee comprising external and internal members. The mode and components of the evaluation and the weightages attached to them shall be published by the Department at the beginning of the semester.

DEPARTMENT OF ZOOLOGY

PROGRAMME: MASTER OF SCIENCE IN ZOOLOGY

DETAILED SYLLABUS

ZGBT0001: BIOSYSTEMATICS, TAXONOMY AND EVOLUTION
(4 Credits-60 hours)

Objective: *The objective of this course is*

- *to acquaint the student with different procedures of taxonomy and different methods of analysis of variations and theories of classification.*
- *to enable the students to identify, classify and name the organisms according to international code of zoological nomenclature.*
- *to comprehend the scientific concepts of animal evolution through an understanding of its evidences, its mechanics, process and products.*

Module I: Biosystematics (10 hours)

Trends in Biosystematics: Chemotaxonomy, Cytotaxonomy, Numerical and Molecular Taxonomy; Dimensions of Speciation; Species Concepts: Subspecies and other intra specific Categories; Cladistics

Module II: Taxonomy and Nomenclature (10 hours)

Taxonomic Categories. Different Kinds, Hierarchy of Categories; Taxonomic Procedures: Taxonomic collections, Preservations, Process of identification (General Idea); Taxonomic Keys: types, merits and demerits; International Code of Zoological Nomenclature (ICZN): Operative principles, interpretation and application of important rules; Formation of names of various Taxa.

Module III: Biodiversity Indices (10 hours)

Evaluation of Biodiversity, Biodiversity indices: Shannon- Weiner Index, Richness Indices; Dominance Index, Association index, Similarity and Dissimilarity Index

Module IV: Concept of Evolution (15 hours)

Micro and Macro evolution; Natural Selection- Concept of stabilizing selection, Frequency dependent selection, Balancing selection, Disruption selection; Destabilizing factors- Mutation, Genetic drift, Migration, Meiotic drive; Neural Theory - Emergence of Non Darwinian theory of evolution, Neutral theory of evolution (Kimura).

Module V: Genetic Parameters (15 hours)

Isolation Mechanisms - Isolation Mechanisms and their role in speciation, Models of speciation (Allopatric, sympatric, parapatric); Gene frequencies in population - The Hardy-Weinberg principle and analysis of gene frequencies in natural population. Major factors influencing gene frequencies (migration, inbreeding), effects of selection and mutation on gene frequencies. Gene flow between subpopulations; Molecular basis of evolution- Constructing evolutionary trees, measures of genetic relationship among organisms, Molecular clock of evolution, Molecular phylogeny; Origin and Evolution of Primates - Evolution of Anthropoid Primates, The first hominids and origin of modern man.

Suggested Readings

1. G. G. Simpson. Principle of animal taxonomy; Oxford IBH Publishing Company.
2. V.C Kapoor-Theory and practice of animal taxonomy
3. J.C. Avise. Molecular Markers, Natural History and Evolution, Chapma & Hall, New York.
4. E.O. Wilson, Biodiversity, Academic Press, Washington.
5. E. Mayer & P. Ashlock. Principles of systemic Taxonomy
6. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northem & Co.
7. Dalela and Sharma.Animal taxonomy and Museology,Jaipraash nath & company.
8. Bugs, Butterflies, Spider, snakes (1998).Kern Preston-Mafham,Nigel Marven & Roblturvey

9. Dbzhansky, Th., F.J. Ayala, G.L. Stebbines and J.M. Valentine. Evolution. Surject Publication, Delhi.
10. Futuyama, D.J. Evolutionary Biology, Suinuaer Assciates, INC Publishers, Dunderland. 11. Jha, A.P- Genes and Evolution. John Publication, New Delhi.
11. Ashok Verma, Principles of Animal Taxonomy, Alpha Science International Ltd, Delhi.
12. Ramesh Chandra Tripathi, Biosystematics and Taxonomy, University Book House, Jaipur.
13. Avers, C. J. Evolution Process and Pattern in Evolution Oxford University, Press, New York, Oxford.
14. Ayala, F. J. and Valentine J. W. Evolving the theory and Process of Organic Evolution,
15. Brookfield, A. P. Modern aspects of Evolution. Hutchinson London, Melbourne.
16. Gallow, P. Evolutionary principles.
17. Chapman and Hall. Freeman, S. and Herron, Jon C. Evolutionary analysis Pearson Prentice Hall, New Jersey.
18. Futuyma, D. J. Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
19. Meglitsch, P. A. Invertebrate Zoology (3rd edition), Oxford University Press.
20. Minkoff, E. C. Evolutionary Biology, Addison Wesley Pub. Co., London.
21. Wen-Hsiung Li, Molecular Evolution, Sinauer associates Inc.Pub. USA.
22. Burton S. Guttman: Evolution a beginner's guide, Oneworld Publications.

ZGBG0002: CELL BIOLOGY AND GENETICS – THEORY AND APPLICATIONS

(4 Credits 60 hours)

Objective: *This course is designed to give a better understanding of cellular biology with complicated biochemical and physiological processes. The course also focuses on genetics as it relates to the function and structures of cells. It will also serve as a foundation for further studies in advanced molecular Biology and Biochemistry.*

Module I: Cell Organisation (14 hours)

Complexity and organisation of cell - Structural and Molecular features of Prokaryotic and Eukaryotic cells.

a) Biomembranes - Molecular composition and functional feature of membrane lipid, protein and carbohydrate.
b) Cytoskeletons - Structure and Organisation of Microfilament, Microtubule and Intermediate filament.
c) Cell Motility - Muscle contractility, intercellular transport, kinesin-dynin, cilia and flagella.

Module II: Cell Division and Signalling (24 hours)

a) Cell division and cell cycle (Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle); Genetics of Cell Cycle - Cyclins and Cyclin Dependent Kinases (CDK), Regulation of CDK-Cyclin activity, Molecular basis of Cellular Check Points; Extracellular Matrix and Cell Interaction - Cell walls, Adhesion junctions, Tight junctions, Gap junctions, Plasmodesmata; Cell-Cell Adhesion - Ca^{++} dependent and Ca^{++} independent Homophillic Cell-Cell Adhesion
b) Cell-Cell Signalling - Cell Signalling, Cell surface receptors, G-Protein coupled receptors and Second messenger
c) Cell cycle in cancer – uncontrolled cell growth, oncogenes, tumor suppressor genes; programmed cell death, aging and senescence

Module III: (10 hours)

a) Organisation of genetic material - Nucleosome, Molecular anatomy of eukaryotic chromosome; Genome size and Complexity - C value paradox, Unique and repetitive DNA, Euchromatin and Heterochromatin
b) Sex Chromosomes - Sex determination, Role of Y chromosome, Dosage Compensation in Drosophila and Human Being, X-Chromosome inactivation, Sex chromosome anomalies
c) Human Genetics - Normal Human Karyotyping, Autosomal chromosome abnormalities, Principle and Methods of Pedigree Analysis
d) Genetic Imprinting - Imprinting of genes, Epigenetic, Epigenetic regulation by DNA methylation; Somatic Cell Genetics - Cell fusion technology, Chromosome mapping, Application of Somatic Cell Genetics.

Module IV: Genetic Inheritance (12 hours)

a) Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests; Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters

b) Extra Chromosomal Inheritance: Inheritance of Mitochondrial and chloroplast genes, maternal inheritance; Genetic Counselling - Objectives, Ethics, Principles, Methods for counselling for Point mutation, Chromosomal Disorder

Suggested Readings

1. Cooper, G. M., Cell (A Molecular Approach)
2. Sadava D. E., Cell Biology
3. Kish V. M. and Kleinsmith L. J., Cell and Molecular Biology
4. DeRobertis & DeRobertis: Cell and Molecular Biology (Lee & Febiger, 1987)
5. Gardner, Principles of Genetics
6. Strickberger, Genetics
7. Ram Mahabal, Fundamentals of Cytogenetics and Genetics
8. Brooker: Genetics : Analysis and Principles
9. Griffith et al: Modern Genetic Analysis
10. Hartl & Jones: Essential Genetics: A Genomic Perspective
11. Karp: Cell and Molecular Biology
12. Lewin, Genes VIII
13. Lodish et al: Molecular Cell Biology
14. Pollard & Earnshaw: Cell Biology
15. Russell: Genetics
16. Snustad & Simmons: Principles of Genetics
17. Switzer and Garrity: Experimental Biochemistry, Freeman
18. T.A.Brown, Genome
19. Wilson and Walker: Practical Biochemistry, Cambridge Univ. Press
20. B. Guttman, A. Griffiths, D. Suzuki, T. Cullins: Genetics a beginner's guide. Oneworld Publications
21. Verma P.S. and Agarwal V.K, Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Company Ltd.
22. Verma P.S. and Agarwal V.K, Cell Biology (Cytology, biomolecules and Molecular Biology), S. Chand & Company Ltd.
23. Verma P.S. and Agarwal V.K, Genetics, S. Chand Publishing.
24. Verma P.S. and Agarwal V.K, Genetic Engineering, S. Chand Publishing.

ZGBC0003: MOLECULAR BIOLOGY AND BIOCHEMISTRY

(4 Credits-60 hours)

Objective: *The objective of this course is to provide a comprehensive knowledge of molecular aspects of biological function at the molecular level, with particular emphasis on the structure and regulation of genes, as well as the structure and synthesis of proteins and its applications.*

Module I: Nucleic Acids (16 hours)

a) Nucleic acids - Molecular Structures of DNA and RNA.

b) DNA Replication - Replication in Prokaryotes and Eukaryotes, Semi conservative nature of DNA replication, Messelsons-Stahl experiment, Enzymes and proteins associated with replication, DNA polymerases, Regulation of eukaryotic genome replication.

c) DNA Damage and Repair Mechanism - Different types of DNA Damage, Direct repair system, Excision repair system, Mismatch repair system, DNA break repair.

Module II: Transcription and Translation (16 hours)

a) Transcription - Basic concept of Prokaryotic and Eukaryotic transcription, Promoters (Pribnow box, TATA box, Cp Gisland), Transcription factors, Initiation, elongation and termination of transcriptions in Eukaryotes.

b) Post Transcriptional Modification - Post transcriptional processing of RNA, Molecular events in Capping, Polyadenylation and Splicing mechanism
c) Translation - Genetic Code, Mechanism of Initiation, Elongation and Termination.

Module III: Metabolism (18 hours)

a) Carbohydrate metabolism - Glycolysis, Glycogenolysis, Gluconeogenesis, TCA cycle, Cori cycle, Phosphogluconate pathway.
b) Lipid metabolism - Oxidation of fatty acid, Cholesterol biosynthesis and metabolism, Prostaglandins.
c) Protein metabolism - Amino acid Classification, Amino acid degradation, Decarboxylation, Deamination, Ornithine Cycle.

Module IV: Bioenergetics and Enzymes (10 hours)

a) Bioenergetics - Energy producing and utilizing system, Electron transfer system and Oxidative Phosphorylation.
b) Enzymes - Classification of enzymes, General properties of enzymes, Mechanism of enzyme action, Enzyme kinetics, Michaelis-Menten and Lineweaver-Burke Equations; Enzyme inhibition.

Suggested Readings

1. Alberts et al: Molecular Biology of the Cell, Garland
2. Berg et al.: Biochemistry, Freeman
3. Boyer: Modern Experimental Biochemistry and Molecular biology
4. DeRobertis & DeRobertis: Cell and Molecular Biology
5. Freifelder: Physical Biochemistry
6. Holme and Peck: Analytical Biochemistry,Tata McGraw Hill
7. Karp: Cell and Molecular Biology (John Wiley & Sons)
8. Lodish et al: Molecular Cell Biology, Freeman
9. Pollard and Earnshaw: Cell Biology
10. Switzer and Garrity: Experimental Biochemistry
11. Biochemistry, Tata-McGraw Hill
12. N. Arumugan, Molecular Biology, Saras Publication.
13. N. Arumugan, Cell Biology and Molecular Biology, Saras Publication.
14. U. Satyanarayana and U. Chakrapani,Biochemistry, Elsevier.
15. U. Chakrapani and U. Satyanarayana, Fundamentals of Biochemistry, New Central Book Agency (P)

ZGPE0004: ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY

(4 Credits- 60 hours)

***Objective**: This course aims to help students to understand the internal physical and chemical functions of animals and their parts which include digestion, excretion, circulation, respiration, nervous system, sense organs and reproduction. Hormones and their influence on body metabolisms is also studied with special reference to reproduction.*

Module I (18 hours)

a) Physiology of digestion: Glands and secretion of digestives enzymes, Mechanism of digestion, Gastrointestinal hormones, Absorption of Carbohydrates, lipids and proteins.
b) Physiology of Respiration: Alveolar ventilation, alveolar-capillary gas exchange, Transport of O_2 and CO_2 Oxygen dissociation curve and the factors influencing it, Regulation of respiration.
c) Mammalian blood chemistry, blood groups, blood clotting mechanism, cardiac cycle and its regulation in mammals.
d) Musculature in vertebrates: Types of muscles, Ultrastructure and chemical composition of skeletal muscles, molecular mechanism and regulation of muscle contraction, muscle fatigue and rigor mortis.

Module II (15 hours)

a) Physiology of Excretion: Ultrastructure of nephron, mechanism of urine formation, excretion of dilute solutes and mechanism of excretion of excess solutes. Osmoregulation in different animal groups (aquatic and terrestrial)
b) Thermoregulation: Heat balance in animals, Adaptations to temperature extremes, Aestivation and hibernation, acclimatization, avoidance and tolerance, stress and hormone
c) Neuron: Ultrastructure, types and function, Resting membrane, membrane potential, action potential, Nerst Equation, Chronaxi, Rheobase, utilization time.
d) Neural impulse induction through an axon, neurotransmitters and synaptic transmission-mode of information transfer across electrical and chemical synapses

Module III (7 hours)

Basic concepts of Endocrinology, Hormone and homeostasis; Chemical nature of hormones: Amino-acid derived hormones, Peptide hormones, Glycoprotein hormones, Steroid hormones and Prostaglandin; Hormone receptor and target organ concept, Feedback system and trophic hormones; Biosynthesis and mechanism of action of peptide and steroid hormones.

Module IV (10 hours)

a) Structure of the pituitary gland; pituitary hormones and their functions Hypothalamo - hypophysialaxis
b) Structure of thyroid glands, thyroid hormones – biosynthesis and metabolic functions. Role of thyroid hormone in amphibian metamorphosis
c) Structure of adrenal gland; Synthesis of adreno-cortical and medullary hormones and their functions.
d) Structure of endocrine pancreas and Hormones of Islets of Langerhans, testis and ovary – endocrine structure and their functions; Hormone therapy

Module V (10 hours)

Reproduction: Reproductive cycle, Reproductive processes (implantation, parturition and lactation), neuroendocrine regulators in insects and mammals, pheromones, counter current mechanism

Suggested Readings

1. Brooks and Marshall: Essentials of Endocrinology, Blackwell Science.
2. Ganong: Review of Medical Physiology, Lang Medical Publications
3. Guyton and Hall: Text Book of Medical Physiology , W.B. Saunders
4. Hadley: Endocrinology, Prentice hall. International Edition.
5. Keel et al: Samson Wright's Applied Physiology,Oxford Press,
6. Larson: Williams Text Book of Endocrinology, 10th edition. W. B. Saunders Company, Philadelphia.
7. Murray et al: Harper's Illustrated Biochemistry, Appleton & Lange
8. Norris: Vertebrate Endocrinology. Lea &Febriger.
9. Turner and Bagnara: General Endocrinology, W. B. Saunders Company Philadelphia.
10. West: Best and Taylor's Physiological Basis of Medical Practice , Williams and Wilkins,
11. N Arumugam and A Mariakuttikan, Animal Physiology, Saras Publication.
12. N Arumugam, Animal Physiology & Biochemistry, Saras Publication.
13. Dharmalingam, Textbook Of Endocrinology, Jaypee Brothers Medical Publisher
14. Verma P.S, Agarwal V.K and Tyagi B. S, Animal Physiology, S. Chand Publishing.

ZGDB0005: DEVELOPMENTAL BIOLOGY

(4 Credits–60 hours)

Objective: *The objective of this course on Developmental Biology is to enable the students understand the process of development in animals and the phenomena associated with it. It will enable the students understand the environmental influences on development and factors responsible for ageing and also to imbibe the current knowledge pertaining to the development of animal embryos of diverse taxonomic groups through experimental analyses based on modern biological tools.*

Module I (14 hours)

a) Fertilization - pre and post fertilization events, activation of eggs, gamete fusion and prevention of phylogeny
b) General concept of Induction: mesoderm development, Determination: Imaginal disc of insects, Differentiation: Formation of fruiting bodies in Dictyostellium
c) Neocytoplasmic interaction in development of unicellular organism and in early development and differentiations of multicellular organisms, importance and role of cytoplasm, hybridization experiments, nature of changes in nuclei, cell hybridization, nuclear transplantation experiments.

Module II (10 hours)

a) Principles of experimental embryology: the developmental dynamics of cell specifications stem cells and developmental commitment, totipotency and pluripotency.
b) Morphogenesis and cell adhesion - the thermodynamic model of cell interactions, concept of morphogen gradient and morphogenetic field, cell adhesion molecules.

Module III (10 hours)

Role of maternal contribution in early embryonic development in Drosophila: maternal effect genes, gap genes, pair rule genes and hox genes in development.

Module IV (10 hours)

Organogenesis: vulva formation in Caenorhapditis elegans; Regeneration of Salamander limbs: Polar Co-ordinate model; Lens regeneration in amphibia; Bone and neural regeneration - Medical Advances in regeneration.

Module V (16 hours)

a) Medical implications of Developmental Biology - Genetic error of human development; Environmental assault on human development, Teratogenic agents (Retinoic acid, pathogens, alcohol, drugs and chemicals, heavy metals); Environmental oestrogens.
b) Infertility - In vitro fertilization and embryo transfer. Cloning experiments – Amphibians and Mammals. Embryonic stem cells and their applications; ethical issues
c) Sex determination - Timing and gene expression in mammalian sex determination, Brain sex determination pathways in vertebrates and flies, Hormone disruptors and sex determination problems, Temperature-dependent sex determination in turtles, Evolution of sex from invertebrate to vertebrate; ethical issues

Suggested Readings

1. Balinsky, B.I. An Introduction to Embryology. W.B Saunders Co., Philadelphia.
2. Gilbert, S.F. Developmental Biology. Sinamer Associates Inc. Saunderland, Massachusets, U.S.A.
3. John E. Hall: Text Book of Medical Physiology. Guyton & Hall
4. Kalthoff: Analysis of biological development. McGraw-Hill, 1996.
5. Karp,G. and Berrill,N.J. Development. McGraw Hill, New York.
6. Nagabhushanam,R. and Sarojini,R. Invertebrate Embryology. Oxford and IBA Publishing Co.
7. Oppenheimer, S.B. Introduction to Embryonic Development. Allyn and Bacon, Inc.
8. Saunders, J.W. Developmental Biology. MacMillan Co., London.
9. Tyagi and Shukla, Development of Fishes. Jaya Publishing House, New Delhi.
10. Wolpert: Principles of development. Oxford.
11. N. Arumugan, A textbook on Embryology,Saras Publication.
12. Gurbachan S. Miglani, Developmental Genetics, I.K. International Publishing House Pvt. Ltd.
13. Verma P.S. and Agarwal V.K, Chordate Embryology, S. Chand Publishing.
14. Chordate Embryology by Verma P.S. and Agarwal V.K., S. Chand Publishing.
15. Saidapur.S.K. Reproductive cycles of Indian vertebrates. (Allied Publishers Ltd. New Delhi)
16. Sarkar. H.B.D Principles of Vertebrate reproductive Biology
16. Chester-Jones I: Fundamentals of Comparative vertebrate Endocrinology (Pleum Press: NY)

ZGEE0006: ECOLOGY, ENVIRONMENTAL BIOLOGY AND ETHOLOGY

(4 Credits – 60 hours)

Objective: *The purpose of this course is to familiarize students with essential aspects of environmental conservation and management through a comprehensive understanding of animal behaviour and the components of the ecosystem, biological cycles, habitat ecology, resource ecology, pollution and its management.*

Module I (10 hours)

a) Definition and structure of ecosystems - abiotic and biotic components and their relationship; Types of ecosystems – Salient features of aquatic and terrestrial ecosystems and their biotic communities.
b) Ecological energetics and energy flow; Measuring ecosystem productivity
c) Population Ecology - Population density, Growth rate, Natality, mortality, survivorship curves and life tables, Biotic potential

Module II (10 hours)

a) Community Ecology - Types of biotic communities, organization, population density, dominance, carrying capacity, r and k-selection, species richness, species diversity.
b) Community Development – Types of community changes, ecological succession - its causes and examples, climax community.
c) Positive and Negative interactions between two species, Competition theory, Niche, Habitat, Ecological Equivalents, Character displacement; Liebig law of minimum, Shelford's law of tolerance, Significance of limiting factors, Ecotone and Edge effect.

Module III (10 hours)

a) Eutrophication in freshwater, coastal and marine ecosystem, Remediation of eutrophication.
b) Acidification in aquatic and terrestrial environment, Consequences and control strategies.
c) Major environmental regimes of Earth, Environmental monitoring, Environmental impact assessment and environmental management plan.
d) Biogeochemical cycles – carbon, nitrogen, sulphur cycles, impact of human activity on nutrient cycles.

Module IV (10 hours)

a) Biodegradation and Bioremediation: concept, environmental limitation for bioremediation, bioremediation of ecosystem (Air/water/soil)
b) Wastes in Ecosystem and management: Agricultural wastes and Management, Biomedical wastes and Management, Domestic waste, effects and management for purification and recirculation.
a) Environmental toxicology: Diversity and classification of environmental toxins, Air, Water and soil pollutants, Food additives and contaminants, Pesticides, Metals and Solvents, Radioactive pollution.

Module V (10 hours)

a) Concepts of Ethology, Genes and behaviour; Evolution of behaviour, Development of behavior
b) Neuroethology: Methods of studying brain and behaviour - neuroanatomical, neurophysiological and neurochemical; Mammalian Brain and Behaviour, Limbic system and hypothalamus; Sleep-arousal and reticular formation
c) Definition of Social behaviour: Properties and advantages of social grouping, social group of monkeys; Sociobiology - Darwinian fitness, individual fitness, kin selection, group selection, cooperation, reciprocation, altruism , reciprocal altruism, Proximate and Ultimate causations; Home range, territory, core area and aggression; Human behaviour

Module VI (10 hours)

Feeding and sexual strategies in animals; Parental care in animals (amphibians); Communication in animals - vocal, tactile, visual and chemical; Learning: Introduction and definition, Types - Habituation, trial and error, conditioning, cognition and imprinting; Short and long term memory, neural mechanism of learning

Suggested Readings

1. Asthana, D.K. and Asthana, M. Environmental Problems and Solutions. S. Chand and Co., New Delhi.
2. Odum : Basic Ecology (Saunders)
3. Odum : Fundamentals of Ecology (Saunders)
4. Odum. E.P. Fundamentals of Ecology. Nataraj Publishers, Dehra Dun.
5. Raven, Berg, Johnson : Environment (Saunders College Publishing)
6. Sharma : Ecology and Environment (Rastogi Publication)
7. Smith, R.L. Elements of Ecology. Harpet and Row Publishers, New York.
8. Trivedi, P.R.and Gurdeepraj, K. Environmental Biology. Akashdeep Publishing House New Delhi
9. Turk and Turk : Environmental Science
10. Drickamer & Vessey: Animal Behaviour –Concepts, Processes and Methods, Wadsworth
11. Goodenough et al : Perspectives on Animal Behaviour, Wiley,
12. Grier : Biology of Animal Behaviour, Mosby,
13. Verma P.S. and Agarwal V.K,Environmental Biology (Principles of Ecology) by., S. Chand Publishing.
14. Gupta S.R. and Singh S.P., Ecology Environmental Science and Conservation, S. Chand Publishing
15. Manju Yadav, Ecology, Discovery Publishing House
16. Rana S. V. S., Essentials of Ecology and Environmental Science, S.V.S. Rana. Publisher, Prentice-Hall of India
17. Anderwartha, H.G. and Birch, L. C., The distribution and abundance of animals, University of Chicago Press, Chicago London.
18. Beeby, A., Applying Ecology Chapman and Hall Madras.
19. Begon, M., Harper J. L. and Townsend, C. R, Ecology – Individuals, populations and communities, Blackwell Science, Cambridge UK.
20. Brewer, R., The science of Ecology, Saunders College of Publishing, New York.
21. Chapman, J. L. and Resis, M. J., Ecology- Principles and applications, Cambridge University Press, Cambridge UK.
22. Kaeighs, S. C., Ecology with special references to animal and Man, Prentice Hall Inc.
23. Putmann, R. J. and Wratten, S. D., Principles of Ecology,
24. Crown Helm, London. Salanki, J., Jeffery E. and Hughes G. M., Biological Monitoring of the Environment (A manual of Methods) CAB International, Wallingford UK.
25. Singh M C: Environment Protection and the Law (Ashish Publishing House)

ZGAZ0007: APPLIED ZOOLOGY I

(4 Credits - 60 Hours)

***Objective**: This course aims to provide a basic understanding of sericulture, apiculture, aquaculture and immunology*

Module I (20 hours)

a) Sericulture: Types of Silk Worm (Tasar, Muga and Eri), their host plants, silkworm rearing and management practices. Diseases and Pest of Silk Worm and their management, Sericulture Extension: Principles and importance of extension education in sericulture, methods of sericulture extension, Marketing and Management of Sericulture: Marketing of cocoons and raw silk yarn, traditional and regulated markets. Silk exports - challenges and growth, Seri-germplasm conservation - methods, centres of collection and significance

b) **Apiculture:** Different species of honey bees, bee plants, pollen calendar, bee keeping and management practices, bee products, Bee enemies and diseases.

Module II (20 hours)

Aquaculture: 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 shell fish diseases and their control measures. Fish genetic resource conservation; Aquaphonics–prospect and future.

Module III (20 hours)

Immunology: Immune system-innate and adaptive immunity; components and characteristic features, humoral and cell-mediated immunity; Cells and organs of immune system; T cells and B cells - maturation, activation and differentiation; Antigens- immunological properties of antigens, factors influencing antigenicity; Immunoglobulin- structure and function, classes of Ig molecules, Antigen-antibody interactions; Complement system- classical, alternative and lectin pathways, regulation of complement system, biological consequences of complement activation; Major Histocompatibility Complex (MHC)- general organization and inheritance of the MHC, MHC molecules and genes; Hypersensitivity reactions- types, mechanisms of type I to IV hypersensitivity reactions; Autoimmunity- Organ specific autoimmune disease and treatment.

Suggested Readings

1. Venkitaraman: Economic Zoology, Sudarsana Publishers
2. Srivastava : A Text Book of Applied Entomology, Vol. II & II.I Kalyani Publishers
3. Shukla & Upadhyaya : Economic Zoology. Rastogi Publishers.
4. Ananthakrishnan, T. N. and K.G. Shivaramakrishnan. Ecological entomology: Insect life in odd environment. Scientific Pub.: India
5. David, B. V and T.N. Ananthakrishnan. General and Applied Entomology. 2nd Edition. Tata McGraw-Hill Publ. Co. Ltd.: New Delhi
6. Fenemore P G and Prakash Applied Entomology (New Age Publishers: New Delhi)
7. Packer, B. Aquaponics System: A Practical Guide to Building and Maintaining Your Own Backyard Aquaponics
8. Jayashree, K.V., C.S. Tharadevi& N. Aurumugam.Apiculture.Saras Publication
9. Chandra Girish. Apiculture & the Honey Bee (Know about the species of honey bees, beekeeping, pollination, beehives, entomology, beekeepers, honey making
10. Arumugam, N., T. murugan , R. Ram Prabhu, J. Johnson Rajeshwar. Applied Zoology.Saras publication
11. Ganga & Chetty.Comprehensive Sericulture 2nd Edition Paperback.Oxford & IBH publication
12. Narasaiah, M.L. Problems and Prospects of Sericulture.Discovery Publishing Pvt.Ltd
13. Sharma, A.K., K. Jaiswal & R.N. Pandey.Research and Development in Indian Sericulture.Alfa Publications
14. Singh, R.N. & C.M. Bajpeyi.MugaCulture.APH Publishing Corporation
15. Marepally, L.Tasar Culture. Educreation Publishing
16. Bernstein , S. Aquaponic Gardening: A Step-By-Step Guide to Raising Vegetables and Fish Together New Society Publishers

SPECIALISATION I: ENTOMOLOGY AND ENVIRONMENTAL BIOLOGY

ZGIF0008: INSECTS- STRUCTURE AND FUNCTION

(4 Credits-60 hours)

Objective: *To help students learn about Insect systematics and insect biology.*

Module I (20 hours)

Origin and evolution of insects; Segmentation of insect: head, thorax and abdomen; Type of mouthparts, antennae, legs, their modifications and functional significance; Wings: wing structure, venation and wing coupling; Insect flight taking Drosophila as a model

Module II (20 hours)

Classification of insect up to family with example : a) Coleoptera, Diptera, Hymenoptera; b) Lepidoptera, Odonata; c) Orthoptera, Hemiptera and Isoptera; Insect molecular taxonomy- DNA as a new tool for insect identification

Module III (10 hours)

Insect plant interaction, Plant resistance to insects / Parallel evolution of Insect and angiosperm, Pollination Biology with special reference to Bees

Module IV (10 hours)

Receptor organ in insects (Chemo receptors, mechanoreceptors and photoreceptors); Sound and Light producing organs in insects; Locomotion in insects

Suggested Readings

1. The Insect Structure and Functions, R.F. Chapman, Cambridge University Press
2. Modern Entomology, D.B. Tembhare Himalaya Publishing House
3. Text Book of Applied Entomology Vol- I & Vol- II, K.P. Srivastava, Kalyani Publishers
4. Introduction to General and Applied Entomology, Abhishek Shukla and Sushil kumar Saxena, Astral International (P) Ltd.
5. Indian Insect Pests, H. Maxwel-Lefroy & F.M. Howlett, Astral International (P) Ltd.
6. A Handbook on Economic Entomology, Abhishek Shukla, Astral International (P) Ltd.
7. Insect Pest Management: Ecological Concepts, T.V.Sathe & Jyoti M. Oulkar, Astral International (P) Ltd.

ZGIP0009: INSECT PHYSIOLOGY

(4 Credits-60 Hours)

Objective: To provide in-depth knowledge of insect physiology.

Module I (18 hours)

Digestive System: Different types of alimentary canal, salivary glands, physiology of digestion and absorption; Respiratory System: General organization of respiratory system, classification of respiratory system, respiration in terrestrial insects- different types of spiracles and their structure, opening and closing mechanism of spiracle, trachea and tracheoles, air sac, ventilation of tracheal system, mechanism of gaseous exchange, respiration in aquatic insects, physiology of gill and plastron respiration, respiration in parasitic insects; Circulatory system: Diaphrams and sinuses, doral vessels, accessory pulsatory organs, blood circulation, chemical composition of haemolymph, different types of haemocytes and their functions.

Module II (15 hours)

Nervous system: Structure and types of neurons, central nervous system basic plan, gross anatomy and microanatomy of brain and ganglion, sympathetic nervous system, nerve impulse transmission; Excretory System: Basic and cryptonephreial system, malpighian tubules-anatomy and histology, accessory organs of excretion, metabolic pathways of formation of uric acidand ammonia, elimination of Uric acid by malpighain tubules; Diapause: Hormonal control of embryonic, larva, pupal and reproductive diapause

Module III (15 hours)

Reproductive System: male and female reproductive system, spermatogenesis, oogenesis; Hormonal control of reproduction in male and female insects; Neuroendocrine system: Neuroendocrine organs, hormones produced by neurosecretory cells, corpus allatum, corpus cardiacum and prothoracic gland, their chemical nature and functions, insect immunity; Growth and metamorphosis of insects; Insect Pheromones.

Module IV (12 hours)

Insect integument: Structure, chemical compositions, bio-composition of chitin, function of integument.

Intermediary metabolism: the energy demand for insect flight, mechanism stores carbohydrate resources, proline as a fuel for flight, mobilization and use of lipid for flight energy.

Insect muscle: Structure and function, attachment to exoskeleton, physiology of contraction

Insect eye: Structure and function, physiology of vision.

Suggested Readings

1. The Insect Structure and Functions, R.F. Chapman, Cambridge University Press
2. Modern Entomology, D.B. Tembhare Himalaya Publishing House
3. Text Book of Applied Entomology Vol- I & Vol- II, K.P. Srivastava, Kalyani Publishers

4. Introduction to General and Applied Entomology, Abhishek Shukla and Sushil kumar Saxena, Astral International (P) Ltd.
5. Indian Insect Pests, H. Maxwel-Lefroy & F.M. Howlett, Astral International (P) Ltd.
6. A Handbook on Economic Entomology, Abhishek Shukla, Astral International (P) Ltd.
7. Insect Pest Management: Ecological Concepts, T.V.Sathe & Jyoti M. Oulkar, Astral International (P) Ltd.

SPECIALIZATION II: CELL AND MOLECULAR BIOLOGY

ZGCB0010: CELL AND MOLECULAR BIOLOGY-I
(4 Credits-60 Hours)

Objective: *Through course aims to provide an understanding of the structure and working of various components of the cell such as biomembranes and its role in the transport of various macromolecules, cell cytoskeleton and their role in maintaining proper cell shape and cell movement, chromosomal structure and organization, genes and gene regulation and protein hierarchical structure.*

Module I (10 hours)

Biomembranes: Composition, universality and fluidity of biomembranes, Difference in phospholipid composition in two membrane leaflet- Intrinsic and extrinsic proteins, Integral membrane lipids and glycolipids; Mobility of lipids and integral proteins in biomembrane.

Transport across cell membrane: Mechanism of diffusion, Facilitated diffusion; Osmosis and water channels, movement, Flick's law, Donnan equilibrium; Uniporter-catalyzed transport, difference between uniport-catalyzed transport and passive diffusion, GLUT- 1 transport & its kinetics; Intracellular ion environment and membrane electric potential; Active transport - P-class ion pumps, F-class and V-class ion pumps and ABC superfamily, Plasma Membrane Ca++ ATPase pump, Muscle Ca++ ATPase pump and Na+/K+ ATPase pump; Cotransport by symportors and antiporters; Transport across epithelia, Receptor mediated endocytosis.

Module II (20 hours)

Cytoskeleton: Microfilaments: Actin cytoskeleton, G-actin and F-actin; structural and functional polarity. Cortical actin network, erythrocyte and platelet cytoskeleton; Actin bundle support projecting fingers of membrane; Dynamics of actin assembly, actin polymerization; Toxins effect on actin monomer - polymer equilibrium, stabilization of actin filaments by actin capping proteins; Movement with actin polymerization (a) Intracellular bacterial and viral movements (b) Actin polymerization at the leading edge of moving cells; Myosin: (a) Structure and mechanism of movement with actin (b) Conformational changes in myosin during movement.

Microtubules: Microtubules structure and microtubule assembly from organizing centers, Microtubule dynamics, Microtubule associated proteins (MAP's) and crosslinking of microtubules.

Microtubules and mitosis (a) Centrosome duplication (b) Kinetochore and force for poleward chromosome movement (c) Organization of spindle pole and orientation of assembly (d) Formation of poles and capture of chromosomes (e) Kinetochore and force of poleward chromosome movement (f) Astral microtubule and cytokinesis (g) Microtubules and plant cell formation.

Cell movements: (a) Intracellular transport: Role of kinesin and dynein, microtubule tracks and intracellular membrane vesicles (b) Amoeboid movements (c) Second messengers and signal transduction pathways for coordination of migration of cells.

Cilia and Flagella: Structure and movements (a) Sliding of outer doublet (b) Dynein sliding forces in axonemes (c) Dynein and exonemal bending (d) Dyenin regulatory complex.

Module III (20 hours)

Molecular structure of genes and chromosomes: Definition of gene; Chromosomal organization of genes- coding and non-coding DNA; Functional re-arrangements in chromosomal DNA; Organizing cellular DNA into chromosomes; Morphological and functional elements of eukaryotic chromosomes.

Regulation of Gene expression: Operon concept; Positive and Negative regulation; Inducers and corepressors; Regulation by attenuation-his and trp operons.

Module IV (10 hours)

Protein structure and function: Structure and chemistry of amino acids; Hierarchical structure of proteins-Secondary structure: α-helix, β-pleated sheets and bends; Prediction of secondary structure, Ramachandran plot; Tertiary structure, forces stabilizing tertiary structure; Domains and Motifs; Quarternary structure of proteins

DNA binding proteins and gene regulation: DNA binding domain; Homeodomain proteins; Zinc finger proteins; Winged-helix (Forked head) proteins; Leucine-Zipper proteins; Helix Loop helix proteins.

Suggested Readings

1. Cooper, G. M., Cell (A Molecular Approach)
2. DeRobertis & DeRobertis: Cell and Molecular Biology
3. Lodish et al: Molecular Cell Biology
4. Karp: Cell and Molecular Biology
5. Becker et al: World of Cell
6. T.A. Brown: Genome
7. Griffith et al: Modern Genetic Analysis
8. Hartl & Jones: Essential Genetics: A Genome Perspective
9. Ram Mahabal, Fundamental of Cytogenetics and Genetics
10. Lewin, Genes VIII

ZGIY0011: IMMUNOLOGY-I

(4 Credits-60 Hours)

Objective: Through this theory paper, the course aims to provide a basic introduction to the immune system, its components, cells and organs associated with providing cellular and humoral immunity, antigen and antibody structure, monoclonal antibodies, Major histocompatibility complex, hypersensitivity and autoimmunity.

Module I (15 hours)

Cells and organs of immune system: Hematopoiesis- B-Lymphocytes, T-lymphocytes and Null cells; Mononuclear cells (antimicrobial and cytotoxic activities, secretion of factors); Granulocytic cells (Neutrophils, Eosinophils and Basophils); Mast cells; Dendritic cells and Langerhans cells; Organs of immune system: Primary lymphoid organs (Thymus and bone marrow), Secondary lymphoid organs (Lymph nodes, spleen, mucosal associated lymphoid tissue and cutaneous associated lymphoid tissue, tonsils and Peyer's patches; Lymphatic system.

Molecular Immunology: Components of immunity; Innate (nonspecific) immunity- Anatomic barriers, Chemical barriers, Phagocytic barriers, Inflammatory barriers; Adaptive (specific) immunity-Humoral and cell-mediated immunity (CMI): (a) Recognition of antigen by B-and T-lymphocytes and antigen presenting cell (APC) (b) Clonal selection of lymphocytes; Cellular interactions required for generation of immune responses (a) Activation and proliferation of B and T cells (b) Generation of humoral immune responses (c) Generation of Cell mediated immune responses.

Module II (15 hours)

Antigens: Immunogenicity versus antigenicity; Factors that influence immunogenicity, Contribution of the immunogens (foreignness, molecular size, chemical composition and heterogenesity, susceptibility to antigen processing and presentation); Haptens and epitopes; Immunogen dosage and route of administration and adjuvants.

Immunoglobulins structure and function: Molecular structure of Ig; Immunoglobulin classes (lgG, lgM, IgE and lgD and their biological activities; Immunoglobulin - mediated effector functions (Opsonization, activation of complement, antibody dependent cell- mediated cytotoxicity , neutralization); Antigenic determinants on immunoglobulin (isotype, allotype and idiotype); Monoclonal antibodies: Formation and selection of hybrid cells, Production of monoclonal antibodies, Clinical uses of monoclonal antibodies, Catalytic monoclonal antibodies (abzymes).

Antigen - Antibody Interaction: Antibody affinity and activity; Cross reactivity; Agglutination reactions; Precipitation reaction.

Module III (20 hours)

Major Histocomptability complex: General organization and inheritance of MHC; Location and function of MHC; MHC haplotypes; MHC molecules and gene: Structure of class I molecules; Structure of class II molecules; Organization of class I and II genes; Peptide binding by MHC molecules; Class III molecules; Regulation of MHC expression; MHC and immune responsiveness; MHC and disease susceptibility.

Antigen processing and presentation: Role of antigen presenting cell, Early evidence for the necessity of antigen processing; Cells that function in antigen presentation; Evidence for two processing and presentation pathways; Endogenous antigens (The cytosolic pathway): (a) Peptide generation by proteosomes (b) Peptide transport from the cytosol to rER (c) Assembly of peptide with class I MHC molecules; Exogenous antigens (The endocytic pathway) (a) Peptide generation in endocytic vesicles (b) Transport of class II MHC molecules to endocytic vesicles. (c) Assembly of peptide with class 11 MHC molecules.

Module IV (10 hours)

Hypersensitivity: Type I, II, III and IV; In vivo and in vitro

Autoimmunity: Organ specific autoimmune disease; Systemic autoimmune disease.

Suggested Readings

1. Kuby et al.: Kuby Immunology
2. Abbas A.K., Lichtman A.K. and Pober J.S. Cellular and Molecular Immunology
3. Roitt et al,: Essential Immunology
4. Price C.P., Newman D.J., Principles and Practices of Immunology
5. Kindt T.J., Osborne B.A., Goldsby R., Immunology

SPECIALIZATION III: FISH AND FISHERY BIOLOGY

ZGTF0012: TAXONOMY AND FUNCTIONAL ANATOMY

(4 Credits- 60 Hours)

Objective: To provide knowledge on Fish taxonomy and functional biology.

Module I (10 hours)

Fin fish taxonomy: General characters and classification, major fish groups (extant & extinct), phylogeny of fishes; Gross external anatomy of fishes: skin and its derivatives, scales and their significance; Significance of fish osteology in taxonomy, Fish barcoding

Module II (30 hours)

Fin fish functional biology: Food and feeding habits: Food– Kinds and varieties, abundance of food and its availability, structural adaptation, search for food, classification based on food and feeding habits; respiratory organs in fishes – Modification of gills and Tracheae in relation to habit – Structural adaptations of air breathing fishes; Age and growth: Growth, length weight relationships, condition factors, morphometric indices and bioenergetics index, variation in growth rate, age determination; Modes of reproduction, reproductive cycle, gonad maturity stages, Hormonal regulation of gonadal development, activity of Gonadotropin-releasing hormone, modes of spawning; Environmental factors controlling reproduction and factors affecting development.

Module III (20 hours)

Shell fish taxonomy and functional anatomy: General characters of crustaceans and mollusks; Food, feeding habits and adaptations of cultured prawn and shrimps; Food, feeding habits and adaptations of cultured Mollusks; Reproductive patterns in prawn and shrimp, reproductive organs, gonad maturity, spawning and fertilization; Endocrine organs in crustaceans and their role in reproduction; Reproductive patterns in Molluscs, reproductive organs, gonad maturity, spawning and fertilization

Suggested Readings

1. Barrington, F.J.W. Invertebrates: Structure and Functions. EIBS.
2. Carl, B.E. Biology of Fishes. Saunders,
3. Fretter, V. & A. Graham.The functional anatomy of vertebrates.Academic Press Inc. (Lon.) Ltd.

4. Kaestner, A. Invertebrate Zoology. Vol. I – III, John Wiley & Sons
5. Kurian, C.V. & V.O. Sabastian.Prawns and Prawn Fisheries of India.
6. Lagler, K.E. et. Al. Ichthyology. John Wiley,
7. Low, M.S. & G.M. Calliet (eds.). Readings in Ichthyology. Prentice Hall,
8. Moyle Peterb, Fishes : An Introduction to Ichthyology. Prentice Hall.
9. Nikolsky, G.V. Ecology of Fishes. Academic Press, NY. Howar, W.S. & D.J. Randal. Fish Physiology, Vols. 1–4, Academic Press, NY
10. Norman, J.R. & P.H. Greenwood.A History of Fishes, Ernest Benn Ltd.
11. Jayaram K. C. The fresh water fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka.
12. Jhingran V. G. Fish and Fisheries of India.
13. Lagler, K.F. Ichthyology. John Wiley Publication
14. Norman, J.R. & P.H. Green Wood.A history of fishes.
15. Bond, E. Carl. Biology of fishes.
16. Kumar S and ThembreM Anatomy and Physiology of Fishes (Vikas Publishing House)
17. Love, M.S. &Cailiet, G.M. Readings in Ichthyology.Prentice Hall Publications.
18. Srivastava, C.B.L. Textbook of Fishery Science and Indian Fisheries. KutubMahal
19. Khanna S. S. and H. R. Singh. A textbook of Fish Biology and Fisheries, Narendra Publishing House
20. Beaven C R. Handbook of the freshwater fishes of India (Narendra Publishing House)
21. Biswas K P A Text Book of Fish, Fisheries and Technology, (Narendra Publishing House)
22. Brown E and Margret 1957 Physiology of Fishes Vol I & II (Academic Press, Inc. Publishers)
23. Daniels R J R Freshwater fishes of Peninsular India (Universities press)
24. Kumar S andThembre M Anatomy and Physiology of Fishes (Vikas Publishing House)
25. Bond, E. Carl. Biology of fishes.
26. Brown E and Margret Physiology of Fishes Vol I & II (Academic Press, Inc. Publishers)
27. Lagler, K.F. Ichthyology. John Wiley Publication
28. Love, M.S. &Cailiet, G.M. Readings in Ichthyology. Prentice Hall Publications, 1979.
29. Norman, J.R. & P.H. Green Wood.A history of fishes.
30. Pandey.Fish and Fisheries.Rastogi Publications

ZGAF0013: AQUACULTURE AND FISH GENETICS

(4 Credits-60 Hours)

Objective: *This course is designed to provide in depth knowledge of Aquaculture management and to develop theoretical knowledge on Fishery Genetics and Fish Biotechnology*

Module I(15 hours)

Fishery Management: Construction of fish farm and reclamation of swamps; Selection of species for culture – Biological principles, Preparation and management of nursery ponds, rearing ponds and stocking ponds along with control of weeds, pests and predators, Construction of hatcheries and their management.

Aquaculture Management: Feed, health and water quality management; prophylaxes; quarantine measures.

Module II (30 hours)

Freshwater fish culture : Indian Major carps and exotic carps - Composite Fish Culture; Air breathing fishes; Integrated Fish Farming – Paddy cum Fish Culture and Fish cum Livestock Culture, Monoculture, Monosex culture; Sewage fed fisheries, Catfish culture, Trout culture.

Freshwater prawn culture; shrimps and Crab culture; cage culture and pen culture, Lobster culture, Mussel culture; Pearl oyster culture; Edible oyster culture

Fish nutrition: Nutritional requirements, formulation and preparation of fish feeds Food & Feeding habits of commercially important fishes. Larval nutrition — Importance of live feed and artificial feed, Different types of feed available for larvae.

Fish seed resources: Procurement and transportation of seed from natural resources; management of brood stock and induced breeding of carp and air breathing fishes.

Module III (15 hours)

Fishery Genetics and Biotechnology: Inheritance in fishes, sex determination, hybridization

Cytogenetics and molecular techniques in fisheries: Comet Assay, Micronuclei Test, Fish Cell Culture, Application of biotechnological tools: Recombinant DNA, Application of Hybridoma Technology, Transgenesis and AndrogenesisCell lines and cell culture; production of monoclonal antibodies. Jellyfish Green Fluorescent Proteins and their applications, Cryopreservation

Suggested Readings

1. Arumugam, N. Aquaculture & Fisheries, Saras Publication
2. Bardach, J.E., Ryther, J.H. and McLarney, W.O. Aquaculture. John Wiley & Sons Inc., USA.
3. Beaven C R Handbook of the freshwater fishes of India (Narendra Publishing House)
4. Boris, Gomelsky. Fish Genetics.VDMVerlag
5. C.I.F.R.I., Prawn Fisheries Bulletin
6. Chakroff,M., Freshwater Fish Pond Culture and Management, Scientific Publishers
7. Christenson, K. Aquaculture: Introduction to Aquaculture for Small Farmers. Createspace Independent Publishing Platform
8. Daniels R J R Freshwater fishes of Peninsular India (Universities press)
9. Dholakia, A.D. Identification of Prawns/Shrimps of India and Their Culture. Daya Publishing House
10. Elizabeth Gosling.BivalveMolluscs: Biology, Ecology and Culture Wiley-Blackwell
11. Ghosh, S.., Palanisamy, K. and Pathak, S.C. Shrimp and Freshwater Hatchery Public Relations Division, National Bank for Agriculture and Rural Development, Bombay.
12. Gray, CamilloW.Guide to Shrimp and Prawn Culture in Bangladesh. University of Stirling Institute of Aquaculture
13. Gupta S.K., Gupta P.C .General & Applied Ichthyology.S Chand & Company
14. Hall, C. B., Ponds and Fish Culture, Agro Botanical Publishers
15. Harvey, B. J. and Hoar, W. S.. Theory and practice of induced breeding in fishes.
16. Hora, S. L. and Pillay, T.V. R. Handbook on Fish Culture in the Indo-Pacific Region, Fisheries Division, Biology Branch, FAO,
17. Huet, M., Textbook of Fish Culture, Breeding and Cultivation of Fish, Fishing News (Books) Ltd..
18. CAR.Handbook of Fisheries and Aquaculture Reddy,
19. M.S. A Text Book of Aquaculture, Discovery Publishing Pvt.Ltd
20. Jhingran V. G. Fish and Fisheries of India.
21. KolappanNisha. Identification of Genetic Relation Between Fish Species Using Sds-Page. ambert Academic Publishing
22. Kurian, C.V. and Sebastian,V.O. Prawns and prawn Fishery of India. Hindustan Publishing Corporation (India), New Delhi.
23. Lakra W. S., Abidi SAH, Mukherjee SC and Ayyappan S. 2004.Fisheries Biotechnology.
24. Lucas, J.S. Aquaculture: Farming aquatic animals and plants (Fishing News Books)
25. MacKLenzie, Simon A. Genomics in AquacultureAcademic Press
26. Michael Bernard New(Editor), Wagner CotroniValenti(Editor), James H. Tidwell(Editor). Freshwater Prawns: Biology and Farming Wiley-Blackwell
27. Mikhalev, Viktor. Genetics and Fish Breeding.Arcler
28. Nigel Preston(Editor), Dean R. Jerry(Editor)Biology and Culture of Farmed Marine Shrimps. CRC Press
29. Pandian, T.J. (Editor), C.A. Strüssmann (Editor), M.P. Marian (Editor).Fish Genetics and Aquaculture Biotechnology.CRC Press
30. Pandian, T.J. Genetic Sex Differentiation in Fish. CRC Press
31. Pillay, T. V. R.. 1993. Aquaculture – Principles and Practices. Fishing News Book.
32. Pillay, T.V.R. and M.N. Kutty, Aquaculture: Principles and Practices. Wiley India Pvt Ltd; Second edition
33. Rao, K. L. 1975. India's water wealth.
34. 3Rath, R.K. Freshwater AquacultureScientific Publishers Journals Dept
35. RavishankarPiska, 1999. Fisheries and Aquaculture.Lahari Publications, Hyderabad.
36. Santhanam,R. Fisheries Science, Daya Publishing House, 1990.

37. Selvamani B.R &Mahadevan R.K 2008 Freshwater fish farming (Campus Books International)
38. Singh, B.& A. Dey. Fish and Fisheries. Invincible Publishers
39. Singh, N.P. & B. Santosh. Handbook of freshwater aquaculture.New India Publishing Agency
40. Turner, Bruce. Evolutionary Genetics of Fishes (Monographs in Evolutionary Biology).Springer

SPECIALIZATION IV: ANIMAL ECOLOGY AND WILDLIFE BIOLOGY

ZGEB0014: ANIMAL ECOLOGY AND BIOGEOGRAPHY

(4 Credits-60 Hours)

Objective: To develop an understanding of the theoretical perspectives of Ecology and Biogeography

Module I (10 hours)

Basic Ecological Concept: Habitat and Niche, Competitive displacement, Ecological equivalents; Species richness, Global patterns in species richness, Theories of species richness, Species diversity, Ecotone, Edge effect; Gause's principle, Invasive species and its effect on species richness; Ecological Versatility and Niche dimension

Module II (20 hours)

Habitat and landscape ecology: Introduction to Habitat Ecology; Ecology of major habitats: Grasslands, Wetlands, Forests; Edge ecotones, interspersion and juxtaposition; Physical and anthropogenic factors influencing habitats. Habitat fragmentation and its effect on resident community; Inventory, evaluation and monitoring of wildlife habitat - Measuring wildlife habitat, availability, quality, palatability of graze and browse; Inventory of unique habitats and their distribution, Animals signs as indicators of habitat use; Monitoring changes in habitat parameters.

Module III (10 hours)

Population Ecology: Monitoring population and other demographic parameters, Predator-Prey relation, Population Genetics, Estimation of Survival, Recruitment, and other transition states. Ecological Model

Module IV (20 hours)

Biogeography: History of biogeography; Ecology of dispersal and faunal exchange, barriers, mode of dispersal, origins and radiation; island biogeography theory; Endemism, refugia; Continental drift; dispersal and vicariance biogeography; dispersal mechanisms and dispersal barriers; reconciling distribution of fauna and flora; Biogeographic affinities of the fauna and flora of the Indian sub-continent; India's biogeographic classification.

Suggested Readings

1. Smith TM and Smith RL (2012). Element of Ecology (9th edition). Pearson Publication
2. Begon M, Townsend CR and Harper JL (2006). Ecology From individuals to Ecosystems (4th edition). Blackwell Publishing
3. Ricklefs RE and Miller GL (1999). Ecology (4th edition). WH Freeman Publication
4. Mani MS (1974). Ecology and Biogeography in India. Springer Netherlands
5. Cox CB, Moore PD and Ladle R (2010). Biogeography: An Ecological and Evolutionary Approach (9th Edition). Wiley-Blackwell.
6. Huggett RJ (2004). Fundamentals of Biogeography (2nd edition). Routledge London and New York
7. Ladle R and Whittaker RJ (2011). Conservation Biogeography. WileyBlackwell
8. MacArthur RH (1984). Geographical Ecology: Patterns in the Distribution of Species. Princeton University Press.
9. MacArthur RH and Wilson EO (2001). The Theory of Island Biogeography. Princeton University Press.
10. Mayr E (1969). Principles of Systematic Zoology. Tata McGraw Hill Publ. Co.
11. Mayr E and Ashlock PD (1991). Principles of Systematic Zoology. McGraw Hill International Edition.
12. Simpson GG (1961). Principles of Animal Taxonomy. Columbia University Press.

ZGWM0015: WILDLIFE CONSERVATION AND MANAGEMENT

(4 Credits-60 Hours)

Objective: The Basic objective of the course is to give the students a sound understanding of the wildlife Conservation and Management

Module I (25 hours)

Conservation Biology: Introduction to conservation biology, values of biodiversity and conservation ethics, Patterns and process of biodiversity, losses and threats to biodiversity. Local and regional extinctions, changes in species composition and problem of climate change; Strategies for conservation – in situ conservation: International efforts and Indian initiatives; protected areas in India – sanctuaries, national parks, biosphere reserves, wetlands, mangroves and coral reefs for conservation of wild biodiversity; Control of invasive species; Significance of ecological restoration in conservation; Ex situ conservation : Principles and practices; botanical gardens, fields gene banks, seed banks, in vitro repositories, cryobanks; non-formal conservation efforts.

Module II (25 hours)

Wildlife Management: Principles and practices of wildlife management; Management of special habitats: riparian zones,Grasslands, wetlands; Species conservation projects: tiger, lion, rhino, crocodile, turtle and adjutant stork; Role of Biology in management; Management plan for Protected Areas; Principles of planning: objectives, resource surveys, analysis of surrounding region, management zones, theme plans, communications, staff and visitor amenities, monitoring; Financing protected areas: Forest working plans and wildlife management plans; Need for wildlife management planning.

Module III (10 hours)

Phytoresource Utilization and Conservation: Plant Biodiversity: Concept, status in India, utilization and concerns; Forest products: Important timber yielding plants, Timber types, identification, diagnostic features, structure and quality; Important fire wood plants; Non Timber forest products: bamboos, rattans, fibers pulp; gums, resins, tannins, latex, fruits & tubers; Plants used as avenue trees for shade, pollution control and aesthetics; Threatened plants of India with special reference to NE India

Suggested Readings

1. Hillis DM (1996) (ed). Molecular Systematics. SinauerPubl Inc. Dash, M. Fundamentals of Ecology. Tata Mcgraw Hill
2. Gopal, R. Wildlife Management, Allied International
3. Saharia, V. Wildlife conservation
4. Primack- Essentials of Conservation Biology
5. Dyke- Conservation Biology- Foundation, Concepts , Applications
6. Primack- A primer of Conservation Biology
7. Singh- Textbook of Wildlife Management
8. Bailey- Principles of Wildlife Mangement
9. Krausman and Cain- Wildlife Management and Conservation
10. B.B. Dutta- A handbook of Plant Resource Utilization and Conservation
11. Kibue- Wildlife Conservation and Utilization
12. Trivedi and Sharma- Plant Resource Utilization and Conservation

ZGAZ0016: APPLIED ZOOLOGY II

(4 Credits- 60 hours)

Objective: *The course is designed to provide knowledge on parasitology with special reference to emerging viral diseases, Pest management, Poultry rearing and Biodiversity*

Module I: Parasitology (20 hours)

Parasitism and types of parasites, primary and secondary hosts, transmission of parasitic infection. Host- parasitic interactions – parasitic effects benefiting the parasites, parasitic effects benefiting the

host. *Vibrio cholera* and *Clostridium titani*- Life cycle, mode of transmission, infection and treatment. Influenza, Dengue, Bird flu, Nipah and H1 N1 viruses- Life cycle, mode of transmission, infection and treatment. Toxins and antitoxins, Identification characters, life cycle, pathogenecity and control of *Taenia solium* and *Ancylostoma duodenale*

Module II: Insect pest management, Public Health and Forensic Entomology (10 hours)

Concept of Pest, concept of integrated pest management (IPM)
Mosquito (Aedes, Culex, Anopheles), Housefly- Taxonomy, Biology, Behavior and their control.
Life cycle of Calliphora and Scrophaga, determination of death and causes of death.

Module III: Poultry management (8 hours)

Poultry Rearing / Farming: Housing and equipment; Nutritional Requirements; Poultry diseases
Poultry products: Broilers, meat processing and meat products; Egg structure and quality, factors affecting size and egg processing; Poultry by products

Module IV Biodiversity (12 hours)

Components of Biodiversity (Genetic, Organismal and Ecological), Value of Biodiversity, threats to biodiversity, biodiversity conservation, Mega biodiversity countries, hot spots and heritage sites, Threats to biodiversity. IUCN Red list categories. Habitat diversity of Indian wildlife, endemic and threatened species of northeast India
Ethnozoology with special reference to Northeast India
Vermiculture: species of worms, condition for efficient vermiculture (domestic and commercial level), Economics of Vermiculture

Suggested Readings

1. Venkitaraman: Economic Zoology, Sudarsana Publishers
2. Srivastava : A Text Book of Applied Entomology, Vol. II & II.I Kalyani Publishers
3. Shukla & Upadhyaya : Economic Zoology. Rastogi Publishers.
4. Ananthakrishnan, T. N.and K.G. Shivaramakrishnan.Ecological entomology: Insect life in odd environment. Scientific Pub.: India
5. David, B.VandT.N. Ananthakrishnan.General and Applied Entomology. Tata McGraw-Hill Publ. Co. Ltd.: New Delhi
6. Dent, D. R.Insect pest management.Westville Publishing House: Delhi
7. Eldridge B Medical entomology (Springer)
8. Fenemore P G and Prakash Applied Entomology (New Age Publishers: New Delhi)
9. Madigan, M. T., J. M. Martinko and J. Parker Brock Biology of Microorganisms (Ed. IX).Prentice Hall International Publication.
10. Kreier, J.P. and J.R. Baker.Parasitic Protozoa. Allen and Unwin Press.
11. Kathering ,M.G. A. James paul and V. Zaman. Churchill Livingstone.Medical and Veterinary Protozoalogy
12. Asa C. Chandler, (7th ed.), Introduction to Parasitology, With Special Reference to the Parasites of Man, New York: Wiley
13. Despommier, Gwadz, Hotez, Knirsch: Parasitic Diseases (5th Ed). Apple Trees Productions, LLC.
14. Stephen A. Berger, John Marr, Human Parasitic Diseases Sourcebook, Jones & Bartlett Learning
15. D Molyneux, Advances in Parasitology- Control of Human Parasitic Diseases, (1st Ed).Academic Press.
16. Jeremy Farrar & Peter Hotez& Thomas Junghanss&Gagandeep Kang & David Lalloo& Nicholas J. White. Manson's Tropical Diseases, (23rd Ed).Elsevier publication.
17. Howes, H. Modern Poultry Management.Read Books
18. Jadhav & Siddiqui .Handbook of Poultry Production and Management.Jaypee Publications
19. Maiti, P.K. & P. Maiti. Biodiversity: Perception, Peril and Preservation. PHI Learning Private Limited
20. Bharucha, E.The Bio-Diversity of IndiaHardcover.Grantha Corporation
21. Krishnamurthy. An Advanced Textbook On Biodiversity : Principles and Practice. Oxford & IBH Publishing
22. Johns, J. Worm Farming - Creating Compost at Home With Vermiculture. Createspace Independent Pub

23. NPCS Board of Consultants & EngineersThe Complete Technology Book on Vermiculture and Vermicompost
24. ICAR. Handbook of Integrated Pest Management (IPM) Pub: ICAR, Govt. of India
25. Metcalf, R W.H.Luckmann. Introduction To Insect Pest Management. Wiley India Pvt Ltd

SPECIALISATION I: ENTOMOLOGY AND ENVIRONMENTAL BIOLOGY

ZGIG0017: INSECT ECOLOGY

(4 Credits- 60 Hours)

***Objective**: At the end of the course student will develop understanding of Insect diversity and behavior.*

Module I (16 hours)

Dynamics of insect life system-determinants of insect abundance, population change, birth rate, death rate, movements; Effect of environment on insect development-effect of light, temperature & humidity, Regulation of insect populations, resistance of insect population to pest management; Basic concept of surveillance and sampling of insect

Module II (10 hours)

Dominance of insect-cause of success; Adaptation of insect- aquatic, terrestrial, soil, boring wood

Module III (12 hours)

Insect biodiversity, threats to insect biodiversity, impact of climate change on insect communities; Natural history of dragonfly, leaf insect, hawk moth, lime butterfly, milkweed butterfly, sal stem borer, golden beetle.

Module IV (22 hours)

Insect behavior: chemotropism, thigmotropism, hydrotropism, rheotropism, anemotropism, phototropism, thermotropism, geotropism, instinct. Protective behavior: mimicry. crypsis, warning coloration. Behavioural defence, chemical defence; Breeding behavior; Insect association: Passive insect association, active association, aestivating aggregation, protective aggregation, swarming aggregation, sleeping aggregation, dissociation, social aggregations.

Suggested Readings

1. The Insect Structure and Functions, R.F. Chapman, Cambridge University Press
2. Modern Entomology, D.B. Tembhare Himalaya Publishing House
3. Text Book of Applied Entomology Vol- I & Vol- II, K.P. Srivastava, Kalyani Publishers
4. Introduction to General and Applied Entomology, Abhishek Shukla and Sushil kumar Saxena, Astral International (P) Ltd.
5. Indian Insect Pests, H. Maxwel-Lefroy & F.M. Howlett, Astral International (P) Ltd.
6. A Handbook on Economic Entomology, Abhishek Shukla, Astral International (P) Ltd.
7. Insect Pest Management: Ecological Concepts, T.V.Sathe & Jyoti M. Oulkar, Astral International (P) Ltd.

ZGPM0018: PRINCIPLES OF PEST MANAGEMENT

(4 Credits-60 Hours)

***Objective:** To develop understanding of theoretical perspective of insect pest control and management*

Module I (23 hours)

Concept of pest and pest status, kinds of pest; House hold pest: Cockroach, lepisma, bedbug, their life history and control; Stored grain pest: Sitophilusoryzae, Triboliumcastaneum, Troagodermagranarium, Sitotrogacerellela, Callobruchuschinensis, life history and control; Major pest of rice vegetables, tea, jute and pulses- classification upto family, life history, nature and damage control (two each); Forest insects: defoliators, borers and suckers of teak, sal and gamari classification upto family, life history and control (two each), Insect damage and sign categories of forest insects.

Module II (12 hours)

Pest management: Economic decision level for pest population- Concept of economic injury level, economic threshold, crop susceptibility to injury, Pre insecticide era, insecticide era, concept of pest management.

Module III (25 hours)

Primary control measure: Physical, mechanical, traditional and legislative measure. Chemical control: concept of LD 50 and LC 50, Classification and mode of action of important insecticides, Insecticide toxicity to humans, drawbacks of chemical control, Insect resistance to pesticides, Fumigants application and operation precautions, insecticide law and regulations. Pheromonal control.

Biological and genetic control: Use of parasites, parasitoids, predators and pathogenic organisms, sterile insect techniques, lethal mutations, inherited sterility, cytoplasimic incompatibility; Integrated Pest Management and a case study

Suggested Readings

1. The Insect Structure and Functions, R.F. Chapman, Cambridge University Press
2. Modern Entomology, D.B. Tembhare Himalaya Publishing House
3. Text Book of Applied Entomology Vol- I & Vol- II, K.P. Srivastava, Kalyani Publishers
4. Introduction to General and Applied Entomology, Abhishek Shukla and Sushil kumar Saxena, Astral International (P) Ltd.
5. Indian Insect Pests, H. Maxwel-Lefroy & F.M. Howlett, Astral International (P) Ltd.
6. A Handbook on Economic Entomology, Abhishek Shukla, Astral International (P) Ltd.
7. Insect Pest Management: Ecological Concepts, T.V.Sathe & Jyoti M. Oulkar, Astral International (P) Ltd.
8. Indian Pest Aphids, T.V.Sathe & B.V.Jadhav, Astral International (P) Ltd.
9. Insect Pest Predators, T.V.Sathe & Y.A.Bhosale, Astral International (P) Ltd.
10. Insect Predators and Pest Management, Vaishali J. Patil & T.V.Sathe, Astral International (P) Ltd.
11. Insect in Vegetables, Dhamo K. Butani & M.G.Jotwani, Astral International (P) Ltd.

SPECIALIZATION II: CELL AND MOLECULAR BIOLOGY

ZGMB0019: CELL AND MOLECULAR BIOLOGY-II

(4 Credits-60 Hours)

Objective: This course aims to provide understanding of cell adhesion molecules and their role in cell junctions, various cell signaling methods, intracellular protein traffic, cell cycle, cell death, aging and cancer, and cytogenetic analysis.

Module I (15 hours)

Cell-Cell adhesion and cell-matrix adhesion: Cadherin mediated Ca++-- dependent homophilic cell-cell adhesion; N-CAM's mediate Ca++-- independent homophilic cell-cell adhesion; Cadherin containing junctions; Gap junctions and connexins; Integrin in cell matrix and cell-cell interaction; Integrin and cell to substratum attachment; Collagen-Basic structure and assembly; Non-collagen components of extracellular matrix (Laminin, fibronectin and cell surface proteoglycans)

Cell-Cell Signaling: Endocrine, paracrine and autocrine signaling; Receptor Proteins- Cell Surface receptors and intracellular receptors; Cell Surface receptors-G-protein coupled receptors, ion channel receptors, tyrosine kinase-linked receptors and receptors with intrinsic enzymatic Activity; Second messenger System - cAMP and IP3, DAG; MAP kinase cascade, JAK/STAT and TGF –β / Smad signaling, NF-kB signaling; Signaling from plasma membrane to nucleus (a) CREB links cAMP signals to transcription (b) MAP kinase.

Module II (10 hours)

Protein sorting and targeting to organelles: Protein traffic through the endomembrane system; Targeting of proteins to the Rough Endoplasmic Reticulum and Golgi complex; Anterograde and retrograde transport; Signal-mediated protein transport to organelles (a) Nucleus (b) Mitochondria (c) Peroxisome

Module III (10 hours)

Genetic analysis in Cell Biology: Mutation: type and causes; Isolation and analysis of mutants; Physical and Genetic mapping of mutations; Molecular cloning of genes defined by mutations.

Module IV (15 hours)

Cell Cycle: Bacterial cell cycle (Helmstetier - Cooper or I+C+D model); Partition and cytokinesis; Eukaryotic cell cycle – G l, S, G 2 and M phases; Cell cycle check points; Molecular basis of cell cycle regulation (a) Cyclins and cyclin - dependent kinases (b) Regulation of CDK cyclin activity.

Cell Death: Apoptosis and necrosis; Apoptosis-its characteristics; Genes involved in apoptosis.

Module V (10 hours)

Aging, the biology of senescence: Maximum life span and life expectancy; Causes of aging: (a) General wear and tear and genetic instability (b) Free radicals, oxidative damage and antioxidants (c) Telomerases and aging.

Cancer: Tumor cells and onset of cancer; Proto-oncogenesis and tumor suppressor genes; Mutation causing loss of cell cycle; Mutations affecting genuine stability.

Suggested Readings

1. Cooper, G.M., Cell (A Molecular Approach)
2. Sadava, D.E., Cell Biology
3. Karp, G., Cell and Molecular Approach
4. Kish, V.M. and Kleinsmith L.J., Cell and Molecular Biology
5. Gardener, Principles of Genetics
6. Strickberger, Genetics
7. Ram mahabal, Fundamental of Cytogenetics and Genetics

ZGIM0020: IMMUNOLOGY II

(4 Credits-60 Hours)

Objective: *This course aims to provide a detailed understanding of the organization and expression of the immunoglobulin genes, functional significance of cytokines, immune responses to various infectious diseases, immunodeficiencies and immunization techniques, transplantation and tumour immunology.*

Module I (20 hours)

Organization and expression of Ig genes: Multigene organization of lg genes; Light-chain multigene family; Heavy chain multigene family; Variable region gene rearrangement, V-J rearrangements in light chain DNA, V-D-J rearrangements in heavy chain DNA, Mechanism of gene rearrangement, Allelic exclusion; Generation of antibody diversity, Multiple germ line V, D and J gene segments; Combinatorial V-J and V-D-J joining; Junctional diversity; Association of heavy and light chain; Expression of Ig genes, Differential RNA processing of heavy chain primary transcripts, Expression of membrane secreted Ig, Simultaneous assembly and secretion of IgM and IgD, Synthesis, assembly and secretion of Ig; Class switching of constant regions

Module II (15 hours)

Cytokines: Properties of cytokines, General structure of cytokines, Function of cytokines, Cytokines related diseases, Bacterial septic shock, Bacterial toxic shock and similar diseases, Lymphoid and myeloid cancers, Chagas disease

Immune system in health and disease: Immune response to infectious disease; Viral infections (a) Viral neutralization by humoral antibody (b) Cell - mediated antiviral mechanism (c) Viral evasion of host defense mechanisms; Bacterial infections (a) Immune responses to extra cellular and intracellular bacteria (b) Bacterial evasion of host defense mechanism; Protozoan diseases; Diseases caused by helminthes.

Module III (15 hours)

Vaccines: Active and passive immunization; Designing vaccines for active immunization; Whole organism vaccine (a) Attenuated viral or bacterial vaccines (b) Inactivated viral or bacterial vaccines; Polysaccharide vaccines; Recombinant vector vaccines; DNA vaccines; Synthetic peptide vaccines; Multivalent peptide vaccines

Immunodeficiencies: Primary and Secondary Immunodeficiencies, lymphoid and myeloid lineage; AIDS: Structure and types, genome organization, replication, opportunistic agents and therapeutic agents

Module IV (10 hours)

Tumor immunology: Tumor antigen; Tumor evasion; Immune system against tumors; Therapies.

Transplantation immunology: Acute, hyperacute and chronic rejection; Tissue matching (HLA typing); Graft Vs host (GVH) reaction; Xenotrasplantation; Immunosuppressive drugs; role of monoclonal antibodies in transplantation.

Suggested Readings

1. Kindt, T.J., Osborne, B.A., Kuby, J., Kuby Immunology
2. Kasper, D.l., Fauci, A.S., Harrison's Infectious Diseases
3. Abbas, A.K., Lichtman, A.H.H., Pillai, S., Cellular and Molecular Immunology
4. Sell, S., Berkower, I., Immunology and Immunopathology and Immunity

SPECIALIZATION III: FISH AND FISHERY BIOLOGY

ZGCP0021: CAPTURE FISHERY AND POST-HARVEST TECHNOLOGY

(4 Credits-60 Hours)

Objective: The students will learn about River systems and their fishery, Marine fishery, Fish yield and preservation, processing and marketing of fishes and their by products

Module I (40 hours)

Capture fishery: Fish catch statistics of the world special reference to India; Riverine Fisheries River systems in India, their ecology and fisheries (Ganga & Brahmaputra); Reservoir Fisheries: Development, Exploitation and management of Reservoirs with special reference to India – Dams and their effect on fish migration; Beel fisheries of Assam: Fish resources, problems and management; Cold water fisheries: Hill stream fisheries of North East India; Mahseer fisheries: prospects and problems with special reference to NE India;Major Estuaries of India and their fisheries; Brackishwater Fisheries: Chilka lake

Hilsa fishery – causes of decline and efforts for revival; Craft and Gear used in Fisheries : Traditional and mechanized boats and nets used in catching fish; Marine fish catch in India and fisheries of commercial importance; Coastal fisheries of India (Sardine & Mackerel fisheries); Population Dynamics : Fish populations and factors affecting the population structures ; Estimation of fish yield and control of over-fishing; Fishing crafts and gears used in Inland capture fisheries; Destructive fishing – its impact on fish diversity.

Module II (20 hours)

Post harvest technology and fish by-products: Preservation and processing: Methods of preservation of both finfish and shell fish preservation (Refrigeration and freezing, Drying, Salting, Smoking, Canning, Pickling, pasting and spicing)and associated problems; Rigor mortis and post-mortem changes.handling and packaging of fish for marketing; product stability and shelf -life

Fish By-products:Fish oils, Fish Proteins, Fish manure, Fish glue, Fish flour, Isinglass, Fish meal, Fish Silage, Fish guano, Bone meal; Production of fish sauce by lactic acid fermentation

Suggested Readings

1. Bal, D.V. and VeerabhadraRao, K. Marine Fisheries. IBH Publications
2. Balakrishnan, N. N. and Thampy, D. M.A textbook of marine ecology.
3. Beaven C R Handbook of the freshwater fishes of India (Narendra Publishing House)
4. Biswas K P A Text Book of Fish, Fisheries and Technology, (Narendra Publishing House)
5. Brody , Fishery by-products technology., AVI, Westport
6. Chandy, M. Fishes, National Book Trust, India;
7. EIRI Board.Hand Book Of Fish Farming & Fishery Products
8. Gopakumar, K., Singh, B.N. and Chitranshi, V.R. Fifty Years of Fisheries Research in India, Fisheries Division Indian Council of Agricultural Research, New Delhi.

9. Gupta S.K., Gupta P.C .General & Applied Ichthyology.S Chand & Company
10. Jayaram K. C. The fresh water fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka.
11. Jhingran V. G. Fish and Fisheries of India.
12. Jobling M Environmental Biology of Fishes (Chapmen and Hall)
13. Khanna S. S. and H. R. Singh. A textbook of Fish Biology and Fisheries, Narendra Publishing House,
14. Kreuzer, R., Fishery products., FAO, Fishing News Books Ltd., England
15. Krishnaveni, G., N.VeerabhdraRao and K.Veeranjaneyulu Recent Technologies in Fish and Fisheries.Rigi Publication
16. Lagler, K.F. Ichthyology. John Wiley Publication.
17. Nikolsky, G.V. Ecology of fishes. Academic Press.
18. Pandey.Fish and Fisheries.Rastogi Publications
19. Rao, K. L. India's water wealth.
20. Ravishankar Piska. Fisheries and Aquaculture. Lahari Publications, Hyderabad.
21. Ricker, W.E. 1984.Methods for assessment of fish production in freshwaters.Blackwell Publications.
22. Rounsfell, G.A. and Everhart, W.H. Fishery Science: it's Methods and Applications John Wiley & Sons,
23. Sachindra, N.M. & N.S. Mahendrakar. Fish Processing Byproducts: Quality Assessment And Application Studium press
24. Santhanam,R. Fisheries Science, Daya Publishing House, 1990.
25. Singh, B. A. Dey. Fish and Fisheries. Invincible Publishers
26. Srivastava, C.B.L. A Textbook of Fishery Science and Indian Fisheries, Kitab Mahal.
27. The Wealth of India, Raw Materials Vol. IV, Fish and Fisheries, CSIR, 1962

ZGLF0022: LIMNOLOGY, FISHERY ECONOMICS, ORNAMENTAL FISHERY AND FISH PATHOLOGY (4 Credits-60 Hours)

Objective: *The course will help the students to understand the principles of limnology and economics of fishery. The students will also develop knowledge on fish diseases and control*

Module I (15 hours)

Limnology: Physico-chemical factors of fresh water habitat; Nutrients – Availability, Seasonal distribution and availability of phosphorous, Nitrogen andSilicon; Ecological classification of freshwater organisms; Plankton – Distribution, seasonal variation in space and time, plaktonic migration, cyclomorphosis

Module II (15 hours)

Fishery economics: Larvivorous fishes in relation to public health; Yield and optimum catch; Exclusive Economic Zone (EFZ) and its strategy; Fisheries co-operatives and their role in fish production and marketing; Aquaculture and rural development in India; Fishery education, training and extension; Fishery research Institutes in India; Fishery legislation and their role in fishery development.

Module III (15 hours)

Ornamental fishery: Ornamental fish culture: Ornamental aquarium fishes, Breeding and care of fresh water aquarium fishes; Aquarium keeping — Design and construction of tanks; species-wise tank size requirement; heating, lighting, aeration and filtration arrangements; decorations; common aquarium plants and their propagation; Maintenance of Natural Colour of fishes in Aquarium.

Module IV (15 hours)

Fish pathology: Fish and Prawn/ Shrimp Diseases: Types of Diseases- viral, bacterial, fungal, protozoan and otherparasitic diseases; symptoms & control measures; Diagnosis - Histopathological methods; Immunoassay; Biochemical assay; Serological techniques; Role of biopesticides; Application of monoclonal antibodies; Vaccines and immune stimulants; Drug resistance.

Suggested Readings

1. Agarwal, S.C. Limnology
2. Bond, E. Carl. Biology of fishes.
3. Datta, J. J. DattaMunshi. Fundamentals of Limnology
4. Dholakia, A.D. Ornamental Fish Culture and Aquarium Management.Daya Publishing House
5. Edward,J. Noga. Fish Disease: Diagnosis & Treatment
6. Gerald, A. Textbook of Limnology. The C.V. Morby Co.
7. Hutchinson, G.E.A. Treatise on Limnology. Vol.1. John Wiley & Sons.
8. Kumar, Arvind. Fundamentals of Limnology.APH Publishing Corporation
9. Nikolsky, G.V. Ecology of fishes. Academic Press.
10. Ricker, W.E. Methods for assessment of fish production in freshwaters.Blackwell Publications.
11. Ruttner, F. Fundamentals of Limnology. University of Toronto Press, 1968.
12. Sharma Shailendra &Pawan Kumar Bharti. Limnology and Aquatic Science. Discovery publishing house
13. Smith David J. Aquarium Keeping: Aquarium Keeping Essentials
14. Thornton Kent W., Bruce L. Kimmel, Forrest E. Payne. Reservoir Limnology: Ecological Perspectives
15. Untergasser, D. Handbook of Fish Diseases. TFH Publications
16. Welch, P.S. Limnological Methods. McGraw Hill Book Company, New York.
17. Wetzel, Robert G. Limnology: Lake and River Ecosystems. Elsevier Academic Press

SPECIALIZATION IV: ANIMAL ECOLOGY AND WILDLIFE BIOLOGY

ZGRE0023: WILDLIFE RESOURCE MANAGEMENT AND ECONOMICS

(4 Credits-60 Hours)

Objective: The course is designed to equip students with a foundation for Natural Resource Management and Conservation

Module I (20 hours)

Species conservation: IUCN categories, criteria for allocation into different categories; Threatened animal species of India with special reference to NE India; Role of Iconic species designation in conservation; Concept and significance of conservation of Flagship (Target) species – Wildlife projects implemented in India; An overview of conservation problems and issues of fauna of Indian sub-continent.

Module II (15 hours)

Natural resource management and conservation: Introduction to forestry, principles of forest management, forest and wildlife as natural resources; Importance and performance of joint forest management (JFM) – Role of Non-government Organizations (NGO); Conservation movement in India, socio-economic and political realities; Concept of stakeholders; International conservation bodies: IUCN UNDP, FAO, WWF.

Environmental Laws, Environment Impact Assessment; Intellectual Property Right

Module III (5 hours)

Natural resource economics: Need for integrating environment and economics, cost and benefits of biodiversity conservation. Need for ecosystem service valuation.

Module IV (20 hours)

Population ecology: Demographic and life history parameters, evolution of life history parameters: r & K selection, allometry, aging and sexing, life tables, age and stage structures models, methods of estimation of life history parameters; Sampling designs for population estimation, population estimation methods: Distance based Sampling Methods, Mark-Recapture for Closed Population, Indices, and Estimation of Demographic parameters.

Suggested Readings

1. Caughley G (1978). Analysis Of Vertebrate Populations. John Wiley, Chichester.
2. Hastings A (1997). Population Biology: Concepts And Models. SpringerVerlag, New York.
3. Neal D (2004). Introduction to population biology. Cambridge University Press. UK

4. Ricklefs R (2010). The Economy of Nature (6 edition). W. H. Freeman
5. Tokeshi M (1998). Species Coexistence: Ecological and Evolutionary Perspectives.
6. W.J.Ecological Census Techniques Cambridge University Press
7. Patro, L. Biodiversity Conservation and Management
8. Misra, H.N. – Managing Natural Resources- Focus on Land and Water
9. Anderson, Sweeney and Williams- Wildlife and Natural Resource Management
10. Deal, K.H. Environmental Economucs and Natural Resource Management
11. Kumar, R. Environmental Laws
12. Muthukrishna- Natural Resource Economics
13. Field, B.C. Economics of Environment
14. Began, M. & Mortimer, M.- Population Ecology
15. Rockwood- Introduction to population Ecology

ZGWC0024: WILDLIFE HEALTH, FORENSICS AND CONFLICT

(4 Credits-60 Hours)

Objective: To develop skills in understanding the wildlife health management, To understand the concept of Wildlife Forensics, To develop an understanding of the theoretical perspectives in the area of Human Animal Conflicts

Module I (20 hours)

Wildlife Health: Introduction to disease and epizootiology; Determinants of disease and disease transmission, Disease and population dynamics; Review of major viral, bacterial, protozoan, fungal and parasitic diseases of Indian wild mammals, birds, amphibians and reptiles; Assessment of condition, health and nutritional status in free-ranging populations; Disease control operations, Planning and management of wildlife health programmes

Module II (15 hours)

Capture and handling of wild animals: Capture and handling of animals - purpose, restraint techniques, different capture methods and animal barriers; Drug immobilization - drug delivery equipment and accessories; Handling and transport of wild animals, designing sledge, crate and holding enclosures

Module III (15 hours)

Conservation Genetics and Wildlife Forensics: Introduction to Bio-molecules-DNA, RNA and Proteins; Molecular markers; PCR, DNA Sequencing, Genotyping; Allelic variation; Interpretation of genetic data; Application of genetics for wildlife conservation; Loss of genetic diversity; Wildlife Forensics- Overview, various forensic protocols for species identification, Molecular markers used in wildlife forensics; Wildlife forensics based on morphometry and DNA analysis

Module IV (10 hours)

Human-wildlife conflict: Causes and management; Impact on ecosystem, lives and livelihood of human; Ecotourism: problems and prospects with special reference to northeast India.

Suggested Readings

1. Fowler- Restraint and Handling of wild and Domestic Animals
2. Briscoe, Ballou and Frankhan- Introduction to Conservation Genetics
3. Leeschcke, Temivk and Jain – Conservation Genetics
4. Frankhan, Ballou and Briscoe- Primer of Conservation Genetics
5. Cooper and Cooper- Wildlife Foresnsic Investigations
6. Huffman and Wallacw- Wildlife Forensics – Methods & Applications
7. Sahaipal, Thakar & Goyal – Forensic Examination of Hair of Protected Indian Wildlife Species
8. Linacre and Tobe- Wildlife DNA analysis
9. Rao, G. Textbook on pathology of Wildlife Diseases
10. Jani, R. Basic of Wildlife Health Care Management
11. Ayadi, D.P. Human Wildlife Conflict
12. Wang, J. Human Wildlife Conflict management: Understanding the Fundamentals of Human Wildlife Conflicts in Human Dominated Landscape

ZGBT6001: BIOSYSTEMATICS AND TAXONOMY LAB
(2 credits)

1. Collection, preservation, curation and identification of non-chordate and chordate species (only pest and cultured species)
2. Taxidermy of fish/rat/pigeon/fowl
3. Identification with only diagnostic features (specimen or model/diagnostic photograph)
   a) Spongilla, one coelenterate, Ascaris (male & Female), Fasciola, Taenia, Earthworm, Leech, Julus, King crab, spider, crab, prawn, cricket, leaf insect, stick insect, beetle, butterfly, grasshopper, termite, Pila, sepia, Achitina, Slug, Echinodermata
   b) Puntius, Labeo, Cyprinus, Ctenopharyngodon, Hypopthalmichthys, Cirrihinus, Clarius, Anabas, Anguilla, Mystus, Mastocembalus, Hoplobatrachus, Polypedates, Rhacophorus, Euphlictys, Fejervarya, Moina, sparrow, Parrot, rabbit, Duckbill platypus, Bat, monkey, whale/dolphin
4. Survey and application of biodiversity indices on animal species (any one group)
5. Calculation of Pearson correlation coefficient, T test (One sample t-test, Two sample t-test, Paired t-test); Chi square test, ANOVA, Mann-Whitney test on supplied data.
6. Preparation of Taxonomic key, study of evolution through models/charts.
7. Representatives of Reptile viz. Xenochrophis, Amphiesma, Hemidactylus, Calotes and Chelonia

ZGBG6002: CELL BIOLOGY, GENETICS, PHYSIOLOGY AND BIOCHEMISTRY LAB
(2 credits)

1. Safety measures in labs: general safety measures, personal protection, chemical and other hazards, spillage, acid fume, waste disposal; Use and care and maintenance of common lab equipment (microscope, colorimeter/spectrophotometer, balance, pH meter, oven, incubator, microtome, electrophoretic apparatus, centrifuge, water bath etc.) and glass wares.
2. Study of structural arrangement of plasma membrane using model/chart.
3. Identification of various stages of mitosis and meiosis from prepared slides
4. Temporary squash preparation of onion root-tip/tadpole tail-tip cells to study stages of mitosis and Grasshopper/ Gryllotalpa testis to study meiotic stage of cell division.
5. Preparation of buffers of different pH using Henderson-Hasselbalch equation and its verification using pH meter.
6. Comparison of RBC and WBC in different groups of Vertebrate.
7. Quantitative estimation of amino acid using ninhydrin reagent.
8. Quantitative estimation of total protein by Lowry method.
9. Estimation of glucose in serum by glucose oxidase-peroxidase method/ tissue by Anthrone reagent
10. Micronuclei assay from blood cells to study genotoxicity.
11. Isolation of DNA from animal source.
12. Agarose gel electrophoresis of isolated genomic DNA.

ZGDB6003: DEVELOPMENTAL AND ENVIRONMENTAL BIOLOGY LAB
(2 Credits)

1. In vivo/in vitro culture and study of chick embryo.
2. Isolation of chick embryo and preparation of whole mount.
3. Study of developmental stages of Chick/Frog embryo from permanent slides.
4. Study of Chick/Frog embryo using vital staining.
5. Study of different stages of estrous cycle in mice.
6. Dissection of male/female reproductive system of cockroach.
7. Estimation of CO_2, DO, Nitrites, total alkalinity and hardness of water sample.
8. Study of zooplanktons and its role in a pond ecosystem.
9. Analysis of physical parameters of soil.
10. Study of different types of survey techniques
11. Field Visit.

ZGPR6004: PROJECT MANAGEMENT, REPORTING AND DOCUMENTATION
(2 Credits)

Objective: This course, which will be conducted as a short-term workshop, is designed to help the students to prepare a project proposal, learn the techniques of handling a project and prepare reports.

Objective	Help the student to understand Entrepreneurship, identification of qualities of a successful entrepreneur & how to develop it
Module	Entrepreneurship : Concept and Functions
Content	● 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	Generation of business ideas and linking
Contents	● 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) ● 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) ● Linking business ideas with the entrepreneur ● 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	Social entrepreneurship
Contents	● Who is a social entrepreneur (definition and case study) ● Difference between entrepreneurship and social entrepreneurship ● 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	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)

Content	● 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 expanses, 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	Impart knowledge on implementing, managing and monitoring the progress of the selected project
Module	Project implementation and management
Contents	● 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) and Critical 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	Concept of market
Content	● Traditional market ● Emerging market : E commerce ● Analysing the market environment 4 ● 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	Book keeping and Accountancy
	● Basic concept of Accounting (Management and financial accounting) ● Basic books of accounts (Journal, Purchase book, Purchase return book, Sales book, Sales return book, ledger book, Cash book etc.) ● 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	Documentation and Reporting
Content	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

ZGSL6005: SPECIALIZATION LAB I

INSECT MORPHOLOGY, BIOCHEMISTRY AND ECONOMIC IMPORTANCE LAB
(2 Credits)

1. Study of insect collection and preservation
2. Study of different types of mouth parts
3. Study of different types of antenna
4. Study of different types of legs
5. Preparation of arolium, empodium and pollen basket
6. Preparation and identification of haemocytes, quantitative count of haemocytes.
7. Detection of chitin in insect cuticle
8. Detection of Uric acid in insects
9. Estimation of protein from haemolymph of insects.
10. Identification of Pests (Tea , Jute, Paddy stored grain)
11. Identification of insects of forensic importance and forest defoliator
12. Identification of Conservation importance insects(Butterfly, Honeybee and beetles)
13. Identification and anatomical studies of major vector species of Anopheles, Culex and Ades

CYTOLOGY AND IMMUNOLOGY LAB
(2 Credits)

1. Use of occulometer-standardization and measurements of cell height, nuclear diameters and tabular diameters
2. Use of occular grid- standardization and counting of cells or nuclei in cross section or epithelium
3. Demonstration of the use of different microscopes: Phase contrast microscope, fluorescence microscope and electron microscope.
4. Histology of biological tissues and sectioning by microtome
5. Preparation of salivary gland chromosomes from Drosophila /Chironomous larva and stain with acetocarmine/aceto-orcein/fuelgen
6. Preparation of mammalian chromosomes from bone marrow or testis and stain with Giemsa stain
7. Determination of pK value of buffer
8. Determination of relationship between absorption and various concentration of a solution using a colorimeter, spectrocolorimeter/spectrophotometer.
9. Preparation of standard curve for proteins, lipids and carbohydrates
10. Quantization of enzymes: End point techniques (alkaline and acid phosphatase) and Substrate - left over technique (LDH)
11. Permanent Slides: Types of cells (squamous, cuboidal, columnar epithelial cells, blood cells, nerve cells, muscle cells), connective tissues of various types, adipose tissue, mitotic & meiotic chromosomes and their different phases.
12. Preparation of emulsions- syringe method and hubbed needle method
13. Immunization routes: Intradermal, Subcutaneous, Intramuscular, Intraperitioneal, Intravenous, Foot Pad
14. Bleeding Schedules and collection of blood: Bleeding from ear, retro-orbital, cardiac puncture, branchial vein, external jugular vein
15. Separation and preservation of serum: Liquid Storage using preservative and by sterilization.

FISH TAXONOMY AND FISH HEALTH
2 Credits

1. Identification of commercially important fish species of northeast India representing all fish groups
2. Fish osteology — Alizarin preparation of fish skeleton.
3. Biological Analysis of fish samples for gut contents, maturity stages and fecundity
4. Dissecting out the pituitary gland and preparing the extract
5. Determination of length-weight analysis in fishes.
6. Determination of absolute and relative fecundity in fishes.

7. Determination of gonadosomatic index (GSI), hepatosomatic index (HSI), condition factor (CF), and fecundity.
8. External characters, types of scales, fins, types of teeth, structure of alimentary canal, gill rackers.
9. Visit to fish landing centre and fish farms and make Reports of visit

PLANT AND ANIMAL DIVERSITY & CONSERVATION

2 Credits

1. Identification of species of butterfly, fishes, amphibia, reptilia, aves and mammalia from collection/ model/photographs etc.
2. Identification of fish, amphibian and reptiles (local fauna) using Morphometric land marks
3. Mapping distribution of endangered animal fauna of northeast India
4. Study of nearby protected areas (forests and grasslands) under various management regimesand make a report
5. Time and Activity budgeting
6. Demonstration and uses of equipments-traps, remote drug delivery equipments, tags, collars, radio tracking equipment
7. Systematic study of common plants, Field and Herbarium techniques, Study of resident flora, Status of litter layer in various areas in the campus, Study of successional stages of various forest communities.
8. Measuring diversity using Diversity (Shannon Winner Index, Brillouin's index, simpson index) dominance (Simpson dominance index), species richness & refraction, similarity (Morisita'sindex,Sorenson's coefficient) & dissimilarity (Bray-Curtis) indices, Association index (Test of independence of attributes ,Chi square; Sorenson's andDice index, Jacard index, Ochiai index), comparing communities (Jaccard's index)

ZGPL6008: SPECIALIZATION LAB II

INSECT ANATOMY AND LIFE HISTORY

(2 Credits)

1. Histological study of foregut, midgut and hindgut of insect.
2. Reproductive system of cockroach
3. Prothoracic gland of cockroach
4. Alimentary canal of house fly with crop
5. Bacterial chamber of termite
6. Salivary gland of Cockroach
7. Pharyngeal, labial and thoracic salivary gland of honey bee
8. Sting apparatus of honey bee
9. Identification of aquatic, terrestrial and boring insects with specific adaptive characteristics.
10. Visit to agricultural field/tea garden and forest for on spot study of pest and damage caused by them
11. Preparation of Phylogenetic tree of Insect species
12. Study of Lifecycle of Mosquito, Housefly, Drosophila
13. Collection and identification of economically important insects and various stages of their life history.

CYTOCHEMISTRY AND IMMUNOLOGICAL TECHNIQUES LAB

(2 Credits)

1. Tissue homogenization and fractionation by differential centrifugation for isolation of mitochondria, nuclei and cytosol
2. Separation of proteins and DNA by agarose electrophoresis
3. Separation of proteins and isoenzymes on SDS-PAGE and PAGE
4. Electroeluting of proteins, DNA/RNA from electrophoretic gels
5. Separation of amino acids by paper chromatography
6. Separation of phospholipids by TLC
7. Separation of hemoglobin by column chromatography

8. Detection of Carbohydrate (a) PAS method (b) Alcian blue method
9. Detection of Proteins (a) Mercury bromophenol blue method (b) Ninhydrin method
10. Detection of Lipids (a) Phosphomolybic acid method (b) Copper phthalocynin n method
11. Detection of Nucleic acid (a) Feulgen method (b) Methyle green- Pyronin method.
12. Isolation of lymphocytes from sensitized animals from spleen, lymph nodes and from human blood-rossette formation
13. Purification of antibodies and antigens: (a) Insolubilization of antibodies and antigenic proteins using gluteraldehydates (b) Immuno-adsorption (c) Dissociation of absorbed material from immuno-adsorbents
14. Quantization of antibodies: (a) Precipitation techniques (b) Immunodiffusion method (c) Immunoelectrophoresis method
15. Immunoassay: Demonstration of the use of ELISA

LIMNOLOGY AND FISHERY

2 credits

1. Analysis of water samples for various physico-chemical parameters – pH, free CO_2,dissolved oxygen, alkalinity, chloride, hardness, nitrates, phosphates, BOD, COD
2. Estimation of primary productivity by light and dark method.
3. Composition and biomass of phytoplankton, Collection, enumeration and biomass of Zooplankton
4. Identification of important fish parasites (external and internal).
5. Identification of fishing gears and fish byproducts.
6. Fieldwork : Visit to freshwater bodies, study of physico-chemical and biological status and make a report
7. Visit to fish processing centers and make a report.

TECHNIQUES IN WILDLIFE STUDY

2 Credits

1. Ecological census techniques: mark recapture; point and line transects, belt transect, plot-less & quadrate samplings. Pug mark census, camera trap census; pellet group count
2. Animal sign & marks analysis
3. Scat/ Dung analysis: (parasite identification)
4. Analysis of Abundance Data
5. Preparation of conservation statements applicable to the state of Assam-through review of literature.
6. Extraction of DNA from biological sample, PCR amplification
7. Habitat (habitat suitability index), measuring habitat fragmentation (index of habitat proximity)
8. Canopy (cover &closer), leaf litter and ground cover measurements
9. Acoustic analysis of birds /amphibians

ZGIP6007: INTRODUCTION TO JOURNALISM AND PHOTOGRAPHY

2 Credits

Objective: This course, which will be conducted as a short-term workshop, is designed to help the students with hands on experiences in journalism and photography.

ZGTM6010: TEACHING METHODOLOGY AND CLASS ROOM MANAGEMENT

2 Credits

Objective: This course, which will be conducted as a short-term workshop, is designed to help the students to prepare for efficient teaching with skills of class room management.

DEPARTMENT OF PHYSICS

BACHELOR OF SCIENCE- HONOURS IN PHYSICS

Type of Course/Category	Course Code	Course Name	Credits	Page
Semester I				
Core Paper1 (Theory)/DC	PSMY0101	Mathematical Physics-I	4-0-0	152
Core Paper2 (Theory)/DC	PSMC0102	Mechanics	4-0-0	153
Core Paper1 (Lab)/DC	PSMY6101	Mathematical Physics-I Laboratory	0-0-2	161
Core Paper2 (Lab)/DC	PSMA6102	Mechanics Laboratory	0-0-2	162
Ability Enhancement compulsory Course -1/IC	LSEC0018	English Communication	2-0-0	225
General Elective –I (Maths)/SE	MACD0105	Calculus and Differential Equations	4-2-0	222
	MALG0106	Algebra		223
Total Credits			**20**	
Semester II				
Core Paper3 (Theory)/DC	PSEM0103	Electricity and Magnetism	4-0-0	154
Core Paper4 (Theory)/DC	PSWO0104	Waves and Optics	4-0-0	156
Core Paper3 (Lab)/DC	PSEM6103	Electricity and Magnetism Laboratory	0-0-2	163
Core Paper4 (Lab)/DC	PSWO6104	Waves and Optics Laboratory	0-0-2	163
Ability Enhancement compulsory Course –2/IC	CHES0002	Environmental Studies	2-0-0	164
General Elective –II (Maths)/SE	MAAL0107	Algebra and Numerical Methods	4-2-0	224
	MADV0108	Differential Equations, Vector Calculus and Geometry		224
Total Credits			**20**	
Semester III				
Core Paper5 (Theory)/DC		Mathematical Physics–II	4-0-0	
Core Paper6 (Theory)/DC		Thermal Physics	4-0-0	
Core Paper7 (Theory)/DC		Digital Systems and Applications	4-0-0	
Core Paper5 (Lab)/DC		Mathematical Physics–II Laboratory	0-0-2	
Core Paper6 (Lab)/DC		Thermal Physics Laboratory	0-0-2	
Core Paper7 (Lab)/DC		Digital Systems and Applications Laboratory	0-0-2	
Skill Enhancement Course 1 (Elective)/IE/SE/DE		Computational Physics Skills	2-0-0	
		Electrical circuits and Network Skills		
General Elective –III (Chemistry)/SE	CHAH0105	Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons	4-0-0	198
	CHCF0106	Chemical Energetics, Equilibria & Functional Organic Chemistry-I	4-0-0	200
General Elective –III (Chemistry) Lab/SE	CHAH6105	Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons Lab	0-0-2	207
	CHCF6106	Chemical Energetics, Equilibria & Functional Organic Chemistry-I Lab	0-0-2	208
Total Credits			**26**	

Semester IV				
Core Paper8 (Theory)/DC		Mathematical Physics III	4-0-0	
Core Paper9 (Theory)/DC		Elements of Modern Physics	4-0-0	
Core Paper10 (Theory)/DC		Analog Systems and Applications	4-0-0	
Core Paper8 (Lab)/DC		Mathematical Physics III Laboratory	0-0-2	
Core Paper9 (Lab)/DC		Elements of Modern Physics Laboratory	0-0-2	
Core Paper10 (Lab)/DC		Analog Systems and Applications Laboratory	0-0-2	
Skill Enhancement Course 2 (Elective)/IE/SE/DE		Basic Instrumentation Skills	2-0-0	
		Radiation Safety		
		Applied Optics		
General Elective –IV (Chemistry)/SE	CHAB0101	Inorganic Chemistry - I: Atomic Structure and Chemical Bonding	4-0-0	
	CHSI0102	Physical Chemistry-I: States of Matter and Ionic Equilibrium		
General Elective –IV (Chemistry) – Lab/SE	CHAB6101	Inorganic Chemistry-I: Atomic Structure and Chemical Bonding Lab	0-0-2	
	CHIS6102	Physical Chemistry-I: States of Matter and Ionic Equilibrium Lab		
Total Credits			**26**	
Semester V				
Core Paper11 (Theory)/DC		Quantum Mechanics and Applications	4-0-0	
Core Paper12 (Theory)/DC		Solid State Physics	4-0-0	
Core Paper11 (Lab)/DC		Quantum Mechanics and Applications Laboratory	0-0-2	
Core Paper12 (Lab)/DC		Solid State Physics Laboratory	0-0-2	
Discipline Specific Elective I /DE		Embedded systems- Introduction to Microcontroller	4-0-0	
		Physics of Devices and Communication		
		Advanced Mathematical Physics-I		
		Embedded systems- Introduction to Microcontroller Laboratory	0-0-2	
		Physics of Devices and Communication Laboratory		
		Advanced Mathematical Physics-I Laboratory		
Discipline Specific Elective II/DE		Advanced Mathematical Physics-I	5-1-0	
		Classical Dynamics	5-1-0	
		Communication System	4-0-0	
		Communication System Lab	0-0-2	
Total Credits			**24**	
Semester VI				
Core Paper13 (Theory)/DC		Electromagnetic Theory	4-0-0	
Core Paper14 (Theory)/DC		Statistical Mechanics	4-0-0	
Core Paper13 (Lab)/DC		Electromagnetic Theory Laboratory	0-0-2	
Core Paper14 (Lab)/DC		Statistical Mechanics Laboratory	0-0-2	

Discipline Specific Elective III/DE		Nuclear and Particle Physics	5-1-0	
		Astronomy and Astrophysics	5-1-0	
		Nano Materials and Applications	4-0-0	
		Nano Materials and Applications Laboratory	0-0-2	
Discipline Specific Elective IV/DE		Digital Signal Processing	4-0-0	
		Digital Signal Processing Laboratory	0-0-2	
		Medical Physics	4-0-0	
		Medical Physics Laboratory	0-0-2	
		Plasma Physics	5-1-0	
		Dissertation	5-1-0	
Total Credits			**24**	
Total Programme Credits			**140**	

MASTER OF SCIENCE – PHYSICS

Semester	Category	Course Name	Course Code	Credits	Page
I	DC	Classical Mechanics	PSCM0020	4	131
	DC	Quantum Mechanics I	PSQM0021	4	132
	DC	Mathematical Physics	PSMP0022	4	133
	DC	Electronics I	PSEL0049	4	149
	DC	Physics Laboratory I	PSPL6009	4	157
Total Credits				**20**	
II	DC	Quantum Mechanics II	PSQM0024	4	133
	DC	Condensed Matter Physics	PSCP0025	4	134
	DC	Electrodynamics	PSED0026	4	135
	DC	Nanophysics I	PSNP0050	4	150
	DC	Physics Laboratory II	PSPL6003	4	
Total Credits				**20**	
III	DC	Atomic and Molecular Physics	PSAM0028	4	136
	DC	Nuclear Physics	PSNA0029	4	137
	DC	Computer Oriented Numerical Methods	PSCN0030	2	138
	DC	Computer Oriented Numerical Methods Laboratory	PSCN6010	4	158
	DC	Project Phase I	PSPP6011	4	159
		Specialisation: High Energy Physics			
	DE	Particle Physics	PSPA0035	4	140
		Specialisation: Astrophysics			
	DE	Plasma Physics I	PSPL0036	4	141
		Specialisation: Plasma Physics			
	DE	Plasma Physics I	PSPL0036	4	141

		Specialisation: Electronics			
	DE	Electronics II	PSEC0037	4	142
		Specialisation: Nanophysics			
	DE	Nanophysics II	PSNS0041	4	143
Total Credits				**22**	
IV	DC	Statistical Mechanics	PSSM0034	4	139
	DC	Project Phase II	PSPR6012	6	159
		Specialisation: High Energy Physics			
	DE	Gauge Theories	PSGT0043	4	144
	DE	General Theory of Relativity and Cosmology	PSGR0044	4	145
		Specialisation: Astrophysics			
	DE	Astrophysics	PSAR0045	4	146
	DE	General Theory of Relativity and Cosmology	PSGR0044	4	144
		Specialisation: Plasma Physics			
	DE	Plasma Physics II	PSPM0046	4	147
	DE	Plasma Physics Laboratory	PSPM6013	4	160
		Specialisation: Electronics			
	DE	Electronics III	PSER0047	4	147
	DE	Electronics Laboratory	PSEL6014	4	160
		Specialisation: Nanophysics			
	DE	Nanophysics III	PSNY0048	4	149
	DE	Nanophysics Laboratory	PSNY6015	4	160
Total Credits				**18**	
Total Programme Credits				**80**	

DEPARTMENT OF CHEMISTRY

BACHELOR OF SCIENCE- HONOURS IN CHEMISTRY

Type of Course/Category	Course Code	Course Name	Credits	Page
Semester I				
Core Paper1 (Theory)/DC	CHAB0101	Inorganic Chemistry-I: Atomic Structure & Chemical Bonding	4-0-0	192
Core Paper2 (Theory)/DC	CHSI0102	Physical Chemistry-I: States of matter & Ionic equilibrium	4-0-0	194
Core Paper1 (Lab)/DC	CHAB6101	Inorganic Chemistry-I: Atomic Structure & Chemical Bonding - Lab	0-0-2	204
Core Paper2 (Lab)/DC	CHIS6102	Physical Chemistry-I: States of matter & Ionic equilibrium - Lab	0-0-2	205
Ability Enhancement compulsory Course -1/IC	LSEC0018	English Communication	2-0-0	225
General Elective –I (Maths)/SE	MACD0105	Calculus and Differential Equations	4-2-0	222
	MALG0106	Algebra		223
Total Credits			**20**	
Semester II				
Core Paper3 (Theory)/DC	CHBH0103	Organic Chemistry-I: Basics & Hydrocarbons	4-0-0	195
Core Paper4 (Theory)/DC	CHCT0104	Physical Chemistry-II: Chemical Thermodynamics & its applications	4-0-0	196
Core Paper3 (Lab)/DC	CHBH6103	Organic Chemistry-I: Basics & Hydrocarbons	2	206
Core Paper4 (Lab)/DC	CHCT6104	Physical Chemistry-II: Chemical Thermodynamics & its applications - Lab	2	206
Ability Enhancement compulsory Course –2/IC	CHES0002	Environmental Studies	2	164
General Elective –II (Maths)/SE	MAAL0107	Algebra and Numerical Methods	4-2-0	224
	MADV0108	Differential Equations, Vector Calculus and Geometry		224
Total Credits			**20**	
Semester III				
Core Paper5 (Theory)		Inorganic Chemistry II: s- and p-Block Elements	4-0-0	
Core Paper6 (Theory)		Organic II: Oxygen Containing Functional Groups	4-0-0	
Core Paper7 (Theory)		Physical Chemistry III: Phase Equilibria & Chemical Kinetics	4-0-0	
Core Paper5 (Lab)		Inorganic Chemistry II: s- and p-Block Elements - Lab	2	
Core Paper6 (Lab)		Organic Chemistry II: Oxygen Containing Functional Groups - Lab	2	

Core Paper7 (Lab)		Physical Chemistry III: Phase Equilibria & Chemical Kinetics - Lab	2	
Skill Enhancement Course 1 (Elective)		Basic Analytical Chemistry	2	
		Chemo informatics		
		Chemistry of cosmetics and perfumes		
General Elective –III (Physics)			4-0-0	
General Elective –III (Physics) Lab			0-0-2	
Total Credits			**26**	
Semester IV				
Core Paper8 (Theory)		Inorganic Chemistry III: Coordination Chemistry	3-1-0	
Core Paper9 (Theory)		Organic Chemistry III: Heterocyclic Chemistry	3-1-0	
Core Paper10 (Theory)		Physical Chemistry IV: Electrochemistry	3-1-0	
Core Paper8 (Lab)		Inorganic Chemistry III: Coordination Chemistry - Lab	2	
Core Paper9 (Lab)		Organic Chemistry III: Heterocyclic Chemistry - Lab	2	
Core Paper10 (Lab)		Physica Chemistry l IV: Electrochemistry - Lab	2	
Skill Enhancement Course 2 (Elective)		Pesticide Chemistry		
		Fuel Chemistry		
		Intellectual Property Rights		
General Elective –IV (Physics)		Elements of Modern Physics	4-0-0	
		Analog Systems and Applications		
General Elective –IV (Physics) - Lab		Elements of Modern Physics Lab	0-0-2	
		Analog Systems and Applications Lab		
Total Credits			**26**	
Semester V				
Core Paper11 (Theory)		Organic Chemistry IV: Biomolecules	4-0-0	
Core Paper12 (Theory)		Physical Chemistry V: Quantum Chemistry & Spectroscopy	4-0-0	
Core Paper11 (Lab)		Organic Chemistry IV: Biomolecules - Lab	0-0-2	
Core Paper12 (Lab)		Physical Chemistry V: Quantum Chemistry & Spectroscopy - Lab	0-0-2	
Discipline Specific Elective I		Applications of computers in Chemistry	4-0-0	
		Analytical methods in Chemistry		
		Applications of computers in Chemistry Lab	0-0-2	
		Analytical methods in Chemistry Lab		
Discipline Specific Elective II		Novel Inorganic Solid	4-0-0	
		Polymer Chemistry		
		Novel Inorganic Solid Lab	0-0-2	
		Polymer Chemistry Lab		
Total Credits			**24**	

Semester VI				
Core Paper13 (Theory)		Inorganic Chemistry IV: Organometallic Chemistry	4-0-0	
Core Paper14 (Theory)		Organic Chemistry V: Spectroscopy	4-0-0	
Core Paper13 (Lab)		Inorganic Chemistry IV: Organometallic Chemistry - Lab	0-0-2	
Core Paper14 (Lab)		Organic Chemistry V: Spectroscopy - Lab	0-0-2	
Discipline Specific Elective III		Green Chemistry	4-0-0	
		Inorganic materials & Industrial Importance	4-0-0	
		Green Chemistry Lab	0-0-2	
		Inorganic materials & Industrial Importance Lab	0-0-2	
Discipline Specific Elective IV		Industrial Chemicals & Environment	4-0-0	
		Research methodology for Chemistry	4-0-0	
		Industrial Chemicals & Environment Lab	0-0-2	
		Research methodology for Chemistry Lab	0-0-2	
Total Credits			**24**	
Total Programme Credits			**140**	

MASTER OF SCIENCE – CHEMISTRY

Semester	Category	Course Name	Course Code	Credits	Page
I	DC	Fundamentals of Inorganic Chemistry	CHIC0003	4	165
	DC	Fundamentals of Organic Chemistry	CHOC0004	4	166
	DC	Fundamentals of Physical Chemistry	CHPC0005	4	167
	DC	Introduction to Quantum Chemistry and Group Theory	CHQG0006	3	168
	DC	Inorganic Qualitative and Quantitative Analyses and Preparations - Lab	CHIQ6002	3	202
Total Credits				**18**	
II	DC	Advanced Inorganic Chemistry I	CHIR0007	4	169
	DC	Advanced Organic Chemistry I	CHOG0008	4	171
	DC	Advanced Physical Chemistry I	CHAP0009	4	172
	DC	Fundamentals of Spectroscopy	CHFS0010	3	173
	DC	Introduction to Green and Environmental Chemistry	CHGC0011	3	174
	DC	Experimental Physical Chemistry - Lab	CHEQ6003	3	202
Total Credits				**21**	

III	DC	Advanced Inorganic Chemistry II	CHAI0012	4	175
	DC	Advanced Organic Chemistry II	CHAO0013	4	178
	DC	Advanced Physical Chemistry II	CHAP0014	4	179
	DC	Special Topics in Biochemistry	CHSP0015	3	180
	DC	Applied Spectroscopy	CHAS0016	2	181
	DC	Research Methodology for Chemistry	CHRM0017	3	182
	DC	Organic Qualitative Analysis and Synthesis Lab	CHQA6004	3	203
Total Credits				**23**	
IV	*One Elective Course (of the five offered) and two Specialisation Courses (either Physical or Organic Chemistry courses) to be selected*				
	Electives				
	DE	Materials Chemistry	CHMC0018	3	183
	DE	Computational Chemistry	CHCC0019		184
	DE	Food Chemistry	CHFC0020		185
	DE	Industrial Chemistry	CHIC0021		186
	DE	Medicinal Chemistry	CHMD0022		187
	Specialisation I - Physical Chemistry				
	DE	Recent Advances in Catalysis	CHRC0023	3	188
	DE	Biophysical Chemistry	CHBC0024		189
	Specialisation II - Organic Chemistry				
	DE	Heterocyclic Chemistry	CHHC0025	3	190
	DE	Natural Products Chemistry	CHNP0026		191
	DC	Research Project	CHRP6005	9	203
Total Credits				**18**	
Total Programme Credits				**80**	

DEPARTMENT OF MATHEMATICS

BACHELOR OF SCIENCE- HONOURS IN MATHEMATICS

Type of Course/Category	Course Code	Course Name	Credits (L-T-P)	Page
Semester I				
Core Paper1/DC	MACS0101	Calculus	4-2-0	219
Core Paper2/DC	MAAG0102	Algebra	4-2-0	220
Ability Enhancement compulsory Course -1/IC	LSEC0018	English Communication	2-0-0	225
General Elective –I//IE/ SE/DE (Physics)	PSMY0101	Mathematical Physics-I	3-1-0	152
	PSMC0102	Mechanics		153
	PSMY6101	Mathematical Physics-I Laboratory	0-0-2	161
	PSMA6102	Mechanics Laboratory		162
Total Credits			**20**	
Semester II				
Core Paper3/DC	MAER0103	Elementary Real Analysis	4-2-0	221
Core Paper4/DC	MADQ0104	Differential Equations	4-2-0	221
Ability Enhancement compulsory Course -1/IC	CHES0002	Environmental Studies	2-0-0	164
General Elective -II/IE/ SE/DE (Physics)	PSEM0103	Electricity and Magnetism	3-1-0	154
	PSWO0104	Waves and Optics		156
	PSEM6103	Electricity and Magnetism Laboratory	0-0-2	163
	PSWO6104	Waves and Optics Laboratory		163
Total Credits			**20**	
Semester III				
Core Paper5/DC		Theory of Real Functions	4-2-0	
Core Paper6/DC		Group Theory I	4-2-0	
Core Paper7/DC		Multivariable Calculus	4-2-0	
Skill Enhancement Course 1/IE		Programming in C/Logic and sets	2-0-0	
General Elective -III/IE/ SE/DE(Chemistry)	CHAH0105	Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons	3-1-0	198
	CHCF0106	Chemical Energetics, Equilibria & Functional Organic Chemistry-I		200
	CHAH6105	Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons Lab	0-0-2	207
	CHCF6106	Chemical Energetics, Equilibria & Functional Organic Chemistry-I Lab		208
Total Credits			26	
Semester IV				
Core Paper8/DC		Partial Differential Equations	4-2-0	
Core Paper9/DC		Numerical Methods	4-2-0	
Core Paper10/DC		Mechanics	4-2-0	
Skill Enhancement Course 2/IE		Graph Theory /Computer Graphics	2-0-0	

General Elective –IV/IE/ SE/DE (Chemistry)	CHAB0101	Inorganic Chemistry - I: Atomic Structure and Chemical Bonding	3-1-0	
	CHSI0102	Physical Chemistry-I: States of Matter and Ionic Equilibrium		
	CHAB6101	Inorganic Chemistry-I: Atomic Structure and Chemical Bonding Lab	0-0-2	
	CHIS6102	Physical Chemistry-I: States of Matter and Ionic Equilibrium Lab		
Total Credits			**26**	
Semester V				
Core Paper11/DC		Metric Space and Complex Analysis	4-2-0	
Core Paper12/DC		Ring Theory and Linear Algebra I	4-2-0	
Discipline Specific Elective I/DE		Number Theory	4-2-0	
		Group Theory II		
Discipline Specific Elective II/DC		Probability and Statistics	4-2-0	
		Linear Programming		
Total Credits			**24**	
Semester VI				
Core Paper13/DC		Riemann Integration and Series of Functions	4-2-0	
Core Paper14/DC		Ring Theory and Linear Algebra II	4-2-0	
Discipline Specific Elective III/DE		Industrial Mathematics	4-2-0	
		Mathematical Finance		
Discipline Specific Elective IV/DE		Bio-Mathematics	4-2-0	
		Differential Geometry		
Total Credits			**24**	
Total Programme Credits			**140**	

MASTER OF SCIENCE – MATHEMATICS

Semester	Category	Course Name	Course Code	Credits	Page
I	DC	Real Analysis	MARA0014	4	210
	DC	Linear Algebra	MALA0015	4	211
	DC	Abstract Algebra	MAAB0016	4	212
	DC	Differential Equations	MADE0017	4	212
	DC	Mathematical Methods I	MAMT0018	4	213
Total Credits				**20**	
II	DC	Topology and Functional Analysis	MATF0019	4	214
	DC	Complex Analysis	MACA0020	4	215
	DC	Measure Theory and Probability Theory	MAMP0021	4	216
	DC	Mathematical Methods II	MAMD0022	4	217
	DC	Classical Mechanics	MACL0023	4	218

Total Credits				**20**	
		Research Methodology for Mathematical sciences and Mathematical tools		4	
		Research Seminar		2	
	Electives				
		Dynamical System		4	
		Fuzzy Mathematics			
		Algebra and Number Theory			
		Discrete Mathematics			
	Specialisations				
		Theoretical Mathematics			
		Field Theory		4	
		Number Theory			
		Mathematical Logic			
III		**Applicable Mathematics**			
		Advanced Partial Differential equations		4	
		Numerics for Partial differential equations			
		Fluid Dynamics			
		Computational Mathematics			
		Programming In C++		4	
		Algorithms and Complexity Theory			
		Computational Techniques			
		Interdisciplinary Mathematics			
		Mathematics in Applied Physics		4	
		Mathematics in Finance			
		Biomathematics			
Total Credits				**18**	
		Research Project		6	
	Specialisations				
		Theoretical Mathematics			
		Advanced Analysis		4	
		Multivariable Calculus			
		Advanced Graph Theory			
		Applicable Mathematics			
		Continuum Mechanics		4	
		Riemannian Geometry and Tensor Calculus			
		Finite Element Methods			
		Computational Mathematics			

		Theory of Computation		4	
		Computational Fluid Dynamics			
		Coding Theory and Cryptography			
		Interdisciplinary Mathematics			
		Mathematical Modelling		4	
		Statistical Methods			
		Mathematical Economics and Game Theory			
Total Credits				**18**	
Total Credits				**80**	

SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

DEPARTMENT OF PHYSICS

PSCM0020: CLASSICAL MECHANICS

(4 credits-60 hours)

Objective: *The objective of the course in classical mechanics or Newtonian mechanics is to make the students familiar to the set of physical laws describing the motion of bodies under the action of a system of forces. Classical mechanics describes the motion of macroscopic objects, from projectiles to parts of machinery, as well as astronomical objects, such as spacecraft, planets, stars, and galaxies. Besides this, many specializations within the subject deal with solids, liquids and gases and other specific sub-topics. Emphasis shall be laid upon the solution of numerical problems.*

Module I (12 hours)

Hamilton's variational principle; derivation of Lagrange's equations; velocity dependent forces; dissipation. Charged particles in an electromagnetic field. Space time symmetries and conservation Laws. Varial theorem. Space transformation.

Module II (12 hours)

Two-body problem; central forces; classification of orbits; differential equation for orbits. Kepler problem; scattering in laboratory and centre of mass frames, transformation of cross sections, energies. Rutherford scattering. Kinematics of decay of particles (into two particles).

Module III (12 hours)

Rigid body motion: fixed and moving coordinate systems; orthogonal transformations. Euler angles; angular momentum; rotational kinetic energy. Principal axes transformation; Euler equations; force free motion of a rigid body symmetric top.

Module IV (12 hours)

Legendre transformation; Hamiltonian equations; Significance of the Hamilton function. Cyclic coordinates and conservation theorems. Poisson Brackets – Poisson Bracket of Angular momentum with coordinates. Canonical Transformation Theory. Contact transformation; integral invariants.

Module V (12 hours)

Special theory of relativity: Lorentz transformations. Four dimensional formulation. Force momentum and energy in relativistic mechanics. Properties of space-time in relativity. Two body decay of a particle.

COURSE/LEARNING OUTCOMES

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

CO1: Have a clear understanding of Hamilton's and Lagrange's equations and use them for solving problems in physics
CO2: Deal with two body problems
CO3: Understand rigid body problems
CO4: Get an idea of modern physics from Einstein's special theory of relativity

Suggested Readings

1. H. Goldstein, C. Poole and J. Safko, Classical Mechanics, Pearson Education Asia.
2. N. C. Rana and P. S. Joag, Classical Mechanics, Tata McGraw Hills.
3. K. C. Gupta, Classical Mechanics of Particles and Rigid bodies, Wiley Eastern.
4. D. T. Greenwood, Principles of Dynamics, Prentice Hall.

PSQM0021: QUANTUM MECHANICS I

(4 credits-60 hours)

Objective: *The objective of this course in quantum mechanics is to make the students competent to understand the science of microscopic objects. It will help them to perceive the scientific principles that explain the behaviour of matter and its interactions with energy on the scale of atomic and subatomic particles. Emphasis shall be laid upon the solution of numerical problems.*

Module I (10 hours)

Introduction and revision: inadequacy of classical mechanics; basic postulates of quantum mechanics; ensemble and Copenhagen interpretation. Schrödinger equation; continuity equation; Ehrenfest theorem; admissible wave functions; stationary states. One dimensional problems; potential well and barriers; harmonic oscillator.

Module II (10 hours)

Equation of motion: Schrodinger, Heisenberg and Dirac representations; equation of motion in the respective representations. Application to linear harmonic oscillator.

Module III (10 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 3-D box in Cartesian and polar coordinates, Coulomb problem in spherical and parabolic coordinates - regular and irregular solutions.

Module IV (11 hours)

Spinors and their transformation properties. Pauli spin matrices. Identical particles and statistics. Addition of angular momenta. Clebsch-Gorden coefficients. Winger-Eckart Theorem.

Module V (8 hours)

Symmetry in quantum mechanics. Reflections, time reversal, space inversion, particle exchange. Displacement in space and time, space translation and rotational symmetry. Selection rule and conservation laws.

Module VI (11 hours)

Variational methods for bound states; lower and upper limits in simple cases. WKB approximation; connection with classical limits, validity of WKB approximation. Connection formulae; application to bound states, tunneling in one dimension. Application to radial Schrodinger equation.

COURSE/LEARNING OUTCOMES

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

CO1: Understand different interpretation of quantum mechanics
CO2: Apply the concepts of quantum mechanics to different problems in physics
CO3: Appreciate the idea of symmetry in quantum mechanics
CO4: Get an idea of how to encounter spin
CO5: Comprehend variational method and WKB approximation

Suggested Readings

1. E. Merzbacher, Quantum Mechanics, John Wiley.
2. G. Ahruldhas, Quantum Mechanics, Prentice Hall.
3. L. I. Schiff, Quantum Mechanics, McGraw Hill.
4. V. K. Thankappan, Quantum Mechanics, New Age Int. Pub.
5. P. T. Mathews and Venkatesan, Quantum Mechanics, Tata McGraw Hill.
6. K. D. Krori, Principles of Non-Relativistics and Relativistic Quantum Mechanics, PHI.

PSMP0022: MATHEMATICAL PHYSICS

(4 credits–60 hours)

Objective: *The objective of the course in mathematical physics is to make students familiar with mathematical methods for application to problems in physics and the formulation of physical theories in different disciplines of physics. Emphasis shall be laid upon the solution of numerical problems.*

Module I (15 hours)

Functions of complex variable: Analytic functions; derivatives of an analytic function. Series of analytic functions: Taylor series, Laurent series; zeros and isolated singular points of analytic functions; the calculus of residues: theorem of residues; evaluation of integrals; Jordan's lemma; Principal value of an integral; multi-valued functions; Riemann surfaces; evaluation of an integral involving a multi-valued function; analytic continuation; dispersion relations.

Module II (13 hours)

Vectors and matrices: linear vector spaces; linear operators; matrices; coordinate transformations; eigen-value problems; diagonalisation of matrices; spaces of infinite dimensionality.

Module III (16 hours)

Special functions: associated Legendre differential equation and functions; generating functions; spherical harmonics; orthonormality. Bessel's equation; Bessel function; Spherical Bessel function, Neumann and Hankel functions; expansion of a plane wave into partial waves. Laguerre and associated Laguerre differential equation and functions; generating functions; recurrence relations; orthonormality. Hypergeometric and confluent hypergeometric functions.

Module IV (8 hours)

Integral transforms: general properties of Laplace transforms; inverse Laplace transform; application of Laplace transforms; convolution theorem; solution of differential equations using Laplace transform.

Module V (8 hours)

Probability and statistics: fundamental laws of probability; binomial, Poisson and Gaussian distributions; general properties of probability distributions.

COURSE/LEARNING OUTCOMES

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

CO1: Deal with function of complex variables
CO2: Have an advance knowledge of vectors and matrices
CO3: Learn about different differential equations and their solutions
CO4: Understand the concept of Laplace transform
CO5: Apply the concept of probability and statistics

Suggested Readings

1. G. Arfken, Mathematical Methods for Physicists, Academic Press.
2. J. Mathews and R. L. Walker, Mathematical Methods of Physics, The Benjamin-Cumminngs Publishing Company.
3. P. Dennery and A. Krzywicki, Mathematics for Physicists, Harper and Row.

PSQM0024: QUANTUM MECHANICS II

(4 credits – 60 hours)

Objective: *The objective of the course in quantum mechanics II is to provide a deeper knowledge in the subject. This will be extremely helpful for students intending to go for higher studies in theoretical physics, e.g., theoretical nuclear physics, theoretical condensed matter physics, theoretical high energy physics, etc. Emphasis will be laid on solution of numerical problems.*

Module I (11 hours)

Stationary perturbation theory: Non Degenerate case; first and second order of energy and wave functions, perturbation of one dimensional harmonic oscillator by potentials of the bx^2 and cx^3. Degenerate case; first order Stark effect in hydrogen; Zeeman effect without electron spin.

Module II (9 hours)

Time dependent perturbation theory; first order transition probabilities; constant perturbation. Transition to continuum; Harmonic perturbation; Fermi's golden rule; Sudden and adiabatic approximations.

Module III (10 hours)

Many Electron Atoms: Indistinguishable particles; Pauli's Principle; inclusion of spin; spin functions for two and three electrons; the Helium atom; central field approximation, Thomas-Fermi model of the atom; Hartree equation, Hartree- Fock equation.

Module IV (13 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 (12 hours)

Relative wave equations: Klein-Gordon equation. Difficulty with probability interpretation. Dirac equation; four component solutions for free particle; negative energy solutions – particles and antiparticles. Covariant form of Dirac equation; 4-current density. Properties of γ-matrices. Dirac equation in the presence of electromagnetic field; non-relativistic reduction; spin and magnetic moment.

Module VI (5 hours)

Path integral approach to quantum mechanics: Feynman's Path Integral method, equivalence of Feynman and Schrödinger equations, Dirac-Feynman Action Principle.

COURSE/LEARNING OUTCOMES

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

CO1: Learn about perturbation theory
CO2: Comprehend advanced topics like Hartree- Fock equation
CO3: Apply the concept of quantum mechanics to the problems of scattering
CO4: Understand relativistic quantum mechanics
CO5: Have an idea of path integral approach to quantum mechanics

Suggested Readings

1. E. Merzbacher, Quantum Mechanics, John Wiley.
2. G. Aruldhas, Quantum Mechanics, Prentice Hall.
3. L. I. Schiff, Quantum Mechanics, McGraw Hill.
4. V. K. Thankappan, Quantum Mechanics, New Age Int. Pub.
5. P. T. Mathews and Venkatesan, Quantum Mechanics, Tata McGraw Hill.
6. K. D. Krori, Principles of Non-Relativistics and Relativistic Quantum Mechanics, PHI.

PSCP0025: CONDENSED MATTER PHYSICS

(4 credits – 60 hours)

Objective: *The objective of the course in condensed matter physics is to equip the students to deal with the physical properties of condensed phases of matter. Condensed matter physicists seek to understand the behaviour of these phases by using physical laws. Knowledge of condensed matter physics is required to pursue studies on specialised topic like electronics, nano-sciences, etc. Emphasis shall be laid upon the solution of numerical problems.*

Module I (11 hours)

Crystal structure. Diffraction of waves by crystal. Scattered wave amplitudes, Brillion zones. Fourier analysis of the basis. Crystal binding and elastic constants.

Module II (9 hours)

Phonons: quantisation of lattice vibrations, dispersion relation for acoustic and optical phonon, energy gap, density of states, heat capacity, thermal conductivity and thermal expansion.

Module III (8 hours)

Free electron Fermi gas: Fermi energy, density of states, heat capacity, thermal conductivity and electrical conductivity. Wiedemann-Franz law.

Module IV (10 hours)

Nearly free electron gas: Schrodinger equation of an electron in a periodic potential, Bloch theorem, energy gaps at the zone boundary, approximation solution near a zone boundary, energy bands and their role in properties of metals, insulators and semiconductors. Holes on energy bands. Hall effect.

Module V (12 hours)

Shape of fermi surfaces in the free electron and nearly free electron models. Tight binding approximations. Electron orbits, hole orbits and open orbits. Quantization of orbits in a magnetic field. De Hass-van Alphen effect and its role in experimental determination of Fermi surfaces.

Module VI (10 hours)

Plasmons, polaritons and polarons: dielectric functions of the electron gas, plasmons, electrostatic screening, Mott metal-insulator transition, polaritons, polarons. Peierls instability of linear metals.

COURSE/LEARNING OUTCOMES

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

CO1: Learn about crystal structure in details
CO2: Understand physics of phonons
CO3: Conceptualise free electron and nearly free electron models
CO4: Know about advanced topics like plasmons, polaritons, polarons, etc.

Suggested readings

1. C. Kittel, Introduction to Solid State Physics, John Wiley and Sons, Inc.
2. C. Kittel, Quantum Theory of Solids, John Wiley and Sons, Inc.
3. J. Callaway, Quantum Theory of the Solid State, Academic Press, New York.
4. H. Ibach and H. Luth, Solid State Physics, Narosa Pub. House.

PSED0026: ELECTRODYNAMICS

(4 credits – 60 hours)

Objective: *The objective of the course in electrodynamics (the science of charge and of the forces and fields associated with charge) to get an advanced understanding of electric charges, currents and magnetism. The curriculum provides an excellent description of electrodynamic phenomena which is also required in other disciplines of Physics. Emphasis shall be laid upon the solution of numerical problems.*

Module I (7 hours)

Maxwell's equations: review of Maxwell's equations; boundary conditions at interface between different media; Poisson's and Laplace's equations

Module II (8 hours)

Magnetostatics: introduction; Biot and Savart Law; Ampere's Law; vector potential; vector potential and magnetic induction for a circular current loop.

Module III (8 hours)

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 IV (15 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 V (13 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 VI (9 hours)

Special theory of relativity: matrix representation of Lorentz transformation; infinitesimal generators; Thomas precession; invariance of electric charge; covariance of electrodynamics; transformation of electromagnetic fields

COURSE/LEARNING OUTCOMES

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

CO1: Know electromagnetism in details
CO2: Understand physics of electromagnetic waves
CO3: Explain radiation emitted from accelerating charge
CO4: Have an understanding of advanced topics like retarded potential, waveguides, etc.

Suggested Readings

1. J. D. Jackson, Classical Electrodynamics, John Wiley and Sons.
2. S. P. Puri, Classical Electrodynamics, Tata McGraw Hill Publishing Company Ltd..
3. S. L. Gupta, V. Kumar and S. P. Singh, Electrodynamics, Pragati Prakashan.
4. D. J. Griffiths, Introduction to Electrodynamics, Prentice Hall of India.

PSAM0028: ATOMIC AND MOLECULAR PHYSICS

(4 credits – 60 hours)

Objective: *The course intends to give a widespread knowledge of the physics of atoms and molecules and the spectroscopy to the students. The knowledge of this subject is indispensable to understand matter-matter and light-matter interactions. Its applications are wide. Typically, the theory and applications of emission, absorption, scattering of electromagnetic radiation (light) from excited atoms and molecules, analysis of spectroscopy, generation of lasers and masers in general, fall into these categories. Emphasis shall be laid upon the solution of numerical problems.*

Module I (15 hours)

Introduction of atomic spectrum; fine structure and hyperfine structure of energy levels. Angular momentum and magnetic moment. Doublet structure energy levels and single electron atom. Term symbols and fine structure of energy levels of two electron atoms using L-S coupling and j-j coupling schemes; identification of ground state. Interaction of nuclear and electronic magnetic moments and hyperfine structure with examples.

Module II (10 hours)

Interaction of radiation with atoms; spontaneous and stimulated emission; absorption; transition. Einstein's A and B coefficients. Working principles of He-Ne laser.

Module III (12 hours)

Theories of molecular bond formation; van der Waals bonding, ionic bonding, valance bond and molecular orbital models of covalent bonding. Homonuclear diatomic molecules and the term symbols and their ground states.

Module IV (8 hours)

Vibronic states of molecules and nature of vibronic spectra; harmonic and anharmonic vibrations and potential constants; rotational spectrum and moment of inertia of molecules.

Module V (15 hours)

Symmetry of molecules; symmetry elements and points group; proper and improper rotations and their matrix representation. Introduction to character table of point group; reducible and irreducible representation for simple molecules such as H_2O, NH_3, etc.Normal coordinates and normal modes of vibrations. Infrared absorption and Raman scattering form molecular vibrations and rotations, and selection rules.

COURSE/LEARNING OUTCOMES

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

CO1: Explain atomic and molecular spectroscopy in details
CO2: Understand interaction of radiation with atoms
CO3: Appreciate bond formation
CO4: Know about symmetry of molecules

Suggested Readings

1. H. E. White, Introduction to Atomic Spectra, Mc-Graw Hill.
2. Martin Karplus and Richard N. Porter; Atoms and Molecules, W. A. Benjamin.
3. G. Hertzberg, Spectra of Diatomic Molecules, Van Vostrand.
4. O. Svelto, Principles of Lasers, Plenum Press.

PSNA0029: NUCLEAR PHYSICS

(4 credits–60 hours)

Objective: *This course is mainly the study of the physics of elementary particles of the nature. The main of objective of the course is to give the students a comprehensive knowledge of the constituents and interactions of atomic nuclei which will find its applicability in nuclear power generation. Further, many fields, including magnetic resonance imaging, are the direct applications of the knowledge of nuclear physics. Elementary knowledge of particle physics and detectors is also provided in the course. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Conventional Units to be Adopted in Nuclear Physics (8 hours)

Properties of nucleons and pion, elements of nucleon and pion structure in terms of quark model. Basic properties of nuclei-charge, mass, binding energy, size, spin and statistics, parity, magnetic dipole moment, electric dipole moment with illustration examples.

Module II: Nuclear Two Body Problem and Nuclear Force (12 hours)

Properties of deuteron bound state and low energy n-p scattering in terms of scattering length and effective range, spin dependence, charge independence of nucleon force. Non-central part of nucleon force, isospin concept, exchange forces, magnetic moment and electric quadrupole moment of deuteron. Yukawa theory of nuclear force.

Module III: Nuclear Models (8 hours)

Magnetic number and single shell model using oscillator well, and l.s interaction, Schmidt lines, spin parity assignment, rotational model, vibrational model with examples.

Module IV: Nuclear Reactions (15 hours)

Conservation laws: Kinematics governing nuclear reactions, Q-value, cross section of nuclear reactions, neutron reactions at low energies, Coulomb effects in nuclear reactions, neutron reactions at low energies, Coulomb effects in nuclear reactions, neutron reactions, compound nucleus hypothesis, Breit Wigner one level formula for resonance reactions. Elements of direct reactions (qualitative), energies of fission and fusion, neutron induced fission, chain reaction, hydrogen burning in the sun.

Module V: Nuclear Decay (8 hours)

Fermi theory of decay, selection rules, non-conservative of parity. Gamma decay, electric and magnetic multipole transitions, selection rules, examples of beta and gamma decay.

Module VI: Interactions of Charged Particles and Gamma Radiation with Matter (9 hours)

Linear attenuation coefficients, Compton scattering, photoelectric absorption, and pair production. Stopping power and range energy relations.Semiconductor detectors for charged particles and scintillation detectors.

COURSE/LEARNING OUTCOMES

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

CO1: Explain nucleus and nuclear forces in details
CO2: Expound nuclear models
CO3: Understand nuclear reaction and origin of nuclear energy
CO4: Describe interactions of charged particles and gamma radiation with matter

Suggested Readings

1. S. N. Ghosal, Atomic and Nuclear Physics, Vol-II, S. Chand and company Ltd.
2. S. M. Wong, Introductory Nuclear Physics, Prentice Hall Inc.
3. B. L. Cohen, Concepts of Nuclear Physics, Tata McGraw Hill Publishing Company Ltd.
4. R. D. Evans, The Atomic Nucleus, Tata McGraw Hill Publishing Company Ltd.
5. S. S. Kapoor and V. S. Ramamurthy, Nuclear Radiation Detectors, Wiley Eastern Ltd.
6. W. N. Cottingham and D. A. Greenwood, An introduction to nuclear Physics, Cambridge University Press.

PSCN0030: COMPUTER ORIENTED NUMERICAL METHODS

(2 Credits – 30 hours)

***Objective**: Most problems in physics benefit from numerical methods, and many of them resist analytical solution altogether. The objective of this course is to learn the principles of numerical techniques and apply them to problems of Physics. Knowledge of computer programming is given with FORTRAN language. Emphasis will be laid on the solution of numerical problems.*

Module I: Numerical Analysis (10 hours)

a) Introduction to numerical methods: approximate and significant figures, absolute and relative errors, general formula for errors, application of the error formula to the fundamental operations of arithmetic and to logarithms. The error of a sum, the error of a difference, the error of a product and number of correct digits, the error of quotients and number of correct digits, the relative error of a power, the relative error of a root, successive approximation, Taylor's series, principle of least square, law of error of residuals.
b) Matrices and linear equations: addition, subtraction and multiplication of matrices, inversion of matrices, Jacobi transformation of a symmetric motion, determinant of a matrix, transpose of a matrix, solution of equations by matrix method, Gauss-Jordan elimination Method, eigenvalues and eigenvectors.
c) The solution of numerical, algebraic and transcendental equations: Equations in one unknown: Finding approximate values of the roots, finding roots by repeated application of location theorem, bisection method, the Newton-Raphson method; their convergence and geometric significance.

Module II: Solutions of Ordinary Differential Equations (9 hours)

a) Equations of the first order: Euler's method and its modification, the Runge-Kutta method, checks, errors and accuracy.
b) Equations of the second order and systems of simultaneous equations: Milne's-predictor and corrector methods, boundary value problems, conditions for convergence.
c) Minimization or maximization of functions: golden selection search in 1-D, parabolic interpolation and Brent's method in 1-D, 1-D search with 1 derivatives, Downhill simplex method in multidimensions, Direction set (Powell's method in Multidimensions)

Module III (5 hours)

a) Numerical Integration: Classical formulae for equispaced abscissae: Simpson's rule, trapezoidal rule, Gaussian quadrature formula.
b) Computation of factorials, computation of square roots, recurrence relations.

Module IV: Review of FORTRAN Language I (6 hours)

a) Introduction to computer programming, Machine and High Level Languages.
b) Constants, variables, expressions, operations, statements and built in functions.
c) Conditional and looping structures, arrays, subprograms and subroutines.
d) File operations.

COURSE/LEARNING OUTCOMES

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

CO1: Explain the concept of numerical methods
CO2: Apply numerical techniques to solve different problems in Physics
CO3: Understand high level language through Fortran

Suggested Readings

1. Seymour Lipschutz and Arthur Poe, Theory and problems of Programming with FORTRAN, McGraw-Hill.
2. C. Xavier and R. Rajaraman, FORTRAN 77 and numerical methods, New Age International Publishers
3. V. Rajaraman, FORTRAN 77 Programming, Prentice Hall of India.
4. V. Rajaraman, Numerical Analysis, Wiley Eastern.
5. W. H. Press, S. S. Tenkulsky, W. T. Wettering and B. P. Flannery, Numerical Recepies in FORTRAN, Cambridge University Press.
6. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India.
7. M. K. Jain et al., Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
8. F. B. Hildebrand, Introduction to Numerical Analysis, McGraw-Hill Book Company Inc.

PSSM0034: STATISTICAL MECHANICS

(4 credits – 60 hours)

***Objective**: The course intends to describe physical phenomena in terms of a statistical treatment of the behaviour of large numbers of atoms or molecules, especially as regards the distribution of energy among them. Emphasis will be laid on the solution of numerical problems.*

Module I: Essentials (17 hours)

a) Probability theory: the random walk problem, binomial, Poisson and Gaussian distributions, central limit theorem.
b) Classical equilibrium statistical mechanics: concept of equilibrium; Ergodic hypothesis; microcanonical, canonical and grand canonical Ensembles; partition functions and their relation to thermodynamics.
c) Classical nonequilibrium statistical mechanics: approach to equilibrium, Liouville's theorem, Boltzmann's H theorem

Module II: Quantum Statistics (15 hours)

a) Quantum statistical mechanics: Schrödinger and Heisenberg Picture; pure and mixed states, the density matrix, quantum mechanical Liouville's theorem; the fundamental postulates.
b) Quantum statistics: quantum gases of independent particles; partition functions; Bose Einstein's and Fermi Dirac's distributions; electrons in metals; black body radiation; Bose Einstein's Condensation

Module III: Phase Transitions (15 hours)

a) Phenomenology: first and second order phase transitions; elementary ideas of critical phenomena; universality of critical exponents; scaling of thermodynamic functions.

b) 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 (13 hours)

a) Non equilibrium phenomena: transport theory; Boltzmann equation; Maxwell-Boltzmann distribution.
b) Irreversible processes: fluctuations; Brownian motion; Langevin's equation; Wiener Khintchine relations, Nyquist theorem, Fluctuation-Dissipation theorem; Fokker Planck equation.

COURSE/LEARNING OUTCOMES

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

CO1: Appreciate the connection between statistical mechanics and thermodynamics
CO2: Conceptualise quantum statistical mechanics
CO3: Understand the physics of phase transition

Suggested Readings

1. Federick Reif, Fundamental of Statistical and Thermal Physics, McGraw Hill, Singapore.
2. Shang-Keng Ma, Statistical Mechanics, World Scientific, Singapore.
3. Richard E. Wilde, and Surjit Singh, Statistical Mechanics: Fundamental and Modern Applications, Wiley-Interscience, John Wiley and Sons Inc., New York.
4. Leo P Kadanoff, Statistical Physics: Statics, Dynamics and Renormalisation, World Scientific, River Edge, New Jersey.
5. K. Huang, Statistical Mechanics, John Wiley and Sons Inc., New York.
6. D. J. Amit and J. Verbin, Statistical Physics, World Scientific, Singapore.
7. L D Landau, E.M. Lifshitz, Statistical Physics, Butterworth-Heinemann.
8. R. K. Pathria, Statistical Mechanics, Academic Press.

PSPA0035: PARTICLE PHYSICS

(4 credits – 60 hours)

***Objective**: The objective of the course in particle physics is to make the students learn about the most primitive, primordial, unchanging and indestructible forms of matter and the rules by which they combine to compose all the things of the physical world. Thus, it is the branch of physics that studies the nature of the particles that constitute matter (particles with mass) and radiation (massless particles). In principle, all physics (and practical applications developed there from) can be derived from the study of fundamental particles. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Relativistic Kinematics (5 hours)

Lorentz transformation, four vectors, relativistic collisions and their application.

Module II: Group theory and Tensors (10 hours)

Introduction to group theory, representation theory, Lie group and Lie Algebra, direct product group, Young tableau. Basics of tensors, covariant and contravariant tensors, covariant derivative.

Module III: Introduction to Elementary Particles and their Interactions (13 hours)

Classification of elementary particles, interactions and Feynman diagram, particle exchange, leptons and weak interactions, quarks and hadrons, quark model, space time symmetry, C, P, CP conservation, time reversal, conservation law in different interactions.

Module IV: Quantum Field Theory (17 hours)

Concept of field, canonical quantisation of classical system, second quantisation, Fock space quantisation of scalar, Dirac and electromagnetic fields, Noether theorem - conservation of energy, momentum and charge of the field, the vacuum in field theory; C, P, T transformation of scalar and E. M. fields.

Module V: Quantum Electrodynamics (15 hours)

Covariant perturbation theory, Wick's theorem, Feynman rule, Compton scattering, Mott's scattering, basics of renormalisation.

COURSE/LEARNING OUTCOMES

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

CO1: Use mathematical skills like group theory, tensors, kinematics, etc.
CO2: Explain quantum field theory
CO3: Explicate quantum electrodynamics

Suggested Readings

1. D. Griffiths, Introduction of Elementary Particle, Wiley-vch Verlag Gmbh.
2. F. Halzen and A. D. Martin, Quarks and Leptons : An Introductory Course in Modern Particle Physics, Wiley India.
3. L. H. Ryder, Quantum Field Theory, Cambridge University Press.
4. D. H. Perkins, Introduction to High Energy Physics, Addison-Wesley.
5. Brian R. Martin and Graham Shaw, Particle Physics, Wiley.
6. Michael E. Peskin and Daniel V. Schroeder, An introduction to Quantum Field Theory, Westview Press Inc.

PSPL0036: PLASMA PHYSICS I

(4 Credit – 60 hours)

Objective: *The objective of this course is to give a basic understanding of plasma physics. The course dealing with the knowledge of the fourth state of matter is not only important for taking up advanced studies in plasma physics but also in other branches of physics. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Introduction to Plasma Physics (12 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; classification of plasma; occurrence of plasma in nature

Module II: Single Particle Motion (12 hours)

Uniform electric and magnetic fields; non-uniform magnetic field: grad-B drift, curvature drift, magnetic mirrors, the loss cone; non-uniform electric field; time-varying electric field; time-varying magnetic field; adiabatic invariants.

Module III: Plasma Diagnostics (14 hours)

Langmuir probe: I-V characteristics, measurement of plasma potential, floating potential, electron temperature and electron density; double probe; optical emission spectroscopy: radiation from plasma, plasma models, temperature measurement by Boltzmann plot and line intensity ratio method, line broadening in plasma, Doppler broadening and stark broadening, applications; absorption spectroscopy; calorimetric methods; laser and microwave interferometer.

Module IV: Laboratory and Space Plasma (10 hours)

Glow discharge plasma; production and stabilization of thermal plasma, principle of DC, AC and high frequency discharges, RF and ECR plasmas, dielectric barrier discharge plasma, laser produced plasmas; sun and solar winds, Van Allen belts, the ionosphere, formation of, accretion disks, dusty plasmas.

Module V: Applications of Plasma (12 hours)

Thermal plasma: nanoparticle synthesis, plasma spraying, waste management; plasma sputtering; plasma nitriding; plasma processing; plasma enhanced vapour deposition; plasma assisted surface engineering; biomedical applications; the magneto-hydrodynamic generator; plasma propulsion.

COURSE/LEARNING OUTCOMES

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

CO1: Explain theoretical concepts of plasma physics
CO2: Describe plasma diagnostic
CO3: Understand laboratory plasma
CO4: Explicate plasma in the universe
CO4: Know various applications of plasma

Suggested Readings

1. F. F. Chen, Introduction to Plasma Physics and Controlled Fusion, Plenum.
2. J. A. Bittencourt, Fundamentals of plasma physics, Springer.
3. I. H. Hutchinson, Principles of plasma diagnostics, Cambridge University Press.

PSEC0037: ELECTRONICS II

(4 credits–60 hours)

Objective: *The course provides basic analog electronic circuit design techniques and analytical skills using diodes, op-amps, FETs, and BJTs. The student will develop ability to apply basic engineering sciences to the design, analyses and operation of electronics devices and circuits and problem solving skills of electronic circuits. Emphasis will be laid on the solution of numerical problems.*

Module I (20 hours)

a) Bipolar junction transistor: BJT biasing: fixed bias, emitter bias, voltage divider bias, D.C. collector feedback bias; DC and AC load line, Q- point, stability considerations. BJT modeling: two port representation of BJT with z, y, h-parameters; re and hybrid models of C-E, C-B, C-C configuration. Hybrid-pi model of C-E amplifier in voltage divider bias configuration, frequency response in low, mid and high frequency conditions, respective voltage gain, current gain, input and output impedances.

b) Field effect transistors: FET biasing: self bias, fixed bias, voltage divider bias, stabilization of Q-point. Small signal AC equivalent circuit of FET as amplifier, hybrid parameters. JFET amplifiers: CS, CD amplifiers; enhancement mode MOSFET amplifier, depletion mode MOSFET amplifiers; Introduction to CMOS, characteristics, structure of MOSFET, CMOS.

Module II (25 hours)

a) Thyristors: four layer diode, SCR, Photo SCR, gate controlled switch, silicon controlled switch, Diac, Triac, UJT;

b) Op-Amp - ideal operational amplifiers: Input impedance. DC offset parameters, frequency parameters, gain-bandwidth, CMRR, SVRR, SR. Op-Amp applications in constant gain multiplier, voltage summing, log - antilog amplifier, subtractor, comparator – zero crossing detector, Schmitt trigger, integrator, differentiator and controlled sources. instrumentation amplifier. Active filters: low, high and bandpass filters; ADC and DAC.

c) 555 timer: block diagram, monostable operation, astable operation, bistable operation, voltage controlled oscillator, ramp generator.

Module III (15 hours)

a) Feedback configurations: voltage series, voltage shunt, current series, current shunt.

b) Oscillators: introduction and classification, general form of LC oscillator, e.g. Hartley oscillator, Colpitts oscillator, RC phase shift oscillator, Wein Bridge oscillator, crystal oscillator.

c) Regulated power supply: voltage feedback regulation, current limiting characteristics, power supply characteristics, 3 terminal IC regulators, current boosters, switching regulators.

d) Characteristic of instruments: static characteristics, span, accuracy and precision, linearity, tolerance, error, repeatability, sensitivity, calibration, hysteresis, input impedance, resolution, bias and drift.

COURSE/LEARNING OUTCOMES

At the end of this course students will be able to:
CO1: Know about different types of transistors
CO2: Describe devices like thyristors, operational amplifiers, oscillators, etc.

Suggested Readings

1. Robert L. Boylestad and Lowis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education, New Delhi.
2. Jacob Millman, Christos C Halkias and Satyabrata Jit, Millman's Electronic Devices and Circuits, 2nd Edition, Tata McGraw Hill, New Delhi.

3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, Tata McGraw-Hill.
4. Streetman and Banerjee, Solid State Electronic Devices, Prentice Hall, New Delhi.
5. David A. Bell, Electronic Devices and Circuits, Prentice Hall of India, New Delhi.
6. Jacob Millman, Christos C Halkias, Integrated Electronics, McGraw Hill Int. students Edition.
7. Ramakant A. Gayakwad, Op-amps and Linear Integrated Circuits, PHI.

PSPT0038: PHYSICS FOR TECHNOLOGISTS

(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Note: For details see pages 556-557 of *Regulations and Syllabus, School of Technology*

PSEP0039: ENGINEERING PHYSICS: MECHANICS

(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Note: For details see pages 557-559 of *Regulations and Syllabus, School of Technology*

PSET0040: ENGINEERING PHYSICS: ELECTROMAGNETIC THEORY

(4 Credits – 60 Hours) (L-T-P: 3-1-0)

Note: For details see pages 559-560 of *Regulations and Syllabus, School of Technology*

PSNS0041: NANOPHYSICS II

(4 credits – 60 hours)

Objectives: *The aim of the course is to introduce the students to the world of nanomaterials and their synthesis and characterization process. Students will learn various kinds of nanomaterials and their potential use in the field of science and technology. The course will give scope of knowing about various methods of formation of nanostructures, surfaces and interfaces of nanostructures, natural nanomaterials and toxicology of nanomaterials. The common synthesis methods are also given emphasis as well as the characterization tools such as SEM, TEM, etc. will be discussed in detail. This course will help the students to take up practical work on nanotechnology. Emphasis will be laid on the solution of numerical problems.*

Module I (15 Hours)

Surfaces and interfaces in nanostructures; ceramic interfaces, superhydrophobic surfaces, grain boundaries in nanocrystalline materials, defects associated with interfaces; thermodynamics of nanomaterials, natural nanomaterials; toxicology of nanomaterials.

Module II (25 Hours)

Chemical routes for synthesis of nanomaterials: electrochemical synthesis, photochemical synthesis; synthesis in supercritical fluids. hydrothermal growth of nanoparticles and different nano structures. Ostwald ripening; zeta potential; fabrication of nanomaterials by physical methods: -inert gas condensation, arc discharge, plasma arc technique, RF plasma, MW plasma, ion sputtering, laser ablation, laser pyrolysis, ball milling, molecular beam epitaxy, physical and chemical vapour deposition method; electrodeposition. Core-shell quantum dots.

Module III (20 Hours)

Nanostructures: zero-, one-, two- and three- dimensional structure, size control of metal nanoparticles; properties: optical, electronic, magnetic properties; surface plasmon resonance, structural characterization X-ray diffraction, small angle x-ray scattering, optical microscope and their description, scanning electron microscopy (SEM), scanning probe microscopy (SPM), TEM and EDAX, SAED analysis, scanning tunneling microscopy (STM), atomic force microscopy (AFM). Spectroscopic characterizations: basic concepts of spectroscopy, operational principle and application for analysis of nanomaterials, UV-VIS-IR spectrophotometers, principle of operation and application for band gap measurement (Tauc plot).

COURSE/LEARNING OUTCOMES

At the end of this course students will be able to:
CO1: Explain different properties of nanomaterials
CO2: Know about different methods for the synthesis of nanomaterials
CO3: Appreciate the technology associated with characterisation of nanomaterials

Suggested Readings

1. G. L. Hornyak, J. Dutta and H. F. Tibbals, A. Rao Introduction to nanoscience, CRC Press.
2. T. Pradeep, Nano: The Essentials, McGraw Hill.
3. D. Maclurcan and N. Radywyl (Eds.) Nanotechnology and Global Sustainability, CRC Press.
4. G. W. Hanson Fundamentals of Nanoelectronics, Pearson.
5. R. Vajtai (Ed.), Springer Handbook of Nanomaterials, Springer.
6. B. Bhushan (Ed.), Springer Handbook of Nanotechnology, Springer.

PSGT0043: GAUGE THEORIES

(4 credits – 60 hours)

Objective: *The objective of this advanced course in physics is to use the knowledge of the earlier course in particle physics to understand the recent developments in high energy physics. The course mainly deals with Gauge theories which are fundamental for the understand of standard model and physics beyond standard model. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Introduction (10 hours)

Introduction to Gauge symmetries – global and local gauge transformations, abelian group U(1) (QED), Yang-Mills (Non-Abelian) groups – SU(2) (isospin), SU(3)C (QCD).

Module II: Spontaneous Symmetry Breaking (SSB) (12 hours)

Ground state with spontaneous symmetry breaking, some examples; global symmetry breaking and Goldstone bosons, proof of Goldstone theorem, local symmetry breaking and Higgs mechanism for giving masses to vector bosons, examples U(1), SU(2).

Module III: Standard Model (SM) (12 hours)

Standard model of electroweak unification, gauge bosons W^+, W^-, Z^0, charged weak current and neutral current, Higgs particle, experimental status.

Module IV: Beyond Standard Model (12 hours)

a) Introduction to Grand Unified Theories (GUTs) – SU(5) and SO(10), and proton decay predictions;
b) Minimal Supersymmetric Standard Model (MSSM) and its extension, its predictions;
c) Introduction to String Theories and Planck scale physics.

Module V: Neutrino Physics (14 hours)

Solar and atmospheric neutrino puzzles, theory of neutrino oscillations in vacuum and medium (MSW mechanism), neutrino masses and leptonic mixings, survey of various neutrino oscillation experiments, seesaw mechanism for small neutrino masses.

COURSE/LEARNING OUTCOMES

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

CO1: Explain gauge theories
CO2: Familiarise with physics of spontaneous symmetry breaking and Higg's mechanism
CO3: Expound standard model and physics beyond standard model
CO4: Understand neutrino physics

Suggested Readings

1. Ta-Pei Cheng and Ling-Fong Li, Gauge Theory of elementary particle physics, Oxford University Press.
2. Francis Halzen and Alan D. Martin, Quarks and leptons: An introductory Course in Modern Particle Physics, John Wiley & Sons.

3. David Griffiths, Introduction to Elementary Particles, John Wiley & Sons.
4. Barton Zwiebach, A First Course in String theory, Cambridge Univ. Press.
5. Graham G Ross, Grand Unified theories, Oxford University Press.
6. R. N. Mohapatra and P. B. Pal, Massive Neutrinos in Physics and Astrophysics, World Scientific, Singapore.

PSGR0044: GENERAL THEORY OF RELATIVITY AND COSMOLOGY

(4 credits – 60 hours)

Objective: *The course aims to provide the theoretical foundations of the general theory of relativity, and bring the student to the frontier of elementary cosmology, which would then enable the pursuit of future research in this area. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Theoretical Background of Relativity (15 hours)

a) Foundations of relativity: postulates of relativity, GR units, space-time intervals, proper time; special Lorentz transformations in Minkowski space-time; four-vectors.
b) Review of tensor calculus in Euclidean space; tensor calculus in Riemannian space: generalized N-dimensional spaces, covariant and contravariant tensors; Riemann-Christoffel curvature tensor, Christoffel symbols, Einstein's tensor, geodesics; metric tensor, covariant differentiation, Bianchi Identities, Ricci tensor.

Module II: General Theory of Relativity (30 hours)

a) Motion of a free particle in a gravitational field, equations of electrodynamics in the presence of a gravitational field; gravitational field equations – action for gravitational field, energy-momentum tensor, extremum principle, Einstein field equations, energy-momentum pseudotensor.
b) Field of gravitating bodies – Schwarzschild solution, Birkhoff's theorem, motion in a centrally symmetric gravitational field, precession of perihelion of Mercury, deflection of light, gravitational lensing; black holes – Schwarzschild black holes, Kruskal space, black hole thermodynamics; gravitational waves – plane waves, weak field approximation, gravitational radiation, transverse-traceless gauge.

Module III: Fundamentals of Cosmology (15 hours)

a) Cosmological principle, cosmological time; spaces of constant curvature, Hubble's constant, Hubble's Law, red-shift of galaxies, big bang, age and density of universe; cosmological constant – Einstein space, de Sitter space, anti-de Sitter space; Robertson-Walker metric, introduction to Friedmann-Robertson-Walker (FRW) universe.
b) The observed universe and its dynamics, Friedmann-Lemaitre-Robertson-Walker (FLRW) metric, Friedmann equation and its solutions; composition of the universe – origin of matter, big bang nucleosynthesis, abundance of light elements, dark matter and dark energy, cosmological constant as dark energy, origin of matter-antimatter asymmetry, baryogenesis.

COURSE/LEARNING OUTCOMES

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

CO1: Use mathematics necessary for understanding general theory of relativity
CO2: Explain general theory of relativity
CO3: Understand cosmology

Suggested Readings

1. D. F. Lawden, Introduction to Tensor Calculus, Relativity and Cosmology, Dover Publications.
2. B. Shutz, A First Course in General Relativity, Cambridge University Press.
3. B. Ryden, Introduction to Cosmology, Cambridge University Press.
4. C. W. Misner, K. S. Thorne and J. A. Wheeler, Gravitation, Princeton University Press.
5. L. D. Landau and E. M. Lifshitz, The Classical Theory of Fields, Butterworth-Heinmann.
6. A. Einstein, The Meaning of Relativity, Oxford & IBH.
7. P. A. M. Dirac, General Theory of Relativity, Prentice-Hall of India.
8. R. P. Feynman, F. B. Moronigo and W. G. Wagner, Feynman Lectures on Gravitation, Addison-Wesley.

9. S. Weinberg, Gravitation and Cosmology, Wiley.
10. J. V. Narliker, Introduction to Cosmology, Cambridge University Press.
11. S. Dodelson, Modern Cosmology, Academic Press.
12. V. Mukhanov, Physical Foundations of Cosmology, Cambridge University Press.

PSAR0045: ASTROPHYSICS

(4 credits - 60 hours)

Objective: *The objective of this course is to enable the students to apply basic physical principles from a wide spectrum of topics in physics to astronomical situations and formulate astrophysical problems and thereby, apply analytical and numerical methods towards its solution. This course seeks to develop competence in areas of astrophysical theory and experiment. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Fundamentals of Astronomy (12 hours)

Astronomy fundamentals: celestial coordinate systems, telescope and its operational principles and mounting, atmospheric extinctions, magnitude systems. Radiation mechanism, flux density and luminosity, specific intensity, (emission/absorption coefficients, source functions), basics of radiative transfer and radiative processes.

Module II: Stellar Parameters (18 hours)

Magnitudes, motions and distances of stars: absolute stellar magnitude and distance modulus, bolometric and radiometric magnitudes, colour-index and luminosities of stars, stellar positions and motions, velocity dispersion, statistical and moving cluster parallax, extinction, stellar temperature, effective temperature, brightness temperature, color temperature, kinetic temperature, excitation temperature, ionization temperature, spectral classification of stars, utility of stellar spectrum, stellar atmospheres. Binaries, variable stars, clusters, open and globular clusters, compact objects, shape, size and contents of our galaxy, normal and active galaxies.

Module III: Interstellar Medium (10 hours)

Neutral and ionized gas, gaseous nebulae, HII regions, supernova remnants, photo-dissociation regions, different phases of the interstellar medium: cold neutral medium, warm neutral and ionized medium, hot medium, diffuse clouds, dense clouds.

Module IV: Stellar Physics (20 hours)

Introduction to stars: HR diagram, a discussion on the variety of stellar phenomena, stellar structure, stellar opacities, stellar polytropes, energy generation in stars: calculation of thermonuclear reaction rates for non-resonant and beta-decay reactions, various reaction chains: pp-I, II, III, CNO, He-burning, C-burning, Si-burning, stellar degeneracy and equations of state: stellar degeneracy, Chandrasekhar mass, EoS of matter at near-nuclear and nuclear densities, final stages of stellar evolution: supernovae and neutron stars.

COURSE/LEARNING OUTCOMES

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

CO1: Explain fundamental ideas of astrophysics
CO2: Conceptualise the physics of interstellar medium
CO3: Describe in detail different stages of a star

Suggested Readings

1. P. Jain, An Introduction to Astronomy and Astrophysics, CRC Press.
2. B. Basu, An Introduction to Astrophysics, PHI Learning Pvt. Ltd.
3. K. D. Abhayankar, Astrophysics: Stars and Galaxies, Universities Press.
4. Erika Böhm-Vitense, Introduction to Stellar Astrophysics, Cambridge University Press.
5. J. B. Hartle, Gravity: Introduction to Einstein's General Relativity, Pearson Education.
6. P. J. E. Peebles, Physical Cosmology, Princeton University Press.

PSPM0046: PLASMA PHYSICS II

(4 Credit – 60 hours)

Objective: *This advanced course in plasma physics provides a detailed description of physics of plasma. It further discusses various applications of plasma physics. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Plasma as fluids and Plasma Kinetic Theory (20 hours)

Introduction to fluid model; equation of motion; continuity equation; fluids drifts perpendicular to B; fluids drifts parallel to B; the plasma approximation; Introduction to kinetic theory; equations of kinetic theory; derivation of the fluid equation; plasma oscillation; Landua damping: meaning and physical derivation.

Module II: Waves in Plasma (10 hours)

representation of waves; group velocity; plasma oscillation; electron plasma waves; sound waves; ion waves; validity of plasma approximation; ion acoustic waves; Alfven waves.

Module III: Diffusion and Resistivity (10 hours)

Diffusion and mobility; plasma decay by diffusion; steady state solution; recombination; diffusion across a magnetic field; the single MHD diffusion equation; solutions of the diffusion equation.

Module IV: Instability and Non-linear Effects (10 hours)

Hydro-magnetic equilibrium; diffusion of magnetic field into a plasma; classifications of instability; two stream instability; plasma sheaths; ion acoustic shock waves; the ponderomotive force; parametric instabilities; plasma echoes; non-linear Landua Damping.

Module V: Controlled Fusion (10 hours)

Controlled fusion and problems; magnetic confinement: toruses, mirrors, pinches; laser fusion; plasma heating; fusion technology; tokamaks; ITER.

COURSE/LEARNING OUTCOMES

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

CO1: Explain plasma physics in details
CO2: Describe diffusion and resistivity in plasma
CO3: Appreciate a few advanced topics in plasma physics like waves in plasma, non-linear effects, controlled fusion, etc.

Suggested Readings

1. F. F. Chen, Introduction to Plasma Physics and Controlled Fusion, Plenum.
2. J. A. Bittencourt, Fundamentals of plasma physics, Springer.

PSER0047: ELECTRONICS III

(4 credits - 60 hours)

Objectives: *The objectives of this course are to introduce the concept of digital systems and give students the concept of digital electronics. The course also provides an in-depth understanding of the operation of microprocessors and basics of microcontrollers, assembly language programming and microprocessor interfacing techniques. The students will be able to design and implement microprocessor-based systems in both hardware and software and can apply this knowledge to more advanced structures. Emphasis shall be laid upon the solution of numerical problems.*

Module I (15 hours)

a) Number system: representation of signed integers, 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:, rules (postulates and basic theorems) of Boolean algebra, dual and complement of a Boolean expression, sum of products and product of sums forms.

canonical forms. Conversion between different forms, conversion between Boolean expression and truth table;, implementing logic expressions with logic gates (logic circuits).

c) Digital logic families: designing of basic logic gates with diode and transistor; elementary idea of DTL, TTL, RTL, ECL, I^2L logic family and characteristics.

Module II (15 hours)

a) Combinational circuit: Simplification of Boolean expressions using algebraic method, Karnaugh map method and Quine-McCluskey method, Don't Care conditions. Multiplexer, demultiplexer, encoder, decoder, half-adder, hull-adder, magnitude comparator, parity checkers: basic concepts, design of parity checkers, parity generation, code converters, binary –to- gray and gray-to-binary Code converter; concept of magnitude comparator.

b) Sequential circuit: simple R-S flip-flop or Latch, clocked R-S Flip-flop, D flip-flop. J-K flip-flop, T flip-flop, master-slave flip-flop, J-K Master-Slave flip-flop. Asynchronous preset and clear, edge triggering and level triggering. Registers: shift registers, parallel/serial in, parallel/serial out. Buffer counter design: different types of counters like asynchronous and synchronous, up and down, ring, Johnson etc. counter design using state diagram, state table and state equation.

c) Semiconductor memory: classification of memories, main memory and secondary memory, sequential access memory, static and dynamic memory, volatile and nonvolatile memory, concept of ROM, PROM, EPROM, RAM, DRAM, SDRAM, PSRAM, memory decoding.

Module III (30 hours)

a) History and evolution of microprocessor; introduction to CPU: components of CPU, block diagram, buses-data, control and address; ALU, control unit; main memory and secondary memory; I/O devices; memory addressing-memory mapped I/O and I/O mapped I/O; address decoding; memory and I/O interfacing;

b) Introduction to 8085; block diagram, registers, use of register pairs, PSW, accumulator; addressing modes; Instruction set of 8085: data transfer, arithmetic, logic, branch and machine control instructions; instruction cycle: fetch, decode and execute. Delay and counter; stack and its application; interrupt and its application; assembly level language programming of 8085.

c) Interfacing: Memory interfacing; I/O interfacing; interfacing small devices like keyboard, 7-segment display, relay, event counter etc.; idea of PPIs like 8251, 8255, 8257 and 8279 (block diagram and function only); serial communication standard (RS-232C).

d) Example of 16-bit processors (introduction to 8086); microcontroller (block diagram and application of 8051).

COURSE/LEARNING OUTCOMES

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

CO1: Expound advanced topics of digital electronics
CO2: Describe microprocessor, microcontroller and assembly language
CO3: Apply this knowledge in advanced structures

Suggested Readings

1. M. Mano, Digital Logic and computer Design, PHI.
2. R. P. Jain, Modern Digital Electronics, TMGH.
3. Jain and Floyd, Digital Fundamentals, Pearson Education.
4. Malvino and Leach, Digital Electronics, Pearson Education.
5. Malvino, Digital Computer Electronics, TMGH.
6. Morris Mano, Digital Design, Principles and Practices, Pearson Education.
7. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, Vikash Publishing House Pvt. Ltd.
8. P. H. Talukdar, Digital Techniques, N. L. Publications.
9. Anand Kumar, Fundamentals of Digital Circuits, PHI.
10. Gaonkar, Introduction to Microprocessors, New age Publication.
11. B. Ram, Fundamentals of Microprocessor, Dhanpat Rai.
12. N. K. Srinath, 8085 Microprocessor Programming and Interfacing, PHI.
13. Slater, Microprocessor Based Design, PHI.
14. Gilmore, Microprocessors, McGraw Hill Publication.

PSNY0048: NANOPHYSICS III

(4 credits – 60 hours)

Objective: *This course will help students to understand the physics behind the different properties of nanoparticles and nanostructures. The quantum effect of nanostructures and their conduction and electronic behaviours are included in the course. Understanding of this course will build a strong base for pursuing theoretical and practical research in the field of nanoscience and nanotechnology. Emphasis shall be laid upon the solution of numerical problems.*

Module I (15 Hours)

Absorption and scattering of EM waves from nanoparticles based on bulk properties. Electronic phenomena in nanostructures: electronic structures and effective mass theory for bulk Si , Ge, GaAs; excitons. Boltzmann electron transport in bulk. Electron energy states in quantum confined systems, semiconductor heterojunctions.

Module II (20 Hours)

a) X-ray photoelectron spectroscopy (XPS): fundamentals: photoelectric effect, binding energy and chemical shift, ultraviolet photoelectron spectroscopy (UPS): information.
b) Extracted: band structure, occupied band states of clean solid surfaces as well as bonding orbital states of adsorbed molecules; fundamentals of Fourier transform infrared radiation (FTIR) and Raman spectroscopy.
c) 2-DEG systems, quantum wires, quantum dots. Transmission in nanostructures: tunneling in planar barrier, resonant tunnel diodes. Ballistic transport, Landauer formula, electron transport in quantum wave-guide structures.

Module III (15 Hours)

Single electron phenomena: electronic states in quantum dots, without and with magnetic fields, single electron tunneling and Coulomb blockade, single electron tunneling, elastic, inelastic, spin polarized tunneling, surface density of states for different dimensions, role of tip geometry, lithography and atomic manipulation; single electron transistor. Spin-orbit interaction and spin effects.

Module IV (10 Hours)

Nanomechanics: introduction to NEMS, CNT oscillation, nanoscale electrometer, bolometer. nanophotonics; science of Graphene.

COURSE/LEARNING OUTCOMES

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

CO1: Explain properties of nanomaterials in details
CO2: Understand quantum effects on nanostructures
CO3: Describe nanomechanics
CO4: Engage in higher studies and research in nanophysics

Suggested Readings

1. D. K. Ferry and S. M. Goodnick, Transport in Nano-Structures, Cambridge University Press, 1997.
2. S. Datta, Electronic Transport in Mesoscopic Systems, Cambridge University Press.

PSEL0049: ELECTRONICS I

(4 credits-60 hours)

Objective: *This course is intended to give a glimpse of the electronics world. The course is designed with a view of giving, students the knowledge of passive components, different electronic devices, digital electronics and introduction to communication so that it provides a motivation towards practical applications. Emphasis shall be laid upon the solution of numerical problems.*

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, 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, 7 segment display, photo diode, photo transistor, opto coupler, Schottky diode, varactor diode, tunnel diode
d) Transistor - BJT: construction, npn, pnp, operation and configuration, V-I characteristics, introduction to FET- JFET, MOSFET.
e) OP-AMP: block diagram, ideal op-amp equivalent circuit, ideal characteristics, transfer curve, open loop and closed loop configurations, op-amp as an inverting amplifier, non-inverting amplifier, adder, subtractor.

Module III: Digital Circuits (12 hours)

Number systems, Boolean algebra, De-Morgan's law, AND, OR, NOT, Universal gates, combinational logic circuits.

Module IV: Communication (13 hours)

a) Introduction: communication process, source of information, communication channels, modulation types and need, block diagram of communication systems, AM, FM, PAM, PWM, PPM.
b) Introduction to digital modulation: ASK, PSK, FSK.

COURSE/LEARNING OUTCOMES

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

CO1: Know about passive components and DC networks.
CO2: Students will be able to understand electronic devices and circuits.
CO3: Describe electronic communication.
CO4: Explain digital circuits.

Suggested Readings

1. S. Salivahanan, Electronic Devices and Circuits, McGraw Hill Publications.
2. R. D. Singh and S. D. Sapre, Communication System, TMGH.
3. D. Roy Choudhury, Networks and Systems, New Age International.
4. David A. Bell, Electronic Devices and Circuits, Oxford University Press.
5. Moris Mano, Digital electronics, EEE.

PSNP0050: NANOPHYSICS I

(4 credits – 60 hours)

Objective: *The objective of this course is to get students introduced to the new branch of science called Nanoscience and the technology associated with it. Nanotechnology can be considered as an interdisciplinary converging technology that brings together aspects of hitherto unrelated fields of studies. This course will deal with basic concepts laying more stress on the science rather than the technology. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Introduction (20 hours)

Distinction between nanoscience and nanotechnology, requisite definitions; historical perspectives; nanomaterials: overview, definitions, and examples; structurally confined materials: nanoparticles, islands, nanowires, thin films; metal nanoparticles: fundamentals and applications; self-assembled

monolayers, semiconductor quantum dots: fundamentals and applications; ceramic nanomaterials: fundamentals and applications; carbon nanomaterials(Fullerenes and carbon nanotubes and nanofibers): fundamentals and applications; magnetic nanoparticles: fundamentals and applications; bionanomaterials, computational nanomaterials, composite nanomaterials and applications.

Module II: Characterization tools (10 hours)

Electron microscopy, atomic force microscopes, X-ray spectroscopy, surface enhanced Raman spectroscopy, lithography, computer modelling and simulation.

Module III: General Fabrication Methods (12 hours)

Background; top down fabrication: mechanical methods, thermal methods, high energy methods, chemical fabrication methods, lithographic methods; bottom up fabrication: gaseous phase methods, liquid phase methods, template synthesis

Module IV: Basic Properties of Nanomaterials (10 hours)

Importance of surface: natural, inorganic and the nano perspectives; particle shape and surface; surface: geometric surface to volume ratio, specific surface area; atomic structure: crystal systems.

Module V: Natural and Bio-nanoscience (8 hours)

Natural nanomaterials: inorganic natural nanomaterials, nanomaterials from the animal kingdom, nanomaterials derived from cell walls, nanomaterials in insects; Introduction to biomolecular nanoscience: history, biomolecular nanoscience, nano perspective

COURSE/LEARNING OUTCOMES

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

CO1: Explain nanophysics
CO2: Describe properties of nanomaterials and natural nanomaterials
CO3: Know about characterization and fabrications of nanomaterials

Suggested Readings

1. G. L. Hornyak, J. Dutta and H. F. Tibbals, A. Rao Introduction to nanoscience, CRC Press.
2. T. Pradeep, Nano: The Essentials, McGraw Hill.
3. D. Maclurcan and N. Radywyl (Eds.), Nanotechnology and Global Sustainability, CRC Press.
4. E. Lichtfouse, J. Shwarzbauer and D. Robert, Environmental Chemistry for a Sustainable World, Vol.2, Springer Verlag.
5. G. L. Hornyak, J. Dutta, H. F. Tibbals and A.Rao Introduction to nanotechnology, CRC Press.
6. G. W. Hanson Fundamentals of Nanoelectronics, Pearson.

ENGINEERING PHYSICS: WAVES AND OPTICS

[L: 3; T: 1; P: 0 (3 credits – 45 hours)]/[L: 3; T: 1; P: 0 (4 credits – 60 hours)]

Objective: *The objective of the course is to impart the knowledge of oscillations and waves, geometrical and wave optics and fundamentals of laser structure, working and applications to the students of mechanical engineering. Emphasis shall be laid upon the solution of numerical problems.*

Module I: SHM and Oscillators (8 hours)/(11 hours)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator.

Module II: 1D Waves and Dispersion (8 hours)/(11 hours)

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves. Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.

Module III: Light propagation and geometrical optics (12 hours)/(15 hours)

Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescent wave. Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method.

Module IV: Wave Optics (8 hours)/(11 hours)

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

Module V: Laser Fundamentals (9 hours)/(12 hours)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO 2), solid-state lasers(ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Suggested Readings

1. Ian G. Main, Oscillations and waves in physics.
2. H. J. Pain, The physics of vibrations and waves.
3. E. Hecht, Optics.
4. A. Ghatak, Optics.
5. W. T. Silfvast, Laser Fundamentals.
6. O. Svelto, Principles of Lasers.

PSMY0101: MATHEMATICAL PHYSICS-I

(4 credits–60 hours)

Objective: *The objective of the course is to make students familiar with basic mathematical methods for application to problems in physics and the formulation of physical theories in different disciplines of physics. Emphasis shall be laid upon the solution of numerical problems. The importance of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.*

Module I: Calculus (21 hours)

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only).

First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.

Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

Module II: Vector Calculus (27 hours)

Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities.

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs).

Module III: Orthogonal Curvilinear Coordinates (6 hours)

Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.

Module IV: Introduction to Probability (4 hours)

Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance.

Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing.

Module IV: Dirac Delta Function and its Properties (2 hours)

Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

COURSE/LEARNING OUTCOMES

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

CO1: Describe advanced topics of calculus and vectors
CO2: Understand the concept of curvilinear coordinates
CO3: Explain probability
CO4: Describe Dirac delta function

Suggested Readings

1. G. B. Arfken, H. J. Weber and F. E. Harris, Mathematical Methods for Physicists, Elsevier.
2. E. A. Coddington, An introduction to ordinary differential equations, PHI learning.
3. George F. Simmons, Differential Equations, McGraw Hill.
4. James Nearing, Mathematical Tools for Physics, Dover Publications.
5. D. A. McQuarrie, Mathematical methods for Scientists and Engineers, Viva Book.
6. D. G. Zill and W. S. Wright, Advanced Engineering Mathematics, Jones and Bartlett Learning.
7. Goswami, Mathematical Physics, Cengage Learning.
8. S. Pal and S. C. Bhunia, Engineering Mathematics, Oxford University Press.
9. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India.
10. K. F. Riley and M. P. Hobson Essential Mathematical Methods, Cambridge Univ. Press.

PSMC0102: MECHANICS

(4 credits–60 hours)

Objective: *The objective of the course is to give a clear understanding of the motion of and forces on objects. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Fundamentals of Dynamics (6 hours)

Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance. Momentum of variable- mass system: motion of rocket. Motion of a projectile in Uniform gravitational field Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse.

Module II: Work and Energy (4 hours)

Work and Kinetic Energy Theorem. Conservative and non- conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Module III: Collisions (3 hours)

Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.

Module IV: Rotational Dynamics (12 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.

Module V: Elasticity (3 hours)

Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Module VI: Fluid Motion (2 hours)

Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube.

Module VII: Gravitation and Central Force Motion (9 hours)

Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere.

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

Module VIII: Oscillations (7 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.

Module IX: Non-Inertial Systems (4 hours)

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 X: Special Theory of Relativity (10 hours)

Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum.

COURSE/LEARNING OUTCOMES

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

CO1: Explain mechanics starting from basic concepts
CO2: Comprehend different properties of matter
CO3: Expound modern physics from Einstein's special theory of relativity

Suggested Readings

1. D. Kleppner, R. J. Kolenkow, An introduction to mechanics, McGraw-Hill.
2. C. Kittel, W. Knight, et.al. Mechanics, Berkeley Physics, vol.1, 2007, Tata McGraw-Hill.
3. Resnick, Halliday and Walker, Physics, Wiley.
4. G. R. Fowles and G. L. Cassiday, Analytical Mechanics, Cengage Learning.
5. R. P. Feynman, R. B. Leighton and M. Sands, Feynman Lectures, Vol. I, 2008, Pearson Education.
6. R. Resnick, Introduction to Special Relativity, John Wiley and Sons.
7. Ronald Lane Reese, University Physics, Thomson Brooks/Cole.
8. D. S. Mathur, Mechanics, S. Chand and Company Limited.
9. F. W. Sears, M.W. Zemansky and H. D. Young, University Physics, Addison Wesley.
10. J. W. Jewett and R. A. Serway, Physics for scientists and Engineers with Modern Phys., Cengage Learning.
11. M. R. Spiegel, Theoretical Mechanics, Tata McGraw Hill.

PSEM0103: ELECTRICITY AND MAGNETISM

(4 credits–60 hours)

Objective: *The course intends to provide a clear understanding and important concepts of the interactions between electric charges and currents using an extension of the classical Newtonian model. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Electric Field and Electric Potential (22 hours)

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry.

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere.

Module II: Dielectric Properties of Matter (8 hours)

Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between **E, P** and **D**. Gauss' Law in dielectrics.

Module III: Magnetic Field (9 hours)

Magnetic force between current elements and definition of Magnetic FieldB. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.

Module IV: Magnetic Properties of Matter (4 hours)

Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis.

Module V: Electromagnetic Induction (6 hours)

Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current.

Module VI: Electrical Circuits (4 hours)

AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.

Module VI: Network theorems (4 hours)

Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.

Module VII: Ballistic Galvanometer (3 hours)

Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR.

COURSE/LEARNING OUTCOMES

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

CO1: Explain electromagnetism
CO2: Understand physics of electricity

Suggested Readings

1. S. Mahajan and Choudhury, Electricity, Magnetism & Electromagnetic Theory, Tata McGraw.
2. Edward M. Purcell, Electricity and Magnetism, McGraw-Hill Education.
3. D. J. Griffiths, Introduction to Electrodynamics, Benjamin Cummings.
4. R. P. Feynman, R. B. Leighton and M. Sands, Feynman Lectures, Pearson Education.
5. M. N. O. Sadiku, Elements of Electromagnetics, Oxford University Press.
6. J. H. Fewkes & J. Yarwood, Electricity and Magnetism, Vol. I, Oxford Univ. Press.

PSWO0104: WAVES AND OPTICS

(4 credits–60 hours)

Objective: *The objective of this curriculum is to provide a clear concept of science of waves. This will make students obtain a comprehensive knowledge of optics. Emphasis shall be laid upon the solution of numerical problems.*

Module I: Superposition of Collinear Harmonic oscillations (5 hours)

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.

Module II: Superposition of Two Perpendicular Harmonic Oscillations (5 hours)

Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses.

Module III: Wave Motion (5 hours)

Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.

Module IV: Velocity of Waves (6 hours)

Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.

Module V: Superposition of Two Harmonic Waves (7 hours)

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.

Module VI: Wave Optics (3 hours)

Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.

Module VII: Interference (9 hours)

Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Module VIII: Interferometer (4 hours)

Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

Module IX: Diffraction (2 hours)

Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula. (Qualitative discussion only)

Module X: Fraunhofer diffraction (8 hours)

Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating.

Module XI: Fresnel Diffraction (7 hours)

Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.

Module XII: Holography (3 hours)

Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms.

COURSE/LEARNING OUTCOMES

At the end of this course students will be able to:
CO1: Explain waves
CO2: Comprehend advanced geometrical optics
CO3: Conceptualise advanced topics like Holography

Suggested Readings

1. Francis Crawford, Waves: Berkeley Physics Course, vol. 3, Tata McGraw-Hill.
2. F. A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill.
3. Max Born and Emil Wolf , Principles of Optics, Pergamon Press.
4. Ajoy Ghatak, Optics, 2008, Tata McGraw Hill.
5. H. J. Pain, The Physics of Vibrations and Waves, John Wiley and Sons.
6. N. K. Bajaj, The Physics of Waves and Oscillations, Tata McGraw Hill.
7. A. Kumar, H. R. Gulati and D. R. Khanna, Fundamental of Optics, R. Chand Publications.

PSPL6003: PHYSICS LABORATORY II

(4 credits)

At least 10 experiments should be performed from the following

1. To study the characteristic of SCR using the breadboard.
2. To study resistivity of a semiconductor by probe method.
3. Determination of difference in wavelengths of Na using Fabry-Perot interferometer.
4. To verify the Beer-Lambert law using UV visible spectrometer.
5. Verification of inverse square law for gamma ray using GM counter.
6. To study attenuation of beta rays using GM counter.
7. To determine the activity of a gamma emitter.
8. To study gamma ray spectrum of Cs-137 source and determine the resolution of a gamma-ray spectrometer.
9. To calibrate the scintillation spectrometer and determine the energy of gamma rays from an unknown source.
10. To study attenuation of gamma-rays from Cs-137 source by using different absorbers.
11. To study decay curve for half-life components of irradiated 115In by a neutron source.
12. To study phonon dispersion of a monatomic chain of atoms using electronic analogue of the chain.
13. Experimental verification of Paschen law in a glow discharge system.
14. To find the floating potential of a plasma using Langmuir probe.

PSPL6009: PHYSICS LABORATORY I

(4 Credits)

At least 10 experiments should be performed from the following

1. Verification of KCL and KVL using discrete components.
2. Verification of Thevenins theorem.
3. VI characteristics of PN junction diode.
4. Series voltage regulaton using zener diode and transistor.
5. Design and study the clipper circuit.
6. Design and study the clamper circuit.
7. VI characteristics of Zener diode.
8. Design of Half wave and Full wave rectifier with and without filter.
9. RC low pass and high pass filter realization.
10. Static Characteristics of a Bipolar Junction Transistor (CE Mode).
11. Static Characteristics of a Bipolar Junction Transistor (CB Mode).
12. Design of voltage multiplier: voltage doubler / quadrupler.
13. Design BJT as a switch.
14. Op-Amp as Inverting and Non Inverting amplifier.

15. Realization of basic gates using discrete components.
16. To measure attenuation and bending losses of an optical fibre.
17. To study and verify the truth table of logic gates.
18. To realize half/full adder and half/full subtractor.

PSCN6010: COMPUTER ORIENTED NUMERICAL METHODS LAB

(4 Credits)

At least 10 experiments should be performed from the following
(All experiments are to be done using the Fortran Language)

1. Basic operations using a matrix A.
   a. To find the transpose of A.
   b. To find the inverse of A.
   c. To verify the accuracy of $AA^{-1}= I$.
   d. To diagonalise a given matrix.
   e. To find the eigenvalues and eigenvectors.
2. Numerical differentiation.
   a. To find the derivative of a given function f(x) using formula where h is the step size.
   b. To determine the second derivative of a given function f(x) using the formula.
   c. Plot the case (a) as a function of x.
   d. Plot the case (b) as a function of x.
   e. Compare the above cases (a) and (b) with the results obtained analytically in specific cases.
3. Numerical method of solving Schrödinger equation.
   a. Obtain numerical solution for the time independent Schrodinger equation in one dimension for a given potential using Runge-Kutta Method or Fox Godwin method.
   b. To plot the wave function obtained from above versus x.
   c. Obtain numerical solution for the time independent Schrodinger equation in three dimension for a given potential using Runge-Kutta method or Fox Godwin method.
   d. To plot the wave function obtained from above versus r.
   e. To evaluate the eigenvalues and eigenvectors for case (a).
   f. To evaluate eigenvalues and eigenvectors for case (b).
   g. To count the number of nodes of the function determined in (a) above and see if it is consistent with the theoretical expectation.
   h. To determine the boundary value problems for cases (a) and (c).
4. Spherical harmonics.
   a. To compute the Legendre polynomials.
   b. To plot spherical harmonics as a function of polar angles.
   c. To compute the spherical Bessel function (regular and irregular).
   d. To plot the case (c).
5. Numerical integration.
   a. To integrate a given function numerically by Simpson's Rule.
   b. To compare the results obtained form (a) with those obtained analytically.
   c. To integrate a given function numerically by Trapezoidal rule.
   d. To compare the results obtained from (b) with those obtained analytically.
   e. To integrate a given function numerically by Gauss-Legendre integration.
   f. To compare the results obtained form (c) with those obtained analytically.
6. Solution of algebraic equations.
   a. Solve a given equation numerically using Newton Raphson method.
   b. Compare the result of (a) with those obtained numerically.
   c. To solve a given equation using bisection method.
   d. Comparative study of (a), (b) and (c).
7. Solution of simultaneous equations.
   a. Using Gauss-elimination and Gauss Jordan elimination method.
   b. Compare (a) with solutions obtained analytically or algebraically.
8. Logistic systems.
   To explore the regions of (a) stable fixed points (b) periodic and (c) chaotic solution.

9. Radioactivity.
    a. Use Monte-Carlo method to simulate radioactive decay.
    b. Write a program for a radioactive series, when the daughter is also radioactive and so on.
    c. Plot N (number of nuclei) Vs time t.
    d. From the slope calculate the activity at different times.
10. LCR circuits.
    a. To compute the charge and discharge of RC circuit using DC source.
    b. To compute the charge and discharge of RC circuits using AC source.
    c. Analyse the energy in RL circuit using Runge-Kutta method.
    d. Study the energy dissipated in a series LCR circuit. Plot it versus time t.
11. Modelling of data.
    a. To compute for a given sample of data.
    b. To fit a given sample of data by least square method by a straight line.
    c. To fit by minimizing by straight line.
    d. To make a polynomial fit by least square method.
    e. To make a polynomial fit by minimizing.
12. Fourier transform special methods.
    a. To compute Fourier transform of discretely sampled data.
    b. To compute Fast Fourier transform of real functions and Sine and Cosine transformations.
    c. To compute Fourier transform of a given function in two or more dimensions.

Suggested Readings

1. R. C. Verma et al., Computational Physics An Introduction, New Age International.
2. C. Xavier, Fortran 77 and Numerical Methods, New Age International.
3. E. W. Schmid, G. Spitz and W. Losch, Theoretical Physics on the Personal Computer, Springer-Verlag.
4. W. H. Press, S. S. Teukolsky, W. T. Vetterling and B. P. Flanner, Numerical Recepies in FORTRAN, Cambridge University Press.
5. M. K. Jain et al., Numerical Methods for Scientific and Engineering and Computation, New Age Int. Pub.

PSPP6011: PROJECT PHASE I
(4 credits)

Objective: *During this phase the student will start a project applying the knowledge acquired during the first two 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.*

E-resource for learning:

LaTeX, www.spokentutorial.org

PSPR6012: PROJECT PHASE II
(6 credits)

Objective: *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.*

PSPM6013: PLASMA PHYSICS LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

1. Experimental determination of minimum breakdown voltage in a glow discharge system.
2. To study the effect of variation in chamber pressure on different regions of a glow discharge.
3. To study the effect of variation in discharge voltage on different regions of a glow discharge.
4. To plot the I-V characteristics of a glow discharge plasma.
5. To find the variation in resistance of a glow discharge plasma with chamber pressure.
6. To find the variation in resistance of a glow discharge plasma with discharge voltage.
7. To find the variation in floating potential with discharge voltage of a plasma using Langmuir probe.
8. To find the variation in floating potential with chamber pressure of a plasma using Langmuir probe.
9. To find the plasma potential of a plasma using Langmuir.
10. To find the electron temperature of a plasma using Langmuir probe.
11. To find the electron density of a plasma using Langmuir probe.
12. Identification of different ions/atoms/molecules in plasma by optical emission spectroscopy (OES).
13. To find the plasma density by optical emission spectroscopy (OES) using Stark Broadening of hydrogen lines.
14. To find the plasma temperature by optical emission spectroscopy (OES) using line intensity ratio method.
15. To find the plasma temperature by optical emission spectroscopy (OES) using Boltzmann Plot method.

PSEL6014: ELECTRONICS LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

1. Design of amplifiers: Transistor amplifiers with and without feedback.
2. Design of Integrator and Differentiator using Op-amp.
3. Op-amp linear applications: adders, subtractors, comparator.
4. Op-amp based active filters.
5. 555 timer as monostable multivibrator.
6. 555 timer as astable multivibrator.
7. 555 timer as bistable multivibrator
8. To verify the truth table of MUX and DEMUX.
9. Realization of 2:4 decoder and 4:2 encoder design.
10. To verify the truth table of one bit and four bit comparators using logic Gates.
11. Truth table verification of Flip-Flops: (i) RS-Type, (ii) D- Type, (iii) T- Type, (iv) J-K Master Slave
12. To study shift register in all its modes i.e. SIPO/SISO, PISO/PIPO.

PSNY6015: NANOPHYSICS LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

1. Calculate molarity for different solutions. Learn to use the scientific balance (adjustments, taring, etc.).
2. Prepare stock solution of the following (100 ml)
   - 10mM $Zn(NO_3)_2 . 6H_2O$
   - 10mM 100ml $C_6H_{12}N_4$
   - 25 mM $Na_3C_6H_5O_7$
3. Synthesize ZnO nanoparticles using hydrothermal process.

4. Perform seeding of pre-synthesized ZnO nanoparticles on glass substrate. Also perform direct seeding of ZnO particles on glass substrate by thermal oxidation.
5. Grow ZnO nanorods on glass substrate hydrothermally.
6. Synthesize ZnS nanoparticles using hydrothermal process.
7. Synthesize manganese doped ZnS nanoparticles using hydrothermal process.
8. Make film of ZnO nanoparticles on glass substrate using the LBL machine.
9. Use Super-hydrophobicity testing machine to find out the roll-off and contact angle of a nanoparticle coated surface.
10. Synthesize CdS nanoparticles using hydrothermal process. Observe colour variations with size when illuminated with UV light.
11. Synthesize gold nanoparticles using Turkevitch process.
12. Sample preparation for different characterization techniques.
13. UV-vis spectroscopy to study optical properties of nanomaterials.
14. Tauc's plot to determine band gap of semiconductors.
15. Electron Microscopy Imaging of metallic and semiconducting nanoparticles.
16. Analyzing SAED patterns.
17. Measurement of lattice fringes in TEM images using ImageJ software.
18. Analyzing EDS plots.
19. Extracting information from XRD plots.
20. Measurement of WCA and ROA for different nanomaterial coated substrates.
21. PL spectroscopy on luminescent nanoparticles.

PSTC6016: PHYSICS LAB FOR TECHNOLOGISTS

(2 credits) (L-T-P:0-0-4)

Note: For details see page 560 of *Regulations and Syllabus, School of Technology*

PSEG6017: PHYSICS LAB FOR ENGINEERS

(1 credit) (L-T-P:0-0-2)

Note: For details see page 560 of *Regulations and Syllabus, School of Technology*

PSMY6101: MATHEMATICAL PHYSICS-I LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

Topics	Description with Applications
Introduction and Overview	Computer architecture and organization, memory and Input/output devices
Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflow- emphasize the importance of making equations in terms of dimensionless variables, Iterative methods
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ Programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops), Arrays (1D & 2D) and strings, user defined functions, Structures and Unions, Idea of classes and objects

Programs	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search
Random number generation	Area of circle, area of square, volume of sphere, value of pi (π)
Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving ; in optics
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. sin θ, cos θ, tan θ, etc.
Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method	Given Position with equidistant time data to calculate velocity and acceleration and vice versa. Find the area of B-H Hysteresis loop
Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods	First order differential equation • Radioactive decay • Current in RC, LC circuits with DC source • Newton's law of cooling • Classical equations of motion • Attempt following problems using RK 4 order method: • Solve the coupled differential equations for four initial conditions x(0) = 0, y(0) = -1, -2, -3, -4. Plot x vs y for each of the four initial conditions on the same screen for 0 t 15
	The differential equation describing the motion of a pendulum is . The pendulum is released from rest at an angular displacement , i. e. (0) = α and (0) = 0. Solve the equation for = 0.1, 0.5 and 1.0 and plot P as a function of time in the range 0 t 8. Also plot the analytic solution valid for small (sin() =

PSMA6102: MECHANICS LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. Study the random error in observations.
3. Determine the height of a building using a Sextant.
4. Study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
5. Determine the Moment of Inertia of a Flywheel.
6. Determine g and velocity for a freely falling body using Digital Timing Technique
7. Determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
8. Determine the Young's Modulus of a Wire by Optical Lever Method.
9. Determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10. Determine the elastic Constants of a wire by Searle's method.
11. Determine the value of g using Bar Pendulum.
12. Determine the value of g using Kater's Pendulum.

PSEM6103: ELECTRICITY AND MAGNETISM LABORATORY

(4 Credits)

At least 10 experiments should 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.
3. Determine an unknown Low Resistance using Potentiometer.
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.
11. Study the response curve of a parallel LCR circuit and determine its (a) Anti- resonant frequency and (b) Quality factor Q.
12. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. Determine self-inductance of a coil by Rayleigh's method.
15. Determine the mutual inductance of two coils by Absolute method.

PSWO6104: WAVES AND OPTICS LABORATORY

(4 Credits)

At least 10 experiments should be performed from the following

1. Determine the frequency of an electric tuning fork by Melde's experiment and verify $\lambda 2 - T$ law.
2. Investigate the motion of coupled oscillators.
3. Study Lissajous Figures.
4. Familiarization with: Schuster`s focusing; determination of angle of prism.
5. Determine refractive index of the Material of a prism using sodium source.
6. Determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. Determine the wavelength of sodium source using Michelson's interferometer.
8. Determine wavelength of sodium light using Fresnel Biprism.
9. Determine wavelength of sodium light using Newton's Rings.
10. Determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
11. Determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
12. Determine dispersive power and resolving power of a plane diffraction grating.

SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

DEPARTMENT OF CHEMISTRY

CHES0002: ENVIRONMENTAL STUDIES

(2 Credits - 30 Hours)

Objective: *This course is designed to enhance knowledge skills and attitude to environment. It will help a student to get a broad exposure to problems facing our environment.*

Module I: The Multidisciplinary Nature of Environmental Studies (3 hours)

Definition, scope and importance, need for public awareness.

Module II: Natural Resources (3 hours)

a. Different types of natural resources and associated problems - forest resources, water resources, mineral resources, food resources, energy resources, land resources.
b. Conservation of natural resources.

Module III: Ecosystems (4 hours)

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 (4 hours)

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 (6 hours)

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 (6 hours)

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.
v. Introduction to environmental impact assessment.

Module VII: Human Population and the Environment (4 hours)

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

1. Erach Bharucha; Textbook for Environmental Studies, UGC, New Delhi
2. S. Somvanshi and R. Dhupper; Fundamentals of Environmental Studies, S.K. Kataria and Sons Publisher.
3. A.K. De; Environmental Chemistry, New age publishers.
4. J.P. Sharma; Environmental Studies, University Science Press
5. K.G. Bhattacharyya and A. Sarma; Comprehensive Environmental Studies, Narosa Publishing House Pvt, Ltd.

CHIC0003: FUNDAMENTALS OF INORGANIC CHEMISTRY

(4 Credits - 60 Hours)

Objective: *This course is designed to deal with the concept of acids and bases, properties of transition metals and transition metal complexes.*

Module I: Concepts of Acids and Bases (10 hours)

Hard and soft acid-base concept, non-aqueous solvents, redox chemistry

Module II: Transition Metal Chemistry (8 hours)

Descriptive chemistry of transition metals including lanthanides and actinides, coordination chemistry - coordination number and geometry, isomerism, thermodynamic stability - successive and overall stability constants, Irving-William series, chelate and macrocyclic effects.

Module III: Bonding in Inorganic and Coordination Compounds (20 hours)

VBT (hybridization), CFT and their limitations, ligand field theory, d-orbital wave functions, d-orbital splitting in octahedral, square planar, square pyramidal, trigonalbipyramidal, and tetrahedral complexes; Jahn-Teller distortion, CFSE for d^1 to d^{10} systems, pairing energy, low-spin and high-spin complexes and molecular orbital (MO) theory of selected octahedral, tetrahedral complexes and other geometries, Walsh Diagram.

Module IV: Electronic Spectra of Transition Metal Complexes (12 hours)

d-d transition, charge transfer transition, color, intensity and origin of spectra, interpretation,term symbols and splitting of terms different geometries, selection rules for electronic transitions, correlation, Tanabe-Sugano and Orgel diagrams, calculation of Dq, B and C, nephelauxetic ratio.

Module V: Magnetic Properties of Transition Metal Complexes (10 hours)

Magnetic properties of free ions, types of magnetic behavior: dia-, para-, ferro- and antiferro-magnetism, temperature independent paramagnetism, magnetic susceptibility - Van Vleck equation, experimental measurement, magnetic moment - orbital contribution, quenching of contribution, effect of spin orbit coupling, spin crossover, temperature dependence of magnetic susceptibility, exchange coupling effects, magnetic properties of second and third transition series and lanthanides

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts of Inorganic Chemistry that includes understanding the concept of hard and soft acids and bases, the behavior of inorganic nonaqueous solvents, the properties of transition metals and their complexes (*Knowledge*)

CO2: Have a conceptual understanding of the (i) periodic variation of the strength of acids and bases, their classification and applications (ii) general characteristics, structure, theory, reactivity and applications of coordination compounds (*Comprehension*)

CO3: Predict geometries of coordination complexes, the types of electronic transitions that take place giving rise to colour, they should be able to predict whether a transition metal complex will be dia-, para-, ferro- or antiferro magnetic (*Application*)

CO4: Explain why a certain transition metal complex will be ferro- or para- magnetic, or have tetrahedral or octahedral geometry (*Analysis*)

CO5: How to design transition metal complexes whose properties they can predict (*Synthesis*)

CO6: Students will have an overall understanding of acids and bases, on the properties of transition metal complexes such as the nature of bonding in coordination complexes, their electronic and magnetic properties and resultant applications (*Evaluation*)

Suggested Readings

1. J. E. Huheey, E. A. Keiter and R. L. Keiter; Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education.
2. B. N. Figgis, M. A. Hitchman; Ligand Field theory and its Applications, Wiley India.
3. G. L. Miessler, D Tarr; Inorganic Chemistry, Pearson Education.
4. P.W. Atkins, T. Overton, J. Rourke, M. Weller, F. Armstrong; Shriver and Atkins: Inorganic Chemistry, Oxford University Press.

5. A.K. Das and M. Das; Fundamental Concepts of Inorganic Chemistry, Vols. 1-7, CBS Publishers and Distributors.
6. H.J. Arnikar; Essentials of Nuclear Chemistry, Wiley Eastern, New Delhi.
7. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann; Advanced Inorganic Chemistry,Wiley.
8. C. E. Housecroft and A. G. Sharpe; Inorganic Chemistry, Prentice Hall.
9. F. A. Cotton; Chemical Applications of Group Theory, Wiley.
10. S. A. Cotton; Lanthanide and Actinide Chemistry, John Wiley.
11. G. Fridlander, J.W. Kennedy, E. S. Macias, and J. M. Miller; Nuclear and Radiochemistry, John Wiley, New York.
12. M. Weller, F. Armstrong, J. Rourke, T. Overton; Inorganic Chemistry, Oxford University Press.
13. R. L. Dutta, A. Syamal; Elements of Magnetochemistry, Affiliated East-West Press Pvt. Ltd.-New Delhi.
14. F. E. Mabbs, D. J. Machin; Magnetism and Transition Metal Complexes, Dover Pub.Inc.

CHOC0004: FUNDAMENTALS OF ORGANIC CHEMISTRY

(4 Credits - 60 hours)

Objective: *This course is designed to make the students familiar with reaction mechanisms, reactivity of organic compounds and the stereochemistry.*

Module I: Kinetics and Energetics of Reaction Mechanism (15 hours)

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: Reaction Mechanisms and Intermediates (Structure and Reactivity) - I (15 hours)

a) Carbanions: enolates and enamines, kinetic and thermodynamic enolates, lithium and boron enolates in Aldol and Michael reactions, alkylation and acylation of enolates, name reactions under carbanion chemistry - Claisen, Dieckmann, Knoevenegal, Stobbe, Darzen, Acyloin condensations, Shapiro reaction, Julia olefination, Brook rearrangement, Sakurai reaction, Henry reaction, Kulinkovich reaction, Nef reaction, Baylis-Hillman reaction.
b) Ylids: Chemistry of phosphorous and sulfur ylids - Wittig and related reactions, Peterson olefination
c) Carbocations: structure and stability of carbocations, classical and non-classical carbocations, neighbouring group participation and rearrangements including Wagner-Meerwein, pinacol-pinacolone, semi-pinacol rearrangement, C-C bond formation involving carbocations, oxymercuration, halolactonisation,Tishchenko reaction, Ritter reaction, Prins reaction.

Module III: Reaction Mechanisms and Intermediates (Structure and Reactivity) - II (15 hours)

a) Carbenes and Nitrenes: Structure of carbenes, generation of carbenes, addition and insertion reactions, rearrangement reactions of carbenes such as Wolff rearrangement, generation and reactions of ylids by carbenoid decomposition (existence of O and N based ylids), Structure of nitrene, generation and reactions of nitrene and related electron deficient nitrogen intermediates, Curtius, Hoffmann, Schmidt, Beckmann rearrangement, structure and reactivity of benzynes.
b) Radicals: Generation of radical intermediates and its addition to alkenes, alkynes (inter AND intramolecular) for C-C bond formation and Baldwin's rules, name reactions involving radical intermediates such as Barton deoxygenation and decarboxylation, McMurry coupling.

Module IV: Stereochemistry (15 hours)

a) Classification of organic molecules into different Point Groups, R and S, E and Z nomenclature in C, N, S, P containing compounds, concept of absolute and relative
b) Configuration, chirality in molecules devoid of chiral centres - allenes, spiranes and biphenyls.

c) Concepts of stereogenic centres – chirotopic and achirotopic centres, homotopic and heterotopic ligands and faces, optical purity and enantiomeric excess, conformation of acyclic organic molecules, cyclohexane and decalins.
d) Dynamic stereochemistry, stereoselective synthesis, classification of stereoselective synthesis, diastereoselective, enantioselective and double stereo-differentiating reactions, nucleophilic addition to aldehyde and acyclic ketones, Prelog's rule, nucleophilic addition to cyclic ketones.
e) Enantioselective synthesis, use of chiral reagent, chiral catalyst and chiral auxiliary, stereospecific and stereoselective reactions

COURSE/LEARNING OUTCOMES

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

CO1: Unique features of organic reactions mechanism, reaction intermediates, stereochemistry and reaction kinetics and principles involved in it (*Knowledge*)
CO2: Understand application of reaction mechanism and stereochemistry in different reactions as well as products (*Comprehension*)
CO3: Apply their skills for getting the stereochemistry of the product, mechanism of different reactions (*Application*)
CO4: Different problems related to organic reaction mechanisms, stereochemistry (*Analysis*)
CO5: Understanding of application of reaction mechanism of different types of reactions involving reactive intermediates like carbocation, carbanion, carbene etc and would be able to provide analytical solution towards their synthesis (*Synthesis*)
CO6: Demonstrate the unique features of organic reaction mechanism, reaction mechanism and stereochemistry (*Evaluation*)

Suggested Readings

1. F. A. Cary and R. I. Sundberg; Advanced Organic Chemistry, Part A and B,Springer.
2. A. J. Kirby; Stereoelectronic Effects,OUP.
3. W. Carruthers and I. Coldham; Modern methods of Organic Synthesis, South Asian Edition, Cambridge University Press.
4. T. H. Lowry, K. S. Richardson; Mechanism and Theory in Organic Chemistry.
5. J. Clayden, N. Greeves, S. Warren, Organic Chemistry.
6. E. V. Anslyn, D. A. Dougherty; Modern Physical Organic Chemistry, University Science Books.

CHPC0005: FUNDAMENTALS OF PHYSICAL CHEMISTRY

(4 Credits - 60 hours)

Objective: *This course is designed to give the students a basic understanding of equilibrium, non-equilibrium and statistical thermodynamics, polymer chemistry and some concepts of sampling and data analysis.*

Module I: Equilibrium and Non-equilibrium Thermodynamics (22 hours)

a) Laws of thermodynamics, state and path functions and their applications, Maxwell's relations, spontaneity and equilibria, Le Chatelier principle.
b) Non-ideal system - thermodynamics of real gases and gas mixtures, fugacity and its determination, non-ideal solutions, activity and activity coefficient, different scales of activity coefficient, electronic activity coefficients.
c) Phase equilibrium - thermodynamic criteria of phase equilibrium, Gibbs phase rule and its application to three component systems - triangular plots - water-acetic acid-chloroform system and ammonium chloride-ammonium sulphate-water system.
d) Non-equilibrium thermodynamics - forced flows and entropy of production, coupled flows and phenomenological relations, Onsager reciprocal relations, thermodynamic effects -Seebeck, Peltier and Thomson effects.

Module II: Statistical Thermodynamics (22 hours)

a) Statistical mechanics of systems independent particles - Maxwell Boltzmann distribution, entropy and probability, calculation of thermodynamic properties for independent particles, molecular partition functions, evaluation of translational, rotational and vibrational and nuclear partition functions.

b) Thermodynamic properties of monatomic and diatomic gases (Suckur Tetrode equation), calculation of partition functions, thermodynamic function, principles of equipartition, heat capacities (Einstein model and Debye modification), residual entropy, equilibrium constant.

Module III: Polymer Chemistry (8 hours)

Molecular weight of polymers, determination of molecular weight, kinetics of polymerization reaction, copolymerization, average dimension of polymer molecules, size exclusion chromatography.

Module IV: Sampling and Data Analysis: (8 hours)

Sampling of solid, liquid and gaseous samples, mean and standard deviation, absolute and relative errors, linear regression, covariance and correlation coefficient

COURSE/LEARNING OUTCOMES

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

CO1: Recall the fundamental laws of thermodynamics, different thermodynamic functions, structure of polymer molecules and analysis of chemical data (*Knowledge*)

CO2: Understand application of thermodynamics in different field such as non- ideal system, phase equillibria, non- equilibrium system. They would also have some idea about the size of a polymer molecule as well as their mechanism of formation (*Comprehension*)

CO3: Apply thermodynamics in real gases, to some three component systems and to microsystem. They would also able to separate polymers molecules according to their sizes. (*Application*)

CO4: Analyse application of thermodynamics in both micro and macro system (*Analysis*).

CO5: Understanding of application of thermodynamics and polymerization process (*Synthesis*)

CO6: Apply thermodynamics to different systems, calculate size of polymer molecules and analyse results of different chemical experiment from the statistical point of view (*Evaluation*)

Suggested Readings

1. P. Atkins, J. Paula; Physical Chemistry,Oxford University Press.
2. I. R. Levine, Physical chemistry, Mcgraw Hill Education.
3. D. A. McQuarrie, J. D. Simon; Physical Chemistry: A Molecular Approach, Viva Student Edition.
4. R. S. Berry, S. A. Rice and J. Ross; Physical Chemistry, Oxford University Press.
5. D. A. McQuarrie; Statistical Mechanics, University Science Books, California.
6. J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis, Pearson.
7. V. R. Gowarikar, N. V. Viswanathan, J. Sreedhar; Polymer Science, New age International Publishers.
8. G. Odian; Principles of Polymerization, Wiley Student Edition.

CHQG0006: INTRODUCTION TO QUANTUM CHEMISTRY AND GROUP THEORY

(3 Credits-45 hours)

Objective: *This course serves to introduce the concepts of quantum chemistry and group theory to students*

Module I: Quantum Chemistry I (15 hours)

Planck's theory, wave-particle duality, uncertainty principle, postulates of quantum mechanics, Schrodinger equation, free particle, particle in a box, degeneracy, harmonic oscillator, rigid rotator, the hydrogen atom, angular momentum, electron spin, spin-orbit coupling.

Module II: Quantum Chemistry II (15 hours)

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, antisymmetry, Slater determinant, term symbols and spectroscopic states

Module III: Chemical Applications of Group Theory (15 hours)

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.

COURSE/LEARNING OUTCOMES

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

CO1: Understand fundamental concepts of quantum chemistry and group theory such as the postulates and theorems of quantum mechanics, complete solution of the Schrödinger equation for one electron systems, approximation methods for multi-electron systems, properties of symmetry groups, assigning symmetry point groups to molecules, irreducible representations of groups (*Knowledge*)

CO2: Explain the concepts of operators, eigenfunctions and eigenvalues and their uses in solving the Schrodinger equation for ideal systems, application of approximation methods applied to multi-electron atoms, symmetry classes and groups, degenerate and nondegenerate representations (*Comprehension*)

CO3: Apply the concepts they learn to calculate properties of simple systems e. g., calculating the probability of an electron occupying a certain energy state inside a well or a box, or the probability of finding an electron outside a potential well, and also determine the symmetry operations that can be applied to a molecule in group theory (*Application*)

CO4: Apply the concepts they learn to solve numerical problems such as writing the Schrodinger equation for a multi-electron atom or devising a trial variation wave function for a particle in a 1-D box (*Analysis*)

CO5: Differentiate between cases when an exact solution of the Schrodinger equation is possible and cases when an exact solution is not possible, they should be able to differentiate between applicability of different approximation methods in quantum chemistry and be able to assign point groups and calculate the character table for a particular point group in group theory (*Evaluation*)

CO6: Design simple problems in quantum chemistry and group theory by incorporating the different concepts they learn (*Synthesis*)

Suggested Readings

1. P. Atkins, R. Friedman; Molecular quantum Mechanics, Oxford University Press.
2. I. N. Levine, Quantum Chemistry, PHI Learning Pvt. Ltd.
3. David J. Griffiths; Introduction to Quantum mechanics, Pearson Education Ltd.
4. F. A. Cotton; Chemical Applications of Group Theory, Wiley India Pvt. Ltd.
5. R. L. Carter; Molecular Symmetry and Group Theory, John Wiley & Sons.

CHIR0007: ADVANCED INORGANIC CHEMISTRY I

(4 Credits-60 hours)

Objective: The objective of this course is to teach students core concepts of organometallic chemistry, inorganic reaction mechanisms, inorganic photochemistry, solid state chemistry, and structure and bonding in different inorganic compounds.

Module I: Descriptive Inorganic Chemistry (15 hours)

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, germenes, 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 aluminumorganyls, carbalumination, hydroalumination, chemistry of Ga (I) and In (I), reduction of Al, Ga and In organyls, Metal organic framework structures (MOFs)

Module II: Introduction to Solid State Chemistry (10 hours)

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.

Module III: Organometallic Chemistry (10 hours)

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.
c) Reactions of organometallic complexes: Substitution, oxidative addition, reductive elimination, insertion and deinsertion, catalysis, hydrogenation, hydroformylation, Monsanto process, Wacker process, alkene polymerization.

Module IV: Mechanism of Inorganic Reactions (7 hours)

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 V: Inorganic Photochemistry (3 hours)

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.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the concepts of organometallic chemistry, inorganic reaction mechanisms, inorganic photochemistry, solid state chemistry and structure and bonding in different inorganic compounds (*Knowledge*)
CO2: Interpret information based on their understanding of the concepts of bonding, structure, photochemistry and reaction mechanism of different inorganic compounds (*Comprehension*)
CO3: Solve problems which arise in different industrial and analytical fields by knowing the characteristics of the inorganic compounds (*Application*)
CO4: Apply their idea for using different inorganic compounds in different industrial fields (*Analysis*)
CO5: Identify the inorganic compounds for their suitable analytical and industrial use (*Synthesis*)
CO6: Judge and assess the inorganic compounds based on their structure and reactivity (Evaluation)

Suggested Readings

1. Cotton, F. A., Wilkinson, G., Murillo, C. A. and Bochmann, M., Advanced Inorganic Chemistry, Wiley.
2. Greenwood, N. N. and Earnshaw, E. A., Chemistry of elements, Butterworth-Heinemann.
3. Huheey, J. E., Keiter, E. A., . Keiter, R. L., Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education.
4. Miessler, G. L., Tarr, D., Inorganic.Chemistry, Pearson Education.
5. Atkins, P.W., Overton, T., Rourke, J., Weller, M., Armstrong, F., Shriver & Atkins: Inorganic Chemistry, Oxford University Press.
6. Douglas, B. E., McDaniel, D. H., Alexander, J. J. Concepts and Models of Inorganic Chemistry, John Wiley.
7. Wulfsberg, G., Inorganic Chemistry, University Science Books.
8. Smart, L., Moore, E. Solid State Chemistry: An Introduction, Nelson Thorns Ltd.

9. Das, A. K. and Das, M., Fundamental Concepts of Inorganic Chemistry, Vols. 1-7, CBS Publishers and Distributors
10. Crabtree, R. H., Organometallic Chemistry of the Transition Metals, John Wiley.
11. Basalo, F. and Pearson, R. G. Mechanisms of Inorganic Reactions, John Wiley

CHOG0008: ADVANCED ORGANIC CHEMISTRY I

(4 Credits- 60 hours)

Objective: This course will discuss nucleophilic, electrophilic and elimination reaction mechanisms along with various oxidation-reduction methods.

Module I (15 hours)

a) Nucleophilic Substitution: S_N1, S_N2 and related mechanisms; Factors influencing reaction rates; Neighbouring group participation by π- and σ-bond; Anchimeric assistance; Aromatic Nucleophilic Substitution: The SNAr, S_N1, benzyne and SR_N1 mechanisms. Reactivity; effect of substrate structure, leaving group and attacking nucleophile; The S_Ni mechanism.Nucleophilic substitution at an allylic, aliphatic trigonal and a vinyl carbon.Aromaticity, antiaromaticity and homoaromaticity.

b) Electrophilic Substitution: Aliphatic: Bimolecular mechanisms: SE1, SE2 and SEi. The SE1mechanism, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and the solvent polarity on the reactivity. Aromatic: The arenium ion mechanism, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in other ring systems.

Module II (15 hours)

a) Elimination reactions: Mechanism and stereochemistry of different types of elimination reactions; Effects of substrate structure, attacking base, leaving group and medium; Formation of other double bonds (C=N, C=O) and triple bonds by elimination reactions; Mechanism and orientation in pyrolytic elimination.

b) Miscellaneous Reactions: Biginelli reaction, Passerini reaction, Nazarov cyclisation, Pd-catalyzed reactions, Vilsmeier Hack reaction, Ugi reaction, Robinson annulations, Mitsonobu reaction, Appel reaction, Favoriskii rearrangement.

Module III Oxidation Reactions (15 hours)

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 IV Reduction Reactions (15 hours)

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 ($NaBH_4$triacetoxyborohydride, L-selectride, K-selectride, Luche reduction, $LiAlH_4$, DIBAL-H, and Red-Al, Trialkylsilanes and Trialkylstannane, Meerwein-Pondorff-Verley reduction), stereo/enantioselective reductions (Chiral Boranes, Corey-Bakshi-Shibata).

COURSE/LEARNING OUTCOMES

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

CO1: Acquire the detailed knowledge on electrophilic substitution, nucleophilic substitution, elimination, organic oxidation and reduction reactions (*Knowledge*)

CO2: Understand how to apply the concept of mechanisms and different types of reactions in the synthetic organic chemistry research field (*Comprehension*)

CO3: Apply the knowledge of mechanisms and different types of reactions in the synthetic organic chemistry research field (*Application*)

CO4: Solve different problems related to organic reaction mechanisms (*Analysis*)

CO5: Understanding of application of reaction mechanism of different types of reactions (*Synthesis*)
CO6: Demonstrate the important features of basic organic reactions like electrophilic substitution reaction, nucleophilic substitution, elimination and oxidation-reduction reactions (*Evaluation*)

Suggested Readings

1. Cary, F. A., Sundberg, R. I., Advanced Organic Chemistry, Part A and B, Springer.
2. Smith, M. B., Organic Synthesis, Academic Press.
3. Carruthers, W. and Coldham, I., Modern Methods of Organic Synthesis, South Asian Edition, Cambridge University Press.
4. Clayden, J., Greeves, N., Warren, S., Organic Chemistry, Oxford University Press.
5. Pine, S. H., Organic Chemistry (5th edn.), McGraw-Hill Bool (1987).
6. March, J. Advanced Organic Chemistry: Reactions, Mechanisms and Structure ,Wiley Student Edition, John Wiley & Sons Asia Pte. Ltd. (2005).
7. House, H. O. Modern Synthetic Reaction, (W. A. Benjamin Inc. 1972).

CHAP0009: ADVANCED PHYSICAL CHEMISTRY I

(4 Credits - 60 hours)

Objective: This course is intended to give students a deep understanding of the kinetics and reaction dynamics of chemical reactions as well as an insight into the principles of electrochemistry

Module I Chemical Kinetics (15 hours)

Theories of unimolecular reactions: Lindemann theory, drawbacks of Lindemann theory- Hinshelwood modification, RRK theory, Slaters treatment, RRKM theory. Steady state approximation and its applications, oscillating reactions, chemical chaos, Belousov-Zhabotinski reaction, straight chain reactions - hydrogen-halogen reactions, alkane pyrolysis, Branching-chain reactions - the hydrogen-oxygen reaction, explosion limits, Enzyme catalyzed reactions, Michaelis-Menten mechanism-Lineweaver-Burk and Eadie plots, enzyme inhibiton. Photochemistry - kinetics of photophysical and photochemical processes, complex photochemical processes

Module II Study of Fast Reactions (5 hours)

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 hours)

Collisions of real molecules- trajectory calculations, Laser techniques, reactions in molecular beam, reaction dynamics, 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, theory of unimolecular reactions- Lindemann theory and its limitations, 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 hours)

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 (15 hours)

a) Theories of Electrical Interface: Electrocapillary phenomena - Lippmann equation, electron transfer at interfaces, polarizable, non polarizable and nonpolaisable interfaces, Butler-Volmer equation, Tafel plot

b) Electro-analytical Techniques: Potential step methods, potential sweep methods, Polarography and Pulse voltammetry, controlled current techniques, techniques based on impedance.
c) 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.

COURSE/LEARNING OUTCOMES

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

CO1: Recall about kinetics of different types of chemical reaction including unimolecular, bimolecular and chain reactions. They would also able to recall the theories of electrochemistry (*Knowledge*)
CO2: Understand the application of kinetic theories to different systems, interactions of ionic species with solvent molecules, different electrochemical techniques, different types of batteries (*Comprehension*)
CO3: Apply the knowledge of kinetic theories to some important types of reactions and to learn the use of different analytical techniques, and batteries (*Application*)
CO4: Analyse the application of reaction rate theories to different system and to analyse the application of electrochemistry in different fields (*Analysis*)
CO5: Understanding of kinetics of chemical reaction and application of electrochemistry (*Synthesis*)
CO6: Calculate rate of different types chemical reactions, compare reaction rate theories, apply the electrochemical techniques to analyse samples, construct different types of batteries (*Evaluation*)

Suggested Readings

1. Atkins, P. and Paula, J. Physical Chemistry, Oxford University Press, Oxford.
2. Levine, I. R., Physical chemistry, Mcgraw Hill Education.
3. Laidler, K. J., Chemical Kinetics, Pearson.
4. Bockris, J. O., Reddy, A. K. N., Modern Electrochemistry Part 1, 2A and 2B, Springer.
5. Bard, A. J., Faulkner, L. R., Electrochemical Methods Fundamentals and Applications, Wiley India.

CHFS0010: FUNDAMENTALS OF SPECTROSCOPY

(3 Credits-45 hours)

Objective: This course introduces students to the concepts of a range of spectroscopic techniques including rotational, vibrational, electronic, magnetic resonance and Mössbauer spectroscopies as well as to mass spectrometry.

Module I: Interaction of light with matter (5 hours)

Fundamental aspects of absorption and emission spectroscopy, probability of transition, oscillator strength, dipole strength, Spontaneous and stimulated emission, origin of selection rules

Module II: Rotational and Vibrational Spectroscopy (10 hours)

Degrees of freedom of molecules, rigid rotor model, rotational spectra of diatomics and polyatomics, effect of isotopic substitution and non rigidity, selection rules and intensity distribution, Vibrational spectra of diatomics, effect of anharmonicity, Morse potential, Vibrational-rotational spectra of diatomics, P,Q,R branches, normal modes of vibration, overtones, hot bands, Raman spectroscopy - Origin, rotational and vibrational Raman spectra of diatomics.

Module III: Electronic Spectroscopy (12 hours)

Electronic spectra of diatomic molecules, Frank-Condon principle, vibronic transitions, Spectra of organic compounds, $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transition, Photoelectron Spectroscopy - basic principle, photoelectron spectra of simple molecules, X-ray photoelectron spectroscopy (ESCA), Auger electron spectroscopy,Lasers - Laser action, population inversion,properties of laser radiation,examples of simple laser systems.

Module IV: Magnetic Resonance Spectroscopy (10 hours)

a) Nuclear Magnetic Resonance: Nuclear spin and nuclear spin states in magnetic field, resonance phenomenon, relaxation process, NMR line shapes and saturation, shielding and de-shielding of magnetic nuclei, chemical shift, spin-spin interactions, spectra of two-spin system (A_2, AB and AX cases), ^{13}C, ^{19}F and ^{31}P NMR spectroscopy.

b) Electron Spin Resonance: Basic principles, factors affecting g values, hyperfine coupling, spin densities and McConnell relationship, Zero field splitting

Module V: Mass spectrometry and Mössbauer spectroscopy (8 hours)

a) Mass spectrometry:Basic principles, ionization techniques, isotope abundance, molecular ion, fragmentation processes of organic molecules, deduction of structure through mass spectral fragmentation

b) Mössbauer spectroscopy: Principles, instrumentation and applications

COURSE/LEARNING OUTCOMES

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

CO1: The different spectroscopic and spectrometric techniques that can be used for determining the structure and properties of known or unknown molecules (*Knowledge*)

CO2: The concepts of different spectroscopic technique and their uses (*Comprehension*)

CO3: Differentiate one spectroscopic technique from another (*Application*)

CO4: Decide which technique would be best suited for determining a particular property of a molecule e.g. if the mass of an unknown compound is to be determined, they should know that mass spectrometry can be used (*Analysis*)

CO5: Decide the set of steps necessary for the analysis of properties or structure of a molecule that may be totally or partially unknown (*Evaluation*)

CO6: Devise a series of experiments to characterize a molecule using a range of spectroscopic techniques (*Synthesis*)

Suggested Readings

1. Hollas, J. M., Modern Spectroscopy, Wiley
2. Banwell, C. N., McCash, E. M. Fundamentals of Molecular Spectroscopy, Tata McGraw Hill.
3. Pavia, D.L., Lampman, G. M., Kriz, G. S., Introduction to Spectroscopy, Brooks/Cole Cengage Learning.
4. Drago, R.S., Physical Methods in Chemistry, Saunders, Thomson Learning
5. Silverstein, R.M., Webster, F. X., Kiemle, D. J., Bryce, D. L., Spectrometric Identification of Organic Compounds, Wiley India
6. Kemp, W., Organic Spectroscopy, Palgrave Macmillan.
7. Field, L. D., Sternhell, S., Kalman, J. R., Organic Structures from Spectra, John Wiley and Sons.
8. Rankin, D.W.H., Mitzel, N., Morrison, C. Structural Methods in Molecular Inorganic Chemistry, Wiley.

CHGC0011: INTRODUCTION TO GREEN AND ENVIRONMENTAL CHEMISTRY

(3 Credits - 45 hours)

Objective: The course is aimed at familiarizing students with the concepts and techniques of environmental chemistry and introduction to green chemistry.

Module I: Environmental pollution (15 hours)

Chemistry and environmental pollution: Chemical hazards, chemical disasters, Water pollution, air pollution and soil pollution; agricultural pollution, pollution by plastics; environmental biochemistry, toxicological chemistry, e-pollution and nuclear hazard.

Environmental analysis: Analysis of water and wastewater, solid-wastes and air pollution.

Module II: Environmental protection (10 hours)

Environmental protection: pollution prevention, green chemistry, biodegradation, water and wastewater purification – removal of arsenic, iron, fluoride, etc.; air purification, waste minimization, industrial and municipal waste treatment and soil remediation

Module III: Principles and concepts of Green Chemistry (10 hours)

Green chemistry: Principles of green chemistry, development of green chemistry; atom economy reactions – rearrangement reactions, addition reactions; atom uneconomic reactions–sublimation, elimination; toxicity measures, need of green chemistry in day to day life.

Module IV: Emerging Green Technology and alternative energy sources (10 hours)

Design for energy efficiency, photochemical reactions – advantages, disadvantages; microwave technology in chemistry - microwave heating, microwave assisted reactions, ultrasound assisted reactions, reactions in organic liquids, reactions in aqueous media, electrochemical synthesis-examples. Supercritical solvents, ionic liquids, green catalyst, auto-exhaust catalyst and clean technology. Real world examples.

COURSE/LEARNING OUTCOMES

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

CO1: Acquire knowledge on environmental chemistry and concepts of environmental friendly chemistry (*Knowledge*)
CO2: Understand principles of green chemistry, green solvent, energy efficiency, renewable source of energy, cause, prevention of all types of pollution (*Comprehension*)
CO3: Apply their knowledge of green chemistry and environmental chemistry in the applied research field (*Application*)
CO4: Aanalyze and solve the problems related to environment (*Analysis*)
CO5: Identify the cause of environmental degradation and able to find the solution for its protection (*Synthesis*)
CO6: Implement the green techniques for research and development in the future course of time (*Evaluation*)

Suggested Readings

1. Manahan, S. E., Environmental Chemistry, 9 th edn (CRC Press, Boca Raton, 2010).
2. Anastas, P. T. and Warner, J. C., Green Chemistry: Theory and Practice, (Oxford University Press, 1998).
3. Moore, J. W. & Moore, E. A., Environmental Chemistry, Academic Press, London (1976).
4. Lancaster, M., Green Chemistry: An Introductory Text, RSC.
5. Hutzinger, O., Handbook of Environmental Chemistry, Springer-Verlag, 1991.
6. Cann, M. C. & Connelly, M. E., Real World Cases in Green Chemistry, ACS, , 2000.

CHAI0012: ADVANCED INORGANIC CHEMISTRY II (FOR BATCH 2017-2019)

(4 Credits - 60 hours)

***Objectives**: The objective of this course is to teach students core concepts of analytical techniques used in inorganic analysis, the role of metal ions in the function of biological macromolecules, supramolecular chemistry and nanomaterials*

Module I: Special Analytical Techniques (25 hours)

a) Principles and applications of Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Spectroscopy (EDS/EDX),Transmission Electron Microscopy (TEM), Selected Area (Electron) Diffraction (SAED), Thermal methods of analysis –thermogravimetric analysis (TGA), Differential Thermal Analysis (DTA), Differential Thermogravimetry (DTG), Differential Scanning Calorimetry (DSC), Powder X-ray Diffraction, Single crystal X-ray diffraction
b) Principles and applications of atomic absorption spectroscopy, atomic emission spectroscopy, Infrared and Raman Spectroscopy, Magnetic Resonance Spectroscopy- Electron Spin Resonance (ESR) of d^1 and d^9 transition metal ions in cubic and tetragonal ligand fields, applications of ^{31}P, ^{19}F, ^{119}Sn and ^{195}Pt nuclear magnetic resonance(NMR) spectrocopy

Module II: Bioinorganic Chemistry (15 hours)

Role of metal ions in biology and their toxic effects; Iron management in biological systems – siderophores, ferritin and transferrin; Dioxygen storage and transport – structure of myoglobin and haemoglobin, cooperativity of O_2 binding in haemoglobin, Bohr effect and Hill coefficients; Electron transfer proteins (structure and function) - Fe-S proteins, cytocchromes and plastocyanines; Structure of nitrogenase and its role in di-nitrogen fixation; Structure and function of vitamin B_{12} and mechanism of 1,2-shift reaction; Inorganic therapeutics - chelate therapy, metal based drugs.

Module III: Supramolecular Chemistry (10 hours)

a) Molecular recognition – Receptors, design and synthesis of co-receptors and multiple recognition, hydrogen bonds – strong, weak and very weak H-bonds, utilization of H-bonds to create supramolecular structures, use of H-bonds in crystal engineering and molecular recognition, chelate and macrocyclic effects.
b) Cation binding hosts, binding of anions, binding of neutral molecules, binding of organic molecules
c) Supramolecular reactivity and catalysis, transport processes and carrier design, supramolecular devices, supramolecular photochemistry

Module IV: Nanomaterials (10 hours)

General introduction to nanomaterials and emergence of nanotechnology; Moore's law; synthesis of nanoparticles of gold, rhodium, palladium, platinum, and silver; Synthesis of nanoparticle semiconductors, nanowires and nanorods; Techniques of synthesis: electroplating and electrophoretic deposition, conversion through chemical reactions and lithography; Thin films: Chemical vapor deposition and Atomic layer deposition techniques; Carbon fullerenes and nanotubes. Applications of nanoparticles.

COURSE/LEARNING OUTCOMES

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

CO1: Gain the concepts of analytical techniques used in inorganic analysis, the role of metal ions in the function of biological macromolecules and also the concepts of supramolecular chemistry and nanomaterials (Knowledge)
CO2: Understand (i) principles and application of various analytical techniques, (ii) biological uses of different metal ions, and (iii) Uses of nano materials in practical field. (Comprehension)
CO3. Apply the knowledge to proper use of various analytical techniques to characterize the chemical compounds which are synthesized in laboratories and industries.(Application)
CO4: Analyze the different uses of biomolecules, nano materials, supramolecules and various analytical techniques.(Analysis)
CO5: Apply their analytical skills for characterization of chemical compounds. (Synthesis)
CO6: Judge the need of different analytical techniques for characterization (Evaluation)

Suggested Readings

1. D. B. Murphy, M. W. Davidson, Fundamentals of Light Microscopy and Electronic Imaging, Wiley.
2. D. B. Williams, C. B. Carter, Transmission Electron Microscopy A Textbook for Materials Science, Springer.
3. D. L. Nelson, M. M. Cox, Lehninger Principles of Biochemistry (W. H. Freeman &Co.).
4. R. H. Abeles, P. A. Frey, W. P. Jencks, Biochemistry, Jones and Bartlett Publishers, Boston.
5. D. Voet, J. G. Voet, C. W. Pratt, Fundamentals of Biochemistry: Life at the Molecular Level.
6. I. Bertini, H. B. Gray, S. J. Lippard, J. S.Valentine, Bioinorganic Chemistry; Viva books Pvt. Ltd.
7. J. A. Cowan, Inorganic Biochemistry: An introduction, Wiley.
8. J. W. Steed and J. L. Atwood, Supramolecular chemistry John Wiley
9. J. M. Lehn Supramolecular Chemistry : Concepts and Perspectives Wiley-VCH
10. G.Zhong Cao. Nanostructures and Nanomaterials: Synthesis, Properties and Applications, Imperial College Press (2004)
11. G. R. Desiraju Ed. Perspectives in Supramolecular Chemistry and Molecular Recognition Wiley
12. M. Ratner & D. Ratner. Nanotechnology: A Gentle Introduction to the Next Big Idea, Pearson Education.

CHAI0012: ADVANCED INORGANIC CHEMISTRY II (FOR BATCH 2018-2020)

(4 Credits - 60 hours)

***Objectives**: The objective of this course is to teach students core concepts of analytical techniques used in inorganic analysis, the role of metal ions in the function of biological macromolecules, supramolecular chemistry and nanomaterials*

Module I: Special Analytical Techniques (25 hours)

a) Principles and applications of Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Spectroscopy (EDS/EDX),Transmission Electron Microscopy (TEM), Selected Area (Electron) Diffraction (SAED), Thermal methods of analysis –thermogravimetric analysis (TGA), Differential Thermal Analysis (DTA), Differential Thermogravimetry (DTG), Differential Scanning Calorimetry (DSC), Powder X-ray Diffraction, Single crystal X-ray diffraction

b) Principles and applications of atomic absorption spectroscopy, atomic emission spectroscopy, Infrared and Raman Spectroscopy, Magnetic Resonance Spectroscopy- Electron Spin Resonance (ESR) of d^1 and d^9 transition metal ions in cubic and tetragonal ligand fields, applications of ^{31}P, ^{19}F, ^{119}Sn and ^{195}Pt nuclear magnetic resonance(NMR) spectrocopy

Module II: Bioinorganic Chemistry (15 hours)

Role of metal ions in biology and their toxic effects; Iron management in biological systems – siderophores, ferritin and transferrin; Dioxygen storage and transport – structure of myoglobin and haemoglobin, cooperativity of O_2 binding in haemoglobin, Bohr effect and Hill coefficients; Electron transfer proteins (structure and function) - Fe-S proteins, cytocchromes and plastocyanines; Structure of nitrogenase and its role in di-nitrogen fixation; Structure and function of vitamin B_{12} and mechanism of 1,2-shift reaction; Inorganic therapeutics - chelate therapy, metal based drugs.

Module III: Introduction to Supramolecular Chemistry (5 hours)

Supramolecular chemistry: Definition, supramolecular host-guest compounds, macrocyclic effect, nature of supramolecular interactions.

Module IV: Introduction to Nanomaterials (5 hours)

Fabrication of nanomaterials – top-down and bottom-up approaches; solution-based synthesis of nanoparticles; other methods of nanomaterial synthesis – brief overview.Carbon fullerenes and nanotubes.Applications of nanoparticles.

Module V: Nuclear and Radiochemistry (10 hours)

Radioactive decay and equilibrium. Mass defect and binding energy, packing fraction, stability of nucleus, neutron-proton ratio, Artificial radioactivity. Nuclear reactions; Q value, cross sections, types of reactions, Chemical effects of nuclear transformations; fission and fusion, fission products and fission yields.Radioactive techniques; nuclear reactors, separation of isotopes; tracer technique, neutron activation analysis, counting techniques such as G.M. ionization and proportional counter. Application of radio-isotopes in agriculture, medicine and industry. Radiocarbon dating

COURSE/LEARNING OUTCOMES

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

CO1: Gain the concepts of analytical techniques used in inorganic analysis, the role of metal ions in the function of biological macromolecules and also the concepts of supramolecular chemistry, nanomaterials and nuclear chemistry (*Knowledge*)

CO2: Have an understanding of (i) principles and application of various analytical techniques, (ii) nuclear reactions, (iii) biological uses of different metal ions, and (iv) uses of nano materials in practical field. (*Comprehension*)

CO3: The knowledge to proper use of various analytical techniques to characterize the chemical compounds which are synthesized in laboratories and industries (*Application*)

CO4: Analyze the different uses of biomolecules, nano materials, supramolecules and various analytical techniques (*Analysis*)

CO5: Apply their analytical skills for characterization of chemical compounds (*Synthesis*)

CO6: Judge the need of different analytical techniques for characterization (*Evaluation*)

Suggested Readings

1. D. B. Murphy, M. W. Davidson, Fundamentals of Light Microscopy and Electronic Imaging, Wiley.
2. D. B. Williams, C. B. Carter, Transmission Electron Microscopy A Textbook for Materials Science, Springer.
3. D. L. Nelson, M. M. Cox, Lehninger Principles of Biochemistry (W. H. Freeman &Co.).

4. R. H. Abeles, P. A. Frey, W. P. Jencks, Biochemistry, Jones and Bartlett Publishers, Boston.
5. D. Voet, J. G. Voet, C. W. Pratt, Fundamentals of Biochemistry: Life at the Molecular Level.
6. I. Bertini, H. B. Gray, S. J. Lippard, J. S.Valentine, Bioinorganic Chemistry; Viva books Pvt. Ltd.
7. J. A. Cowan, Inorganic Biochemistry: An introduction, Wiley.
8. J. W. Steed and J. L. Atwood, Supramolecular chemistry John Wiley
9. J. M. Lehn Supramolecular Chemistry : Concepts and Perspectives Wiley-VCH
10. G.Zhong Cao. Nanostructures and Nanomaterials: Synthesis, Properties and Applications, Imperial College Press (2004)
11. G. Friedlander, J.W. Kennedy, E. S. Macias, and J. M. Miller; Nuclear and Radiochemistry, John Wiley, New York.
12. G. R. Desiraju Ed. Perspectives in Supramolecular Chemistry and Molecular Recognition Wiley
13. M. Ratner & D. Ratner. Nanotechnology: A Gentle Introduction to the Next Big Idea, Pearson Education.

CHAO0013: ADVANCED ORGANIC CHEMISTRY-II

(4 Credits - 60 hours)

Objective: *This course will discuss organic photochemistry, pericyclic reactions, heterocyclic chemistry and Synthetic Strategies towards the synthesis of organic molecules.*

Module I: Organic Photochemistry (15 hours)

a) Introduction to organic photochemical-photophysical processes, chemiluminescence, photosensitization.
b) Photochemistry of carbonyl compounds - α-cleavage, β-cleavage, intramolecular H-abstraction, addition to π-systems- Paterno-Buchi reaction, electron transfer reactions, Photochemistry of olefins - photostereomutation of cis-trans isomers, optical pumping, cycloaddition, photochemistry of conjugated polyenes.
c) Photochemistry of enones, photo-rearrangement reactions- di-π-methane rearrangement, Photo-rearrangement of cyclohexadienones, Barton rearrangement, singlet oxygen photochemistry.

Module II: Pericyclic Reactions (15 hours)

Main features of pericyclic reactions; Woodward-Hoffman rules, correlation diagram and FMO approaches; Electrocyclic reactions – conrotatory and disrotatory motions for 4n and 4n+2 systems;. Cycloadditions – antarafacial and suprafacial additions, [2+2] and [4+2] reactions (hv and Δ), 1,3-dipolar cycloadditions and chelotropic reactions; Sigmatropic [i,j] shifts of C-H and C-C bonds; Sommelet-Hauser, Claisen, thio-Claisen, Cope and aza-Cope rearrangements.

Module III: Introduction to Heterocyclic chemistry (15 hours)

Nomenclature of heterocyclic compounds. Structure, reactivity, synthesis and reactions Pyridine, quinoline, Isoquinoline, Indole, Benzofuran, Benzothiophene, pyrazole, Imidazole, oxazole, Isoxazole, Thiazole, Isothiazole, pyridazine, pyrimidine and pyrazine.

Module IV: Synthetic Strategies (15 hours)

Synthons and synthetic equivalents, disconnection approach, functional group inter-conversions, importance of order of events in organic synthesis, one group and two group C-X disconnections, chemoselectivity, reversal of polarity, cyclisation reactions, amine synthesis.

One group C-C disconnections – alcohols and carbonyl compounds, regioselectiviity, alkene synthesis, use of acetylenes and aliphatic nitro compounds in organic synthesis.

Two group C-C disconnections – Diels-Alder reaction, 1,3-difunctionalised compounds, α, β-unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds, Michael addition and Robinson annelation. Principle of protection of alcohol, amine, carbonyl and carboxyl groups; Common protecting groups.

COURSE/LEARNING OUTCOMES

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

CO1: The detailed knowledge on organic photochemistry, pericyclic reactions, heterocyclic chemistry and Synthetic Strategies towards the synthesis of organic molecules (*Knowledge*)

CO2: Have conceptual understanding of FMO approach, suprafacial antarafacial, conrotatory-disrotatory motion, Woodward Hoffmann rules, Electrocyclic reactions, Cycloaddition reactions, Sigmatropic rearrangement reactions, Chelatropic rection, Ene reaction and Correlation diagrams of different types of reactions (*Comprehension*)

CO3: Apply their knowledge of pericyclic reactions, photochemistry, heterocyclic and retrosynthesis in research and industrial field (*Application*)

CO4: Analyze problems related to pericyclic reactions, photochemistry, heterocyclic compounds and synthetic strategy (*Analysis*)

CO5: Understand heterocyclic compounds and would be able to provide analytical solution towards their synthesis (*Synthesis*)

CO6: Demonstrate different theories in pericyclic reaction and photochemistry in order to check feasibility of chemical reaction (*Evaluation*)

Suggested Readings

1. J.Clayden, N. Greeves, S. Warren; Organic Chemistry, Oxford University Press.
2. Norman, R. O. C., Coxon, J. M. Principles of Organic Synthesis, (Blackie Academic and Professional, 1993).
3. M. Harmata. Strategies and Tactics in Organic Synthesis 4 & 5, Academic Press (2004).
4. L. A. Paquette, Modern Heterocyclic Chemistry, John Wiley, (2007)

CHAP0014: ADVANCED PHYSICAL CHEMISTRY II

(4 Credits - 60 hours)

Objective: This objective of this course to make the students familiar with solid state chemistry, surface chemistry and catalysis.

Module I: Solid state (18 hours)

Structures of solids - crystal planes and Miller indices, Bragg's law and applications, Debye-Scherrer powder method, nanoparticles and nanotechnology, defects in solids, thermodynamics of Schottky and Frenkel defect formation, thin films, Langmuir-Blodget film. Electrical properties of solids, intrinsic and extrinsic semiconductors, doping of semiconductors, p-n junction, super conductors, conducting polymers, organic conductors, molecular electronic devices, nonlinear optical materials, optical reflectance, photoconduction, ionic conductors, Meissner effect, BCS theory.

Module II: Surface Chemistry (22 hours)

a) Electrical aspects of surface chemistry, Electro kinetic phenomena, the structure of electrical double layer, Zeta potential and colloidal stability, Measurement of zeta potential. Surfactants – definition and classification, micelle formation and determination of critical micelle concentration.Reverse micelle and its application, solubilization, microemulsion.

b) Adsorption of gases on solid surfaces – Langmuir's theory and its limitations. Derivation of BET equation – determination of surface area of an adsorbent, thermodynamics of adsorption processes. Capillary condensation – adsorption in micro pores, Kinetics of heterogeneous catalysis – Langmuir-Hinselwood model and Eley-Riedel mechanism.

Module III: Catalysis (20 hours)

Catalysts, classification of catalysts. Characterization of catalysts: Methods of surface analysis, surface area, pore size, void fraction, particle size, mechanical strength, surface chemical composition, surface acidity and reactivity.

Homogeneous catalysis: Atom transfer and electron transfer processes. Role of transition metal ions with special reference to Cu, Pd, Pt, Co, Ru and Rh, catalysis in non-aqueous media.Rates of homogeneously catalysed reactions, turnover number and frequency.Catalysis of isomerisation, hydrogenation, oxidation and polymerisation reactions. Metal clusters in catalysis, phase-transfer catalysis.

COURSE/LEARNING OUTCOMES

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

CO1: Recall the basic structure and properties of solids, different surface processes and types catalyst and catalytic processes (*Knowledge*)

CO2: Understand the electrical properties in terms of semiconductor, superconductor etc., classification of different surfactants, and process of adsorption gases on solid surfaces, types and characterization of catalyst (*Comprehension*)

CO3: Apply the knowledge solid chemistry to understand about different types of conducting materials, interpret the results of adsorption processes in terms of known isotherms, interpret the electro kinetic phenomena of surfaces, and explain the mechanism of different types of catalytic processes (*Application*)

CO4: Analyse the application of solid state chemistry in terms of electrical, magnetic and optical properties, classification of surfactants, process of surface adsorption and types catalysed reaction in terms of homogeneous and heterogeneous catalysis (*Analysis*)

CO5: Understanding of solid state chemistry, electro kinetic phenomena, colloids, surfactants, different types adsorption isotherms, different types of catalyst and catalytic process (*Synthesis*)

CO6: Apply the properties of solids to interpret the conducting behaviour of different types of materials, derive different adsorption isotherms, and interpret the different catalytic processes (*Evaluation*)

Suggested Readings

1. A. R. West. Solid State Chemistry and its Applications, John Wiley.
2. D.K. Chakrabarty. Solid State Chemistry, New Age Publishers.
3. New Directions in Solid State Chemistry- C N R Rao and J Gopalakrishnan
4. Catalytic Chemistry, B. C. Gates, John Wiley & Sons.
5. Fundamentals of Industrial Catalytic Processes C.H. Bartholomew, R. J. Furrauto, Wiley Interscience.
6. M. J. Rosen. Surfactants and Interfacial Phenomena, John Wiley.
7. Atkins, J. Paula; Physical Chemistry, Oxford University Press.

CHSP0015: SPECIAL TOPICS IN BIOCHEMISTRY

(3 Credits - 45 hours)

Objective: *The aim of this paper is to introduce properties of biomolecules, their roles in health and disease and chemical and biochemical methods of synthesizing them.*

Module I: Carbohydrates (9 hours)

Characteristics and properties of carbohydrates – nomenclature and stereochemistry of monosaccharides, typical carbohydrates, sweetening agents; chemistry of monosaccharides – cyclic structures, Haworth and conformational representations, oxidation, determination of ring size, structure of correlations, synthesis, glycosides; Oligosaccharides and Polysaccharides - sucrose and other oligosaccharides, starch, cellulose and other polysaccharides

Module II: Lipids (9 hours)

a) Glycerol derivatives- fats and oils, fatty acid biosynthesis, phospholipids, glycolipids, properties of lipid aggregates, micelles, bilayers, liposomes and biological membranes

b) Steroids – structural characteristics, synthesis and biosynthesis, steroid hormones; prostaglandins – structural characteristics, synthesis and biosynthesis;

c) Pheromones – structure and origin, synthesis

Module III: Nucleosides, Nucleotides and Nucleic acids (9 hours)

a) Nucleosides and Nucleotides: The structure of nucleosides, chemistry of nucleosides, nucleotides; sunlight, carbohydrates and energy – photosynthesis, glycolysis and metabolic energy;

b) Nucleic acids: Structure and function of DNA, RNA (m-RNA, t-RNA, r-RNA), an overview of gene expression (replication, transcription and translation), genetic code (origin, Wobble hypothesis and other features), genetic errors, carcinogenesis and recombinant DNA technology.

Module IV: Amino acids, Peptides and Proteins (9 hours)

a) Amino Acids – structural characteristics, acid-base properties, synthesis;
b) Peptides – amino acid analysis, terminal group analysis, the amino acid sequence, synthesis;
c) Proteins, enzymes and biosynthesis – the alpha-helix, other secondary and tertiary structural characteristics, enzymes; protein synthesis;

Module V: Vitamins (9 hours)

Vitamins: Classification; occurrence; chemistry of Vitamins – structure elucidation and synthesis; biochemical functions; deficiency syndromes.

COURSE/LEARNING OUTCOMES

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

CO1: Explain the different types of biomolecules present in living organisms, how they function, how they are synthesized biochemically and their modes of synthesis in the lab (*Knowledge*)
CO2: Understand the properties of biomolecules and their interplay of that takes place in living organisms for the sustenance of life (*Comprehension*)
CO3: Differentiate between different biological molecules based on their properties (*Application*)
CO4: Understand why certain biomolecules are needed for a particular set of processes (biomolecular pathways) to take place efficiently in a living system and will be able to compare it with the conditions under which those same processes take place outside a living system, in a lab. E.g., comparison of biochemical synthesis of a peptide or protein as compared to the chemical synthesis of the same (*Analysis*)
CO5: Have a working understanding of how certain biomolecular pathways function and have the knowhow to assess what the necessary components are for those pathways and processes. They will know how to recreate some of those processes in vitro (*Synthesis*)
CO6: Given a particular set of conditions and molecules, they will be able to tell whether a particular process can take place or not (*Evaluation*)

Suggested Readings

1. S. H. Pine, J. B. Hendrickson, D. J. Cram, G. S. Hammond Organic Chemistry McGraw Hill
2. J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press
3. J. M. Berg, J. L. Tymoczco, G. J. Gatto, L. Stryer Biochemistry W. H. Freeman & Co
4. D. Voet and J. G. Voet Biochemistry John Wiley and SonsBerg
5. D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, W. H. Freeman & Co.

CHAS0016:APPLIED SPECTROSCOPY

(4 Credits - 60 hours)

Objective: This course will discuss the application of various spectroscopic methods like IR, NMR, Mass spectrometry.

Module I (15 hours)

a) Infrared Spectroscopy: Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines; Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acid anydrides, lactones, lactams, conjugated carbonyl compounds); Effects of H-bonding and solvent effect on vibrational frequency, extension to various organic molecules for structural assignment.
b) Mass Spectrometry: Mass spectral fragmentation of organic compounds, common functional groups; molecular peak, McLafferty rearrangements, examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Module II(15 hours)

a) Nuclear Magnetic Resonance Spectroscopy:
Approximate chemical shift values of various chemically non-equivalent protons and correlation to protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic); Protons bonded to other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides, SH); Chemical exchange, effect of deuteration; complex spin-spin interaction between two, three, four and interacting

nuclei (first order spectra); Complex interaction, virtual coupling, stereochemically hindered rotation, Karplus curve, variation of coupling constant with dihedral angle, nuclear magnetic double resonance, simplification of complex spectra using shift reagents, Fourier transform technique and nuclear Overhauser effect (NOE).

b) C-13 NMR Spectroscopy:
Chemical shift (aliphatic, olefinic, alkynes, aromatic, hetero-aromatic, carbonyl carbon); Coupling constants, two-dimensional NMR spectroscopy, NOESY, DEPT and INEPT terminologies.

c) Applications of IR, NMR and Mass spectroscopy for structure elucidation of organic compounds.

COURSE/LEARNING OUTCOMES

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

CO1: Explain different spectroscopic and spectrometric techniques like FT-IR, 1H NMR, 13C-NMR, Mass spectrometry etc(*Knowledge*)
CO2: Understand the concepts of each technique and the types of molecules that can be studied with each technique and the conclusions to draw from the analyses (*Comprehension*)
CO3: Apply their knowledge of different spectroscopic techniques in structure interpretation of unknown compounds (*Application*)
CO4: Analyze problems related to FT-IR, 1H NMR, 13C-NMR, Mass spectrometry (*Analysis*)
CO5: Identify the unknown compounds for their suitable analytical and industrial use (*Synthesis*)
CO6: Decide the set of steps necessary to elucidate the undefined molecular structure of various compounds (*Evaluation*)

Suggested Readings

1. R. M. Silverstein, G. C. Basseler & T. C. Morill.Spectroscopic Identification of Organic Compounds, John Wiley (1981).
2. W. Kemp. Organic Spectroscopy (3rd edn.), McMillan Press Ltd. (1991).
3. D Williams & I. Fleming.Spectroscopic Methods in Organic Chemistry, McGraw Hill (1989).
4. C. N. Banwell & E. M. McCash. Fundamentals of Molecular Spectroscopy, Tata McGraw-
5. Hill, New Delhi (2006).
6. D.L. Pavia, G. M. Lampman, G. S. Kriz Introduction to Spectroscopy, Harcourt College Publisher (2001) NY.

CHRM0017: RESEARCH METHODOLOGY FOR CHEMISTRY

(3 Credits - 45 hours)

Objectives: *To expose students to the methods of doing research, make them aware of safe procedures for handling chemicals, to train them to assimilate ideas from scientific articles through critical reading and to enable them to identify their topics for their fourth semester research projects.Mode of Assessment: Modules I-III will be assessed based on a written examination (2 credits) while Module IV will be assessed on the basis of a seminar (1-credit).*

Module I: Literature Survey, Methods of Scientific Research and Writing Scientific Papers (10 hours)

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

Module II Chemical Safety and ethical handling of chemicals (7 hours)

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 III: Data Analysis (13 hours)

The Investigative Approach: Making and Recording Measurements. SI Units and their use.Scientific method and design of experiments.

Analysis and Presentation of Data: Descriptive statistics. Choosing and using statistical tests. Chemometrics, Analysis of variance (ANOVA), Correlation and regression, Curve fitting, fitting of linear equations, simple linear cases, weighted linear case, analysis of residuals, General polynomial fitting, linearizing transformations, exponential function fit, r and its abuse. Basic aspects of multiple linear regression analysis.

Module IV: Project Proposal Writing (15 hours) (Seminar Module)

In this module, students will be reviewing scientific articles, writing reports on the papers they have read and finally prepare a research proposal.

COURSE/LEARNING OUTCOMES

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

CO1: Learn about resources for research literature, they will learn how to work safely with chemicals, how to analyze data and to read scientific articles and gain information on research topics that are of interest to them (Knowledge)

CO2: Use print and digital resources, they will develop awareness on safety protocols they need to follow while using chemicals, understand principles of data analysis and understand underlying ideas on research topics they choose (Comprehension)

CO3: Apply their knowledge of print and digital resources to identify sources for research articles of interest to them, handle chemicals safely in the lab, dispose of chemicals the proper way, analyze data (Application)

CO4: Identify scientific articles that are of relevance to them, they should be able to choose the methods they need to analyze data, find out the flow of ideas and logic in papers they read (Analysis)

CO5: Review literature, analyze data, have a good estimate of where research on a topic of interest stands and come up with a workable research proposal (Synthesis)

CO6: Discern the loopholes and drawbacks of methods they come across in scientific articles, evaluate data - know which method works best for analyzing a given data set (Evaluation)

Suggested Readings

1. Dean, J. R., Jones, A. M., Holmes, D., Reed, R., Weyers, J. & Jones, A. (2011) Practical skills in chemistry. 2nd Ed. Prentice-Hall, Harlow.
2. Hibbert, D. B. & Gooding, J. J. (2006) Data analysis for chemistry. Oxford University Press.
3. Topping, J. (1984) Errors of observation and their treatment.Fourth Ed., Chapman Hall, London.
4. Harris, D. C. Quantitative chemical analysis. 6th Ed., Freeman (2007) Chapters 3-5.
5. Levie,R. de, How to use Excel in analytical chemistry and in general scientific data analysis. Cambridge Univ. Press (2001) 487 pages.
6. Chemical safety matters – IUPAC – IPCS, Cambridge University Press, 1992.
7. OSU safety manual 1.01.

CHCM0018: MATERIALS CHEMISTRY

(3 Credits - 45 hours)

Objective: *This course aims to provide an understanding of how molecular structure affects the properties of materials and to predict and control material properties through an understanding of atomic, molecular, crystalline, and microscopic structures of engineering materials.*

Module I: Solid state ionic conductors (11 hours)

Structure, physico-chemical principles, applications of Ferrous alloys, Fe-C phase transformations in ferrous alloys, non-ferrous alloys, properties and applications of ferrous and non-ferrous alloys, magnetic alloy, metallic glass, ceramics, nano-materials and optical materials.

Module II: Polymeric materials and inorganic Polymers (12 hours)

a) Molecular shape, structure and configuration, crystallinity, stress-strain behaviour, thermal behaviour, polymer types and their applications, conducting and ferro-electric properties.

b) Polysiloxanes, polysilanes, polyphosphazenes, polymeric sulphur - synthesis, structure, properties and applications, co-ordination polymers and organometallic polymers.

Module III: Liquid crystals and high Tc materials (12 hours)

Nomatic, smectic, cholesteric - properties and applications, high Tc materials, defect perovskites, high Tc superconductivity in cuprates, 1-2-3 and 2-1-4 materials, anisotropy, temperature dependence of electrical resistance, optical phonon modes, superconducting state, heat capacity, coherence length, elastic constants, position lifetimes, micro-wave absorption pairing and multi gap structure in high Tc materials, applications of high Tc materials.

Module IV: Organic solids and molecular devices (10 hours)

a) Conducting organics, organic superconductors, magnetism in organic materials, fullerenes, doped fullerenes as superconductors.
b) Molecular rectifiers and transistors, artificial photosynthetic devices, sensors, clay -polymer and carbon composites, phosphor and laser materials.

COURSE/LEARNING OUTCOMES

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

CO1: Recall the knowledge of basic structure of materials like ionic solids, high Tc material, inorganic polymer, liquid crystals etc. (*Knowledge*)
CO2: Understand how molecular structure affects the properties of materials (*Comprehension*)
CO3: Explain the properties of different materials on the basis of their structures (*Application*)
CO4: Analyse the application of different types of materials in different field (*Analysis*)
CO5: Understanding of the structure and properties of different types of engineering materials useful in day to day life (*Synthesis*)
CO6: Predict and control material properties through an understanding of atomic, molecular, crystalline, and microscopic structures of engineering materials (*Evaluation*)

Suggested Readings

1. Keer, H.V. Principles of the Solid State, Wiley Eastern
2. Callister, W.D. Material Science and Engineering- An Introduction, Wiley, New York
3. Lever, K.D.; Alexander, J.M.; Rawlings, R.D. Materials Science , J.C. Sanderson, ELBS
4. Marck, J.E.; Allcock, H.R.; West, R. Inorganic Polymers, Prentice Hall
5. Solid State Physics, N.W. Ashcroft and N.D. Mermin, Saunders College.
6. Thermotropic Liquid Crystals, Ed., G.W. Gray, John Wiley.
7. Handbook oN Liquid Crystals, Kelker and Hatz, Chemie Verlag.

CHCC0019: COMPUTATIONAL CHEMISTRY

(3 Credits - 45 hours)

***Objective**: To introduce computational methods to students to enable them to write simple programs, perform chemical calculations, simulate the dynamics of molecules and reactions as well as for them to learn how to identify and use databases relevant to chemists*

Module I: Programming and some numerical methods in chemistry (15 hours)

Introduction to Linux/UNIX and shell scripts; programming in C /python; Least squares fit; root finding; numerical differentiation; integration and solution of ODE; matrix multiplication, inversion and diagonalization; interpolation; pattern recognition techniques and molecular graphics

Module II: Molecular Mechanics (MM) Methods (10 hours)

Basic geometrical description of molecules; force field energy, force field parameterization, differences between force fields, computational considerations, validation of force fields, advantages and limitations of force field methods, transition structure modelling, hybrid force field – electronic structure methods

Module III: Electronic structure (or Quantum Mechanical, QM) Methods

Many electron systems, Hartree-Fock method, basis sets, electron correlation and its treatment, basics of density functional theory, DFT based reactivity descriptors. Introduction to popular softwares (like Gaussian, DMol, GAMESS).Applications to simple molecular systems. Monte Carlo and molecular dynamics simulations

Module IV: Combined QM/MM methods (15 hours)

Implications of the choice of QM and MM methods; Application of QM/MM methods in organic, inorganic and organometallic systems including bio-organic and bio-inorganic molecules.

Quantitative structure activity relation (QSAR): Early approaches, topological indices, fragmental models; quantum mechanical descriptors

COURSE/LEARNING OUTCOMES

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

CO1: A programming language to perform chemical calculations and simulations; they will learn about the similarities and differences between theoretical methods such as HF (Hartree-Fock), DFT(Density Functional Theory) and force field methods (*Knowledge*)

CO2: Describe the principles involved in the different theoretical methods used for simulations (*Comprehension*)

CO3: Apply QM or MM methods to simulate or model chemically related problems (*Application*)

CO4: Identify the advantages and disadvantages of the various methods they learn for simulations/ modelling (*Analysis*)

CO5: Choose suitable methods for calculating electronic properties of simple molecules and crystals. (*Synthesis*)

CO6: Critically analyze the calculated properties of a chosen system (a molecule) after using a method for calculating its electronic properties (*Evaluation*)

Suggested Readings

1. Hinchcliffe, A. Modelling Molecular Structure, John Wiley and Sons
2. Holtje, H. D., Sippl, W., Rognan, D and Folkers, G. Molecular Modeling Basic Principles and Applications, Wiley-VCH
3. Leach, A. R. Molecular Modeling: Principles and Applications, Pearson Education
4. Jensen, F. Introduction to computational chemistry, John Wiley and Sons Press
5. W. H., Tenkolsky, S. A., Vetterling, W. T., and Flannery, B. P. Numerical Recipes in Fortran/C, Cambridge University Press
6. Dawson, M. Python programming for the absolute beginner, Course Technology, CENGAGE learning
7. Vine, M. C programing for the absolute beginner, Thomson Course Technology

CHFC0020: FOOD CHEMISTRY

(3 Credits - 45 hours)

Objective: *This course is aimed at familiarizing students with the importance of food and nutrition, deficiency diseases, its prevention and food additives/preservatives.*

Module I: Basic idea of food and nutrients (2 hours)

Relationship between food, nutrition and health; functions of food: physiological and social.

Module II: Major nutritional constituents (12 hours)

Functions, sources, deficiency/excess diseases of the following major nutrients:

(a) Carbohydrates; (b) Amino acids and proteins; (c) Lipids, sterols, metabolite; (d) Mineral;

(e) Vitamins: A, D, E, K

Module III: Different categories of food (7 hours)

Selection, nutritional contribution and changes during Cooking/Ripening/storage 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: Nutritional needs during life cycle (6 hours)

Body composition, Influence of Nutrition, Physical Activity, Growth and Aging; Maternal Nutrition, Nutritional Requirement during Infancy, Childhood; Diet, Nutrition and Adolescence; Nutrition in the Elderly.

Module V: Prevention and management of deficiencies (6 hours)

Causes, symptoms, treatments and preventions of the following:
Protein-Energy malnutrition among children; Vitamin A deficiency; Iron deficiency; Fluorosis: Over nutrition, obesity, coronary heart diseases, Diabetes (Type I & II); Diet, Nutrition and cancer.

Module VI: Dietary goals & guidelines (10 hours)

National Perspectives; nutritional perspectives of vegetarian diets; Social Health Issues – Smoking, Alcoholism, Drug Addiction, AIDS and AIDS Control Programs; Food Preservation & Food Additives & Colorants.

Module VII: Entrepreneurship Development (2 hours)

Scope of Food based items for Entrepreneur Development in North East India & Identification of Resources; Development of a Project Plan.

COURSE/LEARNING OUTCOMES

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

CO1: Familiar with importance of food and nutrition, deficiency diseases, its prevention and food additives (Knowledge)
CO2: Have conceptual understanding of relationship between food, nutrition & health (Comprehension)
CO3: Apply their knowledge of food chemistry into personal life and food research field for societal development (Application)
CO4: Analyze and solve different problems related to food (Analysis)
CO5: Identify the cause of food borne illness and other food related diseases and be able to find a solution for its cure & prevention (Synthesis)
CO6: Explain/compare food as major dietary constituents, naturally occurring food, their energy/ nutritional values (Evaluation)

Suggested Readings

1. S. R. Mudambi, M. V. Rajagopal, Fundamentals of Foods, Nutrition and Diet Therapy, 5th Ed, New Age International.
2. B.Srilakshmi, Nutrition Science, New Age International.
3. Handbook of Food and Nutrition, 5th Edition, BAPPCO.
4. G. M. Wardlaw, J. S. Hanpl, Perspectives of Nutrition, McGraw Hill
5. S. Sari, A. Malhotra, Food Science, Nutrition and Food Safety, Pearson India Ltd
6. C. Gopalan, B. V. Rama Sastri, S. C. Balasubramanian, Nutritive Value of Indian Foods, NIN, ICMR,
7. M. S. Bamji et al., Textbook of Human Nutrition, Oxford & IBH Pub Co Pvt Ltd

CHIC0021: INDUSTRIAL CHEMISTRY

(3 Credits - 45 hours)

Objective: This course in Industrial Chemistry is designed to provide graduates with basic understanding of chemistry in the following sectors: Rubber, synthetic fibres, fertilizers and pesticides, Sugar, Tea and paints.

Module I: Elastomers (7.5 hours)

Rubbers: origin, importance, types of rubber, natural rubber, gutta percha, guayle rubber, balata. Refining of crude rubber, drawbacks of natural rubber, vulcanization, technique of vulcanization. Synthetic rubber, poly butadiene, buna –S or SBR rubber, neoprene, nitrile rubber, butyl rubber, silicone rubber, & poly urethane.

Module II: Synthetic Fibres (5 hours)

Introduction, natural and artificial fibres characteristics and limitations. Study of following synthetic fibres :- Rayon (nitro cellulose) cupra ammonium rayon, acetate rayon, nylon 66, nylon-6, terylene (Dacron) Teflon & Saran.

Module III: Fertilisers and Pesticides (10 hours)

a) Fertilizers: Plants nutrients, need for fertilizers, qualities of fertilizers, NPK ratio, classification of fertilizers, straight and mixed fertilizers. Nitrogenous fertilizers, manufacture of ammonium nitrate, urea, ammonium sulphate, phosphate fertilizers manufacture of triple phosphate and super phosphate, potassium fertilizers.

b) Pesticides: Introduction, classification, Study of the following types: - Organo chlorine pesticides like DDT, BHC and Aldrin. Organo phosphorous pesticides, malathion& parathion. Rodenticides, fungicides, herbicides, fumigants and repellants (one example each).

Module IV: Sugar and Fermentation Industries (10 hours)

a) SUGAR: Importance of sugar industry, manufacture of raw and refined sugar with flow sheet, estimation of sugar (physical and chemical methods)

b) FERMENTATION: Definition of fermentation, importance of various fermentation industries, basic requirements for fermentation, steps in fermentation process. Manufacture of alcohol from molasses, distillation, coffey still, preparation of absolute alcohol, various useful fractions and their uses, proof sprit, denatured spirit.

Module V: Tea Industry (7.5 hours)

Chemical composition - an overview, Polyphenols in tea- Mechanism of theaflavin formation, biochemistry of tea - Biosynthesis of caffeine, Cinnamate, flavonoids, Chemical properties of tea-Polyphenols as Antioxidants.

Module VI: Paints (5 hours)

Introduction, classification of paints, constituents of paints in brief. Manufacture of paints, qualities of good paint, emulsion paints, paint removers, varnishes enamels, lacquers, thinners in brief.

COURSE/LEARNING OUTCOMES

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

CO1: Distinguish various industries (*Knowledge*)
CO2: Get an in-depth knowledge about industries in the field of Synthetic fibre, Sugar, fertilizer, paint, Tea etc. (*Comprehension*)
CO3: Apply their chemical knowledge in industries (*Application*)
CO4: Compare and analyse different chemical reactions and compound behavior (*Analysis*)
CO5: Use their synthetic knowledge and apply in the synthesis of compounds required in different industries (*Synthesis*)
CO6: Valuate the challenges required in industries and would learn how to overcome various challenges (*Evaluation*)

Suggested Readings

1. Sharma, B. K. Industrial Chemistry, Goel Publishing House Meerut, India.
2. Austin, G. T. Shreeve's Chemical Process Industries, Mc Graw Hill
3. Finar, I. L. Organic Chemistry Vol I.
4. Finar, I. L. Organic Chemistry Vol II.

CHMD0022: MEDICINAL CHEMISTRY

(3 Credits - 45 hours)

Objective: *Students will be introduced to various types of drugs and medicines, their chemistry, modes of action and theoretical aspects of drug design*

Module I: Introduction and History of Drug Development (5 hours)

Definition of drug and prodrugs; need of drugs; germ theory of diseases; history of sulpha drugs and their mode of action; antibacterial agents

Module II: Mechanisms and Theoretical aspects of drug action, drug discovery, design and delivery (10 hours)

Receptors – two-state model of receptor theory, drug-receptor interaction and Clark's Occupancy Theory; physiological response; drug agonist and antagonist – classification; Need of quantification of drug action; definition of chemotherapeutic index and therapeutic index; factors affecting bioactivity of drugs; pharmacokinetics and pharmacodynamics; QSAR; Lead compounds in drug discovery; importance of SAR and molecular modification; importance of combinatorial library and molecular modelling in drug discovery; drug delivery – controlled drug delivery methods

Module III: Antibiotics, Antivirals and Antimalarials (15 hours)

a) General introduction to antibiotics – their sources and classification; causes and concerns of bacterial resistance to antibiotics; definition and need of broad Spectrum Antibiotics.
b) Mechanism of action of lactam antibiotics, non-lactam antibiotics and quinilones;
c) Antivirals – difficulty in developing clinical solutions to viral diseases, introduction to antiviral agents, AIDS –its cause and prevention;
d) Antimalarials – classification of human malaria and plasmodia responsible for human malaria; discovery of quinine and its structure-activity-relationship (SAR), importance of quinine as a lead to the discovery of low cost antimalarials, artemisinin and its derivatives – their SAR and importance in dealing with chloroquine resistant malaria, mode of action

Module IV: Neurotransmitters (5 hours)

Classes of neurotransmitters, drugs affecting cholinergic and adrenergic pathways

Module V: Miscellaneous topics (10 hours)

Antihistamines, anti-inflammatory drugs, antianalgesics, anticancer and antihypertensive drugs, gene therapy, anti-sense and anti-gene strategies and drug resistance

COURSE/LEARNING OUTCOMES

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

CO1: Describe different types of drugs, drug-receptor interactions, drug-enzyme interactions, the mechanisms involved; topics related to drug discovery, drug design, structure activity relationships, molecular modeling of drugs, and methods of drug delivery (*Knowledge*)
CO2: Understand different aspects of drug-target interactions-specific and non-specific interactions, drug discovery, molecular modeling of drugs (*Comprehension*)
CO3: Compare the effectiveness of different drugs for a particular target, how a newly discovered or synthesized molecule is compared against an existing library of drugs and tested for its specificity against a target (*Application*)
CO4: Suggest reasons for differences in interaction of a drug with a range of targets or of a range of drugs with a target, or why certain targets inside a physiological system are hard to reach e. g., most drugs cannot cross the blood-brain-barrier, how to theoretically circumvent these difficulties (*Analysis*)
CO5: Tailor molecules (drugs) for optimal interactions with selected targets (*Synthesis*)
CO6: Compare and critically analyze drug-target interactions through designing drugs, SAR and molecular modelling of drugs (*Evaluation*)

Suggested Readings

1. Thomas, G. Medicinal Chemistry: An Introduction, John Wiley & Sons
2. Patrick, G. L. An Introduction to Medicinal Chemistry,Oxford University Press
3. Gringauz, A. Introduction to Medicinal Chemistry, Wiley India Pvt Ltd.
4. Sriram, D., Yogeeswari, P. Medicinal Chemistry, Pearson Education (Dorling Kindersley India)

CHRC0023: RECENT ADVANCES IN CATALYSIS

(3 Credits - 45 hours)

Objective: *To make the students understand structure, properties of different heterogeneous catalyst and mechanism of catalytic reactions for the design of processes involving catalytic reaction*

Module I: Kinetics of heterogeneous catalysis (10 hours)

Adsorption and catalysis, mechanism of heterogeneous catalysis, kinetics of heterogeneous catalytic reactions, volcano principle, shape and size selectivity of catalysts, characterization of catalysts and their surfaces, methods of surface analysis, surface area, pore size, void fraction, particle size, mechanical strength, surface chemical composition, surface acidity and reactivity.

Module II: Preparation and characterization of industrial catalysts (8 hours)

Catalyst design methods, catalyst support and preparation of industrial catalyst, supported and unsupported metal catalysts, bimetallic catalysts, Electron microscopy, XPS and PES, ESCA, IR and magnetic resonance spectroscopy, temperature programmed desorption (TDP), and DTA and TGA.

Module III: Zeolite and clays (15 hours)

a) Synthesis of some selected important zeolites, modification of zeolites, ion exchange, metals supported on zeolites, dealumination and desilication of zeolites, shape selective catalysis in zeolites.

b) Properties of pillared clays, use of coordination and organometallic compounds as pillaring, pillaring of acid activated clays, mesoporous materials, ordered mesoporous materials, synthesis of silica molecular sieve materials, characterization of mesoporous molecular sieves, catalytic properties of mesoporous materials, catalytic applications of zeolite, clays and mesoporous materials.

Module IV: Catalysis in petroleum industry and environmental catalysts (12 hours)

Design of catalytic reactors, promotion and promoters, catalytic processes in petroleum industry, reforming, cracking and hydrotreating, hydrogenation, hydrodesulphurization, Fischer-Tropsch process, Catalytic deactivation and reactivation, control of pollution from automobile exhaust, catalytic converters, abatement of nitrogen oxides and odours, cleaning of industrial effluents.

COURSE/LEARNING OUTCOMES

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

CO1: Recall their idea about structure and properties of different heterogeneous catalyst (*Knowledge*)
CO2: Understand structure, properties of different heterogeneous catalyst, mechanism of catalytic reactions, preparation and characterization of different types of catalyst (*Comprehension*)
CO3. Learn catalyst preparation and design methods to apply it different field like petroleum industry and for environmental remediation (*Application*)
CO4: Analyse the need of different catalyst for different application (*Analysis*)
CO5: Understanding recent advances of heterogeneous catalyst in terms of structure, properties, their characterization process and application in different field (*Synthesis*)
CO6: The preparation and characterization as well as the properties of different types of heterogeneous catalyst (*Evaluation*)

Suggested Readings

1. Bartholomew, C. H., Furrauto, R. J. Fundamentals of Industrial Catalytic Processes, Wiley Interscience
2. Chakrabarty, D. K., Viswanathan, B. Heterogeneous Catalysis, New Age Int.
3. Gates, B. C. Catalytic Chemistry, John Wiley & Sons
4. Augustine, R.L. Heterogeneous Catalysts for Synthetic Chemists, Marcel-Dekker
5. J. Weitkamp and L. Puppe, Catalysis and zeolites – fundamentals and applications, Springer-Verlag
6. G. Ertl, H. Knozinger, J. Weitkamp, Handbook of Heterogeneous Catalysis, Vol 4 and 5, Wiley-VCH

CHBC0024: BIOPHYSICAL CHEMISTRY

(3 Credits - 45 hours)

Objectives: *To teach the applications of physical chemistry methods for elucidation of the structure and properties of biological molecules*

Module I: Fundamentals of biological macromolecules (5 hours)

Chemical bonds in biological systems; properties of water; thermodynamic principles in biological systems; properties and classification of amino acids; protein structure and function; properties of nucleosides and nucleotides; composition of nucleic acids; structure of nucleic acids

Module II: Molecular modelling and conformational analysis (10 hours)

Complexities in modelling macromolecular structure; polypeptide chain geometries and internal rotation angles; Ramachandran plots; Molecular mechanics; stabilizing interactions in biomolecules; simulating macromolecular structure; energy minimization; molecular dynamics

Module III: Methods for separation of biomolecules (10 hours)

General principles, chromatography; sedimentation - moving boundary sedimentation, zonal centrifugation; electrophoresis, isoelectric focussing; capillary electrophoresis, MALDI-TOF

Module IV: Structural determinations: Physical Methods (10 hours)

Ultracentrifugation and other hydrodynamic techniques; light scattering – fundamental concepts, scattering from a number of small particles, Rayleigh scattering, scattering from particles that are not small compared to the wavelength of radiation, dynamic light scattering, low angle X-ray scattering, neutron scattering, Raman scattering

Module V: Optical Methods and Applications (10 hours)

Optical techniques in biological systems – absorption spectroscopy, fluorescence spectroscopy, linear and circular dichroism, single and multidimensional NMR spectroscopy

COURSE/LEARNING OUTCOMES

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

CO1: Modeling biological macromolecules such as proteins and nucleic acids, they will learn about methods used to separate biological molecules in a mixture and methods to determine their structure (*Knowledge*)

CO2: Explain how to model proteins and nucleic acids, explain the methods used for separating these molecules if they are present in a mixture and also understand and explain the methods that can be used to determine their structures (*Comprehension*)

CO3: Identify conditions that are optimal for modeling a biological molecule, or to identify parameters that will enable separation of a particular protein from a mixture such as a cell or tissue homogenate and suggest optimal methods for determining its structure (*Application*)

CO4: Compare the advantages and disadvantages of the various methods that can be used to separate and purify a biological molecule from a mixture and determine its structure (*Analysis*)

CO5: Design the separation, purification and structure determination of a biological macromolecule from a mixture (*Synthesis*)

CO6: Critically analyze the conditions that will be best suited for the separation and purification of a biological macromolecule from a mixture, and also determine the best method for its structural elucidation (*Evaluation*)

Suggested Readings

1. Cantor and Schimmel Biophysical Chemistry Parts I-III, Macmillan
2. Lehninger, A. L., Nelson, D. L. and Cox, M. M. Lehninger Principles of Biochemistry W. H. Freeman
3. Cooper, A. Biophysical Chemistry The Royal Society of Chemistry, UK
4. Allen, J. P. Biophysical Chemistry Blackwell Publishing

CHHC0025: HETEROCYCLIC CHEMISTRY

(3 Credits - 45 hours)

Objective: *Students will be introduced to nomenclature, reactivity, and synthesis of different types of heterocyclic compounds including natural heterocycles.*

Module I: Introduction & Small Ring Heterocycles

Hantzsch-Widman nomenclature for monocyclic, fused and bridged heterocycles; General approaches to heterocyclic synthesis; Aliphatic and aromatic heterocycles; Basicity and aromaticity of heterocycles.

Syntheses of aziranes, oxiranes & thiiranes; Ring openings and heteroatom extrusion; Synthesis & reactions of azetidines, oxetanes & thietanes; Strain.

Module II: Azoles and condensed five membered Rings

Physical and chemical properties; Synthesis of pyrazole, isothiazole and isoxazole; Synthesis of imidazoles, thiazoles & oxazoles; Nucleophilic and electrophilic substitutions; Ring cleavages; Benzofused analogues.

Synthesis of indole, benzofuran and benzo-thiophene; Nucleophilic, electrophilic and radical substitutions; Addition reactions; Indole rings in biology.

Module III: Diazines, bicyclic heterocycles & seven membered heterocycles

Physical & chemical properties and synthesis of pyridazines, pyrimidines, pyrazines; Nucleophilic and electrophilic substitutions.

Synthesis of quinolines, isoquinolines, benzofused diazines, acridines, phenothiazines, carbazoles and pteridines; Substitution reactions.

Synthesis & reactions of azepines, oxepines, thiepines & diazepines.

Module IV: Natural heterocycles

Porphyrins: Classification and synthesis of porphin rings.

Nucleic Acids: Primary, secondary and tertiary structure of DNA; DNA replication and heredity; Structure and function of mRNA, tRNA and rRNA.

Proteins: Acid-base properties of amino acids; polypeptides; primary, secondary, tertiary and quaternary protein structures; classification of proteins on basis of structure and biological function; Merrifield peptide synthesis.

COURSE/LEARNING OUTCOMES

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

CO1: Describe structure, reactivity, and synthesis of different types of heterocycles (*Knowledge*)
CO2: Understand how to apply the concept of reactivity of hetrocyclic compounds in the synthetic organic chemistry research field (*Comprehension*)
CO3: Apply the knowledge of reactivity of different types of heterocycles in the synthetic organic chemistry research field (*Application*)
CO4: Solve different problems related to heterocyclic reaction mechanisms (*Analysis*)
CO5: Understanding of application of reactions of different types of heterocycles (*Synthesis*)
CO6: Demonstrate the important reactions like electrophilic substitution reaction, nucleophilic substitution, elimination reactions shown by different types of heterocycles (*Evaluation*)

Suggested Readings

1. L. A. Paquette. Modern Heterocyclic Chemistry, W. A. Benjamin
2. I. L. Finar. Organic Chemistry, Vol. II, ELBS
3. T. L. Gilchrist. Heterocyclic Chemistry, Longman
4. A. L. Lehninger. Biochemistry, Kalyani Publishers

CHNP0026: NATURAL PRODUCTS CHEMISTRY

(3 Credits - 45 hours)

***Objective**: Students will be introduced to nomenclature, reactivity, and synthesis of different types of natural compounds.*

Module I: Natural Products and their Biosynthetic Pathways (15 hours)

General classification of natural products, sources and their isolation, characterisation and biosynthesis of common plant products; Extraction and Separation of Natural Products Biosynthesis pathways for natural products using co-enzymes and enzymes, general biogenesis and synthesis of cis-jasmone, methyl jasmonate, prostaglandins, exaltone and muscone.

Module II: Terpenoids and Alkaloids (15 hours)

Terpenes and the Isoprene Rule; General biosyntheses of mono- and sesquiterpenes, trans-chrysanthemic acid, cyclo-pentato monoterpene lactones; Synthesis of α-vetinone and total synthesis of β-eudesmol; Synthesis of hirsutene, abietic acid, cis juvenile hormone, trans annular cyclisation of caryophyllene; Synthesis of caryophyllene and isocaryophyllene; Rearrangements of santonic acid and thujospene; Synthesis and rearrangement of longifolene; Structure, synthesis and biosynthesis of common alkaloids: reticuline, yohimbine and tylophorine.

Module III: Steroids (15 hours)

Nomenclature of steroids and synthesis of squalene; Lanosterol and caretonoids; Synthesis of equlenins; Estrogens and total synthesis of non-aromatic steroids (progesterones); Corticosteroids; Degradation of diosgenin to progesterone and its synthesis; Miscellaneous transformations of steroid molecules.

COURSE/LEARNING OUTCOMES

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

CO1: Attain detailed knowledge about chemistry of medicinal compounds from natural origin (*Knowledge*)
CO2: Understand general methods of structural elucidation of medicinally active natural compounds (*Comprehension*)
CO3: Attain knowledge regarding isolation and purification of medicinal compounds from natural origin (*Application*)
CO4: Identify different types of natural products, their occurrence, structure, biosynthesis and properties (*Analysis*)
CO5: Know the use of natural products as starting materials (*Synthesis*)
CO6: Characterize products by physical and spectroscopic means including IR, NMR, GC, and MS (*Evaluation*)

Suggested Readings:

1. Nakanashi, K. Natural Products Chemistry, Vols. I and II, Academic Press, New York and London
2. Cooper R. and Nicola, G. Natural Products Chemistry, sources, separations and structures, CRC Press, Taylor & Francis Group
3. Bhat, S. V., Nagasampagi, B.A., Sivakumar, M. Chemistry of Natural Products, Springer Science & Business Media

CHAB0101: INORGANIC CHEMISTRY - I: ATOMIC STRUCTURE AND CHEMICAL BONDING

(4 Credits - 60 Hours)

Objectives: *To give students a sound understanding of the concepts of atomic structure, periodicity of elements, chemical bonding and redox reactions.*

Module I: Atomic Structure (14 hours)

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. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams.

Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

Module II: Periodicity of Elements (16 hours)

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.

a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

b) Atomic radii (van der Waals)
c) Ionic and crystal radii.
d) Covalent radii (octahedral and tetrahedral)
e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.
f) Electron gain enthalpy, trends of electron gain enthalpy.
g) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.Sanderson's electron density ratio.

Module III: Chemical Bonding (26 hours)

a) Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals.Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy.Madelung constant, Born-Haber cycle and its application, Solvation energy.
b) Covalent bond: Lewis structure, Valence Bond theory (Heitler-London approach). Energetics of hybridization, equivalent and non-equivalent hybrid orbitals.Bent's rule, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N2, O2, C2, B2, F2, CO, NO, and their ions; HCl, BeF2, CO2, (idea of s-p mixing and orbital interaction to be given). Formal charge, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (σ and π bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability.Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference.
c) Metallic Bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids.
d) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process.

Module IV: Oxidation-Reduction (4 hours)

Redox equations, Standard Electrode Potential and its application to inorganic reactions.
Principles involved in volumetric analysis to be carried out in class.

COURSE/LEARNING OUTCOMES

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

CO1: Describe the concepts of atomic structure, periodicity of elements and chemical bonding (*Knowledge*)
CO2: Explain the concepts they learn e.g., about quantum numbers and their significance, about properties of s and p-block elements such as electronegativity, electron gain enthalpy or electron affinity, concepts of different types of bonds etc. , in their own words (*Comprehension*)
CO3: Apply the concepts they learn to solve simple problems such as how atomic radii vary across a period or down a group, applying Heisenberg's uncertainty principle to calculate uncertainty in position or momentum of a particle in motion, calculate redox potentials of cells, balance redox reactions etc (*Application*)
CO4: Distinguish between periodic properties of elements such as ionization enthalpy from electron gain enthalpy, they should be able to explain the shapes of s, p, d, f orbitals, explain why certain redox reactions are favourable (*Analysis*)
CO5: Connect all the concepts they learn and apply them to predict shapes of molecules, the nature of bonding in different molecules, the polarizability of ions; calculate the redox-potentials of electrochemical cells (*Synthesis*)
CO6: Compare the advantages and disadvantages of the concepts they learn as well as their applications and limitations e.g., comparing the valence bond theory with that of the molecular orbital theory, the usefulness and limitations of valence shell electron pair repulsion theory etc. (*Evaluation*)

Suggested Readings

1. Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.

CHSI0102: PHYSICAL CHEMISTRY-I: STATES OF MATTER AND IONIC EQUILIBRIUM

(4 Credits-60 hours)

Objectives: *To teach students the properties of the three states of matter and the concepts associated with ionic equilibria*

Module I: Gaseous state (18 hours)

a) Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η; variation of viscosity with temperature and pressure. Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

b) Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor, Z, and its variation with pressure for different gases. Causes of deviation from ideal behaviour. Van der Waals equation of state, its derivation and application in explaining real gas behaviour, mention of other equations of state (Berthelot, Dietrici); virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

Module II: Liquid state (6 hours)

Qualitative treatment of the structure of the liquid state; Radial distribution function; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity.Explanation of cleansing action of detergents.Temperature variation of viscosity of liquids and comparison with that of gases.Qualitative discussion of structure of water.

Module III: Solid state (16 hours)

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals.

Module IV: Ionic equilibria (20 hours)

a) Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di-and triprotic acids (exact treatment).

b) Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body.

c) Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations.Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.

COURSE/LEARNING OUTCOMES

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

CO1: The properties of matter – the three states, solid, liquid and gaseous and the laws that govern them; they will also learn the principles of ionic equilibria (*Knowledge*)

CO2: Understand and explain the concepts they have learnt e.g., they should be able to explain the properties of the three states of matter and the principles of ionic equilibria in their own words (*Comprehension*)

CO3. Apply the principles they learn in this course to solve problems such as calculating the solubility product of an electrolyte in water, or calculating the pressure exerted by an ideal gas or calculate the surface tension or viscosity of a liquid (*Application*)

CO4: Differentiate between properties of ideal and real gases, liquids and gases or liquids and solids, strong and weak electrolytes etc. (*Analysis*)

CO5: Connect their understanding of the three states of matter and of ionic equilibria to construct an overview of these fundamental principles of physical chemistry - the applications of which they will encounter in subsequent courses in chemistry as well as in the laboratory and in everyday life (*Synthesis*)

CO6: Decide which laws to apply when solving problems dealing with states of matter and topics related to chemical equilibria (*Evaluation*)

Suggested Readings

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press
2. Ball, D. W. Physical Chemistry Thomson Press, India .
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
4. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).

CHBH0103: ORGANIC CHEMISTRY- I: BASICS AND HYDROCARBONS

(4 Credits-60 hours)

Objectives: *To teach students the underlying principles of organic chemistry, stereochemistry and the chemistry of aliphatic and aromatic hydrocarbons*

Module I: Basics of Organic Chemistry (6 hours)

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties.

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; Nucleophlicity 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.

Module II: Stereochemistry (18 hours)

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-centres, Distereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

Module III: Chemistry of Aliphatic Hydrocarbons (24 hours)

A. Carbon-Carbon sigma bonds Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.

B. 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/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroborationoxidation, 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, ethyl benzene.

15 Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

C. 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.

Module IV: Aromatic Hydrocarbons (12 hours)

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.

COURSE/LEARNING OUTCOMES

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

CO1: Explain the principles that govern organic molecules such as their classification, nomenclature, electronic displacements, types of fission, types of organic reactions, stereochemistry, the chemistry of aliphatic and aromatic hydrocarbons (*Knowledge*)

CO2: Explain the principles e.g., the types and mechanisms of organic reactions, the principle of optical activity, different projection formulae etc. they learn, in their own words (*Comprehension*)

CO3: Apply their understanding to solve problems such as identifying whether a molecule will undergo an addition, elimination or substitution reaction under a certain given condition, finding out whether a molecule with a chiral centre has R or S configuration etc. (*Application*)

CO4: Distinguish between addition, elimination and substitution reactions, they should be able to distinguish between Fischer projection and Newman projection formulae, differentiate between chiral and achiral molecules, and differentiate enantiomers from diastereomers (*Analysis*)

CO5: Describe the classification, nomenclature, stereochemistry, and type of reaction an organic compound can undergo in a given set of conditions (*Synthesis*)

CO6: Decide under which conditions, for example, the elimination reaction converting an alkyl halide to an alkene will take place by the E1 or E2 or E1cb mechanism (*Evaluation*)

Suggested Readings

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London
5. Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International.

CHCT0104: PHYSICAL CHEMISTRY- II: THERMODYNAMICS AND ITS APPLICATIONS

(4 Credits-60 hours)

Objectives: *To teach students the concepts of classical thermodynamics, chemical equilbrium, properties of dilute solutions and colligative properties*

Module I: Chemical Thermodynamics (36 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 the second 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 (8 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 (8 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 Kp, Kc and Kx. Le Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.

Module IV: Solutions and Colligative Properties (8 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.

COURSE/LEARNING OUTCOMES

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

CO1: Understand introductory concepts of thermodynamics, such as the laws of thermodynamics, chemical equilibrium, properties of dilute solutions and colligative properties (*Knowledge*)

CO2: Explain the laws of thermodynamics, the concept of free energy, concept of entropy, chemical equilibrium, etc. in their own words (*Comprehension*)

CO3: Apply the laws of thermodynamics, heats of reactions, free energy functions, reversible and irreversible processes, to solve simple problems (*Application*)

CO4: Differentiate between thermodynamic terms such as intensive and extensive properties; path independent and path-dependent functions; entropy, enthalpy, free energy, reversible and irreversible processes, etc. They should be able to decide the conditions that must be fulfilled, for a given chemical reaction to proceed spontaneously, etc. (*Analysis*)

CO5: Apply their understanding to design and solve analytical problems (*Synthesis*)

CO6: Evaluate conditions under which a system goes from one state to another reversibly and conditions that would make the transformation irreversible, they should understand the derivation of relations between equilibrium constants Kp, Kc, Kx etc. (*Evaluation*)

Suggested Readings

1. Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press .
2. Castellan, G. W. Physical Chemistry 4th Ed., Narosa

3. Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall.
4. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi
5. Assael, M. J.; Goodwin, A. R. H.; Stamatoudis, M.; Wakeham, W. A. & Will, S.
6. Commonly Asked Questions in Thermodynamics. CRC Press: NY.
7. Levine, I .N. Physical Chemistry 6th Ed., Tata Mc Graw Hill .
8. Metz, C.R. 2000 solved problems in chemistry, Schaum Series (2006)

CHAH0105: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

(4 Credits-60 hours)

Objectives: *To give students an understanding of atomic structure, types of bonding, fundamentals of organic chemistry, stereochemistry and aliphatic hydrocarbons*

Module I: Inorganic Chemistry-1 (30 hours)

a) Atomic Structure (14 hours)

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.

What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it.Significance of ψ and ψ2, Schrödinger equation for hydrogen atom. Radial an angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals. 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 (m).

Rules for filling electrons in various orbitals, Electronic configurations of the atoms.Stability of half-filled and completely filled orbitals, concept of exchange energy.Relative energies of atomic orbitals, Anomalous electronic configurations.

b) Chemical Bonding and Molecular Structure (16 hours)

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 solubilityof ionic compounds.Statement of Born-Landé equation for calculation of lattice energy,Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ioniccharacter 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 and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. 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, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and NO+. Comparison of VB and MO approaches.

Module II: Organic Chemistry-1 (30 hours)

a) Fundamentals of Organic Chemistry (8 hours)

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.

Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.

b) Stereochemistry (10 hours)
Conformations with respect to ethane, butane and cyclohexane.Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations.Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; cis - trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

c) Aliphatic Hydrocarbons (12 hours)
Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.
Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.
Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.
Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.
Reactions: formation of metal acetylides, addition of bromine and alkaline KMnO4, ozonolysis and oxidation with hot alk. KMnO4.

COURSE/LEARNING OUTCOMES

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

CO1: Concepts of inorganic chemistry such as atomic structure, chemical bonding and molecular structure; fundamentals of organic chemistry, stereochemistry such as electronic displacements, cleavage of bonds structure, shape, reactivity of organic molecules, stereochemistry, chemistry of aliphatic hydrocarbons (*Knowledge*)

CO2: Understanding of the concepts taught in this course, so as to be able to explain the concepts such as that of the wavefunction in quantum mechanics, the radial distribution function, principles of ionic and covalent bonding, valence bond theory, concepts of resonance MO approach etc. in their own words. Similarly they should be able to explain the concepts of organic chemistry such as electronic displacements, nucleophiles, electrophiles, Newman projection formula etc. (*Comprehension*)

CO3: Write electronic configurations of elements, predict the shapes of some inorganic molecules using the VESPR theory, calculate the strengths of organic acids and bases, predict whether a molecule is aromatic or not, draw the conformations of molecules such as ethane, butane, cyclohexane etc. (*Application*)

CO4: Compare concepts such as □ and □2, explain the Schrodinger equation for hydrogen atom and the resulting radial and angular parts of the hydrogenic wavefunctions, function, differentiate between conformation and configuration of a molecules, nucleophiles and electrophiles, bonding and antibonding orbitals, differentiate between properties of alkanes, alkenes, alkynes (*Analysis*)

CO5: Construct examples and arguments to explain concepts they learn. E.g. when describing enantiomers, they should be able to give appropriate examples, similarly while explaining resonance in inorganic and organic compounds. They should be able to devise problems based on the theories and concepts they learn (*Synthesis*)

CO6: Reflected in the ease with which they can explain and relate the different concepts they learn (*Evaluation*)

Suggested Readings

1. J. D. Lee: A new Concise Inorganic Chemistry, E L. B. S.
2. F. A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley.
3. Douglas, McDaniel and Alexader: Concepts and Models in Inorganic Chemistry, John Wiley.
4. James E. Huheey, Ellen Keiter and Richard Keiter: Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Publication.
5. T. W. Graham Solomon: Organic Chemistry, John Wiley and Sons.
6. Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.

7. E. L. Eliel: Stereochemistry of Carbon Compounds, Tata McGraw Hill.
8. I. L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
9. R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.

CHCF0106: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY-I

(4 Credits-60 hours)

Objectives: *To teach students the principles of chemical energetics, chemical and ionic equilibria and some concepts of organic chemistry*

Module I: Physical Chemistry-1 (30 hours)

Chemical Energetics (10 hours)

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.

Chemical Equilibrium (8 hours)

Free energy change in a chemical reaction.Thermodynamic derivation of the law of chemical equilibrium.Distinction between ΔG and ΔGo, Le Chatelier's principle. Relationships between Kp, Kc and Kx for reactions involving ideal gases.

Ionic Equilibria (12 hours)

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect.Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts.Buffer solutions.Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Module II: Organic Chemistry-2 (30 hours)

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aromatic hydrocarbons (8 hours)

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene).Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

Alkyl and Aryl Halides (8 hours)

Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions.
Preparation: from alkenes and alcohols.
Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.
Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.
Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3).
Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

Alcohols, Phenols and Ethers (Upto 5 Carbons) (8 hours)

Alcohols: Preparation: Preparation of 1o, 2o and 3o 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. KMnO4, acidic dichromate, conc. HNO3). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction.

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic) (6 hours)

(Formaldehye, acetaldehyde, acetone and benzaldehyde)

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, NaHSO3, NH2-G derivatives. Iodoform test.Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation.Clemensen reduction and Wolff Kishner reduction.Meerwein-Pondorff Verley reduction.

COURSE/LEARNING OUTCOMES

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

CO1: Theories of chemical energetics; chemical equilibria; aromatic hydrocarbons; alkyl and aryl halides; alcohols, phenols and ethers; aldehydes and ketones (*Knowledge*)

CO2: Explain concepts such as the free energy changes accompanying chemical reactions, Le Chatelier's principle, principles of electrolytes, preparation and reactions of organic molecules such as aromatic hydrocarbons, nucleophilic substitution reactions of alkyl halides etc. (*Comprehension*)

CO3: Calculate the change in free energy accompanying a chemical reaction, derive equations governing the dissociation of aqueous solutions of weak acids and bases, write out the methods of preparations of alcohols, phenols etc., and mechanisms of organic chemistry reactions such as that for nucleophilic substitution reactions, elimination reactions etc. (*Application*)

CO4: Explain spontaneity of a reaction based on the measure of free energy change accompanying the reaction; they should be able to explain whether a nucleophilic substitution reaction will take place by SN1 or SN2 or SNi mechanism etc. (*Analysis*)

CO5: Put together the methods of preparation of an organic compound such as a phenol and write out the possible reactions it can undergo along with detailed mechanisms (*Synthesis*)

CO6: Differentiate the concept of free energy change from standard free energy change; they should be able to explain how the equilibrium of a system changes when subjected to a change in pressure, temperature or concentration of a reactant; they should be able to compare the mechanisms that alkyl halides undergo with those of aryl halides or the reactions of alcohols with those of phenols etc. (*Evaluation*).

Suggested Readings

1. T. W. Graham Solomons: Organic Chemistry, John Wiley and Sons.
2. Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
3. I.L. Finar: Organic Chemistry (Vol. I & II), E. L. B. S.
4. R. T. Morrison & R. N. Boyd: Organic Chemistry, Prentice Hall.
5. G. M. Barrow: Physical Chemistry Tata McGraw Hill .
6. G. W. Castellan: Physical Chemistry 4th Edn. Narosa .
7. J. C. Kotz, P. M. Treichel & J. R. Townsend: General Chemistry Cengage Lening India Pvt. Ltd., New Delhi.
8. B. H. Mahan: University Chemistry 3rd Ed. Narosa.
9. R. H. Petrucci: General Chemistry 5th Ed. Macmillan Publishing Co.: New York

CHIQ6002: INORGANIC QUALITATIVE AND QUANTITATIVE ANALYSIS - LAB
(3 Credits)

Objective: *This course aims to give an idea about the qualitative and quantitative analysis of binary mixtures, alloys and ores*

1. Qualitative analysis (tertiary mixtures, alloys, ores)
2. Quantitative analysis (binary mixtures, alloys, ores)
3. Inorganic preparation (crystallization, precipitation, calcination)
4. Coordination compounds through ligand synthesis and spectroscopic characterization, magnetic properties
5. Metal Nanoparticle synthesis and characterization

COURSE/LEARNING OUTCOMES

At the end of the Lab experiments students will be able to:

CO1: Gain complete understanding of various chemical processes and laboratory techniques (*Knowledge*)
CO2: Work in the laboratory with different chemicals and apparatus (*Comprehension*)
CO3: Learn the uses of different chemical compounds (*Application*)
CO4: Learn how to handle the apparatus and various instruments in the laboratory (*Analysis*)
CO5: Perform different reactions inside the laboratory (*Synthesis*)
CO6: Use practical concepts to understand the characteristics of various chemical compounds (*Evaluation*)

Suggested Readings

1. J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, B. Sivasankar; Vogel's Textbook of Quantitative Chemical Analysis, Pearson.
2. G. Svehla, S. Mittal; Vogel's Qualitative Inorganic Analysis, Pearson Education.

CHEQ6003:EXPERIMENTAL PHYSICAL CHEMISTRY - LAB
(3 Credits)

Objective: *This laboratory based course is designed to learn the applications of chemical kinetics, electrochemistry, spectrophotometry and pH-metric titrations.*

a) Chemical Kinetics based experiments
b) Electrochemistry based experiments
c) Spectrophotometry based experiments
d) pH-metric Titrations
e) Adsorption on porous materials - equilibrium, kinetic and thermodynamic studies

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Recall fundamental concepts they got in the graduation level in physical chemistry that they applied in the practical field (*Knowledge*)
CO2: Understand the laboratory course which consists of experiments illustrating the principles of physical chemistry relevant to the study of Master of Science. (*Comprehension*)
CO3: Estimate rate constants of reactions from concentration of reactants/products as a function of time, measure activation energy, measure molecular/system properties such as surface tension, viscosity, conductance of solutions, pH of solution etc, adsorption of liquid in solid surfaces, distribution of solutes between two immiscible solvent, determination of unknown concentration of a given solution spectrophotometrically (*Application*)
CO4: Analyse practical utility of different theories chemical kinetics, surface tension, viscosity, conductance, pH meter, phase equillibria, adsorption etc. (*Analysis*)
CO5: Understanding of theories of the experiments they learned in the class by performing it in the laboratory class (*Synthesis*)
CO6: Apply the knowledge of practical classes such as estimation of rate constants of reactions from concentration of reactants/products as a function of time, measure activation energy, measure molecular/system properties such as surface tension, viscosity, conductance of solutions, pH of

solution etc, adsorption of liquid in solid surfaces, distribution of solutes between two immiscible solvent, determination of unknown concentration of a given solution spectrophotometrically etc in the practical field of chemistry to solve problems (*Evaluation*)

Suggested Reading

J. B. Yadav; Advanced Practical Physical Chemistry, Goel Publishing House.

CHQA6004:ORGANIC QUALITATIVE ANALYSIS AND SYNTHESIS LAB

(3 Credits)

Objective: *This course will introduce common laboratory techniques, instruments for carrying out organic synthesis, isolation and extraction of natural products and qualitative and quantitative analysis.*

1. Qualitative analysis of binary mixtures of organic compounds
   (a) Separation of binary mixture into individual components
   (b) Qualitative analysis of individual components by
      (i) Detection of extra elements N, S, Halogens
      (ii) Test for functional groups by systematic analysis
      (iii) Solubility, melting point
      (iv) Preparation of a derivative and determination of its melting point
2. Preparation of organic compounds by using single and multistep process.
3. Chromatographic techniques
   (a) Qualitative TLC separation and identification
   (b) Column chromatographic separation of a mixture of compounds.
4. Extraction of natural products.

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Get idea about organic qualitative analysis, separation of binary mixtures of organic compounds, extraction of natural product, synthesis and different chromatographic techniques (*Knowledge*)

CO2: Synthesize and characterize organic compounds, perform qualitative analysis of simple as well as mixture of organic compounds and learn different chromatographic methods (*Comprehension*)

CO3: Apply different chromatographic techniques for the identification and purification of synthetic organic compounds as well as natural products (*Application*)

CO4: Analyse practical utility of different natural product extraction methods and chromatographic techniques (*Analysis*)

CO5: Understanding of separation of binary mixture of organic compounds by using the concept of solubility. They would be able to synthesize different organic compounds by using single and multistep synthesis (*Synthesis*)

CO6: Identify different types of natural products. They will be able to describe important methods of extraction and their synthesis (*Evaluation*

Suggested Readings

1. Vogel's Textbook of Practical Organic Chemistry, Including Qualitative Organic Analysis
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, Pearson.
4. Ahluwalia, V. K.; Dhingra, S. Comprehensive Practical Organic Chemistry, University Press.

CHRP6005: RESEARCH PROJECT

(9 Credits)

Objective*: To train students to carry out research on a topic that is of relevance to the chemical sciences*
In this course, each student undertakes research on a topic that he/she chooses in project phase I or on a topic assigned to him/her by the concerned mentor.

To this end, the student will first review the current status of research on the selected topic, state a hypothesis or a set of objectives and then carry out experiments (either wet-lab or theoretical) to gather data, which he/she will then analyse, draw conclusions and finally present in a dissertation at the end of the semester.

The format for the final dissertation will be as prescribed by the department. There will be a viva voce examination on the dissertation by an expert committee comprising external and internal members of the department. The mode and components of the evaluation and the weightages attached to them shall be published by the department at the beginning of the semester
This will be a research-based module, whereby, students will carry out either theoretical or wet lab experiments and present their findings in a thesis and perhaps as a paper in a conference or a journal.

COURSE/LEARNING OUTCOMES

At the end of the Research Project students will be able to:

CO1: Experiments to fulfil their research objectives and will in the process learn a wide range of techniques both scientific and statistical, and also probably add to the existing body of scientific knowledge (*Knowledge*)
CO2: Understanding of the methods they use to carry out their research and why a certain set of methods is chosen (*Comprehension*)
CO3: Apply their understanding to steer their research in the right direction (*Application*)
CO4: Troubleshoot when a chosen approach does not yield the expected result (*Analysis*)
CO5: Learn to choose a methodology or approach to fulfil a set of objectives or prove or disprove a hypothesis (*Synthesis*)
CO6: Critically analyse the results they obtain to decide whether the data obtained proves or disproves a stated hypothesis (*Evaluation*)

CHAB6101: INORGANIC CHEMISTRY-I: ATOMIC STRUCTURE AND CHEMICAL BONDING LAB

(2 Credits)

A) Titrimetric Analysis
   (i) Calibration and use of apparatus
   (ii) Preparation of solutions of different Molarity/Normality of titrants
B) Acid-Base Titrations
   (i) Estimation of carbonate and hydroxide present together in mixture.
   (ii) Estimation of carbonate and bicarbonate present together in a mixture.
   (iii) Estimation of free alkali present in different soaps/detergents
C) Oxidation-Reduction Titrimetry
   (i) Estimation of Fe(II) and oxalic acid using standardized KMnO4 solution.
   (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
   (iii) Estimation of Fe(II) with K2Cr2O7 using internal (diphenylamine, anthranilic acid) and external indicator.

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: How to carry out acid-base and oxidation-reduction titrations for the estimation of salts ions in mixtures or in a solution (*Knowledge*)
CO2: Understanding of the principles and procedures that they use in the laboratory to carry out titrations to estimate the concentrations of ions in solution (*Comprehension*)
CO3: Carry out estimations of ions present in unknown proportions in a mixture or estimate ions such as Fe(II) present in unknown concentrations in solution (*Application*)
CO4: Distinguish between procedures of acid-base titration used for estimating carbonate and hydroxide ions in a mixture from the procedure used to estimate concentration of Fe(II) ions in a solution. They should be able to interpret the data they obtain from their measurements (*Analysis*)

CO5: Set up the methods used for estimating an unknown mixture of ions and interpret the results they obtain. (*Synthesis*)

CO6: Compare and contrast the different principles and procedures that they follow to estimate ions whether present in mixtures or independently (*Evaluation*)

Suggested Readings

1. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS.

CHIS6102: PHYSICAL CHEMISTRY-I: STATES OF MATTER AND IONIC EQUILIBRIUM LAB (2 Credits)

1. Surface tension measurements.
   a. Determine the surface tension by (i) drop number (ii) drop weight method.
   b. Study the variation of surface tension of detergent solutions with concentration.
2. Viscosity measurement using Ostwald's viscometer.
   a. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and (iii) sugar at room temperature.
   b. Study the variation of viscosity of sucrose solution with the concentration of solute.
3. Indexing of a given powder diffraction pattern of a cubic crystalline system. pH metry
   a. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
   b. Preparation of buffer solutions of different pH
      i. Sodium acetate-acetic acid
      ii. Ammonium chloride-ammonium hydroxide
   c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
   d. Determination of dissociation constant of a weak acid.

Any other experiment carried out in the class.

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Measure properties such as surface tension, viscosity, pH of solutions, index a given powder diffraction pattern of a cubic crystalline system, prepare buffers etc. (*Knowledge*)

CO2: Understand the principles underlying the experiments they carry out and be able to explain the principles in their own words (*Comprehension*)

CO3: Measure surface tension, viscosity, pH of any given solution and the dissociation constant of unknown weak acids (*Application*)

CO4: Apply the right principles when measuring the property of a given solution be it surface tension, pH or dissociation constant (*Analysis*)

CO5: How to set up an experimental protocol for measuring the property of an unknown sample which may be a sugar solution whose viscosity they want to measure by varying its concentration (*Synthesis*)

CO6: Assess the advantages and limitations of the principles and procedures they learn in the lab for analyzing properties such as surface tension of a solution or the dissociation constant of an unknown weak acid (*Evaluation*)

Suggested Readings

1. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi.
2. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
3. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

CHBH6103: ORGANIC CHEMISTRY- I: BASICS AND HYDROCARBONS LAB

(2 Credits)

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
   a. Water
   b. Alcohol
   c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method)
6. Chromatography:
   a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography
   b. Separation of a mixture of two sugars by ascending paper chromatography
   c. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Purify organic compounds by crystallization, to determine melting points of the purified compounds, to determine boiling point of liquid compounds and to use chromatography to separate out mixtures of two organic compounds (*Knowledge*)

CO2: Give the best crystals, how the melting point apparatus works, setting up a distaillation apparatus to determine the boiling of a liquid, and the significance of melting and boiling points of organic compounds, and the principle of chromatographic separation (*Comprehension*)

CO3: Crystallize an organic compound and determine its melting point or in the case of a liquid, determine its boiling point by distillation or the capillary method, they should be able to set up a chromatography experiment to separate a mixture of two organic compounds (*Application*)

CO4: Students should be able to assess the conditions required for crystallization and in the case of a liquid whether to use the distillation method or the capillary method for measuring the boiling point; they should be also determine optimal solvent compositions to use for chromatographic separation (*Analysis*)

CO5: Set up an experiment to separate a mixture of organic compounds using an appropriate chromatographic technique and identify the compounds based on their Rf values, they should be able to determine the melting point of an unknown organic compound (*Synthesis*)

CO6: Decide based on observations and acquired data, which chromatographic technique and solvent mixtures yield the best separation of a mixture of two organic compounds (*Evaluation*)

Suggested Readings

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi.
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry New Age International: New Delhi.

CHCT6104: PHYSICAL CHEMISTRY- II: THERMODYNAMICS AND ITS APPLICATIONS LAB

(2 Credits)

Thermochemistry

1. 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).
2. Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Calculation of the enthalpy of ionization of ethanoic acid.

4. Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.
5. Determination of basicity/proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.
6. Determination of enthalpy of hydration of copper sulphate.
7. Study of the solubility of benzoic acid in water and determination of ΔH.

Any other experiment carried out in the class.

COURSE/LEARNING OUTCOMES

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

CO1: Measure properties such as surface tension, viscosity, pH of solutions, index a given powder diffraction pattern of a cubic crystalline system, prepare buffers etc.. (Knowledge)
CO2: Understand the principles underlying the experiments they carry out and be able to explain the principles in their own words. (Comprehension)
CO3: Measure surface tension, viscosity, pH of any given solution and the dissociation constant of unknown weak acids. (Application)
CO4: Apply the right principles when measuring the property of a given solution be it surface tension, pH or dissociation constant. (Analysis)
CO5: Set up an experimental protocol for measuring the property of an unknown sample which may be a sugar solution whose viscosity they want to measure by varying its concentration (Synthesis)
CO6: Assess the advantages and limitations of the principles and procedures they learn in the lab for analyzing properties such as surface tension of a solution or the dissociation constant of an unknown weak acid. (Evaluation)

Suggested Readings

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi.
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry New Age International: New Delhi.

CHAH6105: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS LAB

(2 Credits)

Section A: Inorganic Chemistry - Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with KMnO4.
3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4.
4. Estimation of Fe (II) ions by titrating it with K2Cr2O7 using internal indicator.
5. Estimation of Cu (II) ions iodometrically using Na2S2O3.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)
2. Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)
   (a) 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
   (b) Identify and separate the sugars present in the given mixture by paper chromatography.

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Estimate inorganic salts such as sodium carbonate, sodium bicarbonate, Fe(II) ions, Cu(II) ions by volumetric analysis; Detect the presence of N,S, Cl, Br, I in organic compounds, separate mixtures of organic molecules by chromatography (*Knowledge*)
CO2: Explain the principles of the experiments they perform in this course in their own words (*Comprehension*)

CO3: Carry out estimations of mixtures of salts present in different proportions, estimate unknown quantities of Cu(II) or Fe(II) ions, determine the presence of N or S in unknown organic compounds, separate unknown mixtures by chromatography and identify them by comparing their Rf values with standard tables (*Application*)

CO4: Decide the best method for measuring the proportion of salts in a mixture by volumetric analysis; decide appropriate solvent ratios to use for chromatographic separation of organic molecules in a mixture (*Analysis*)

CO5: Design experiments to estimate for instance Cu(II) ions iodometrically, or design the solvent ratios in a chamber for optimal separation of organic molecules in a mixture by paper chromatography (*Synthesis*)

CO6: How to carry out elemental analysis of an organic molecule, know the best procedure for estimating salts in a mixture by volumetric analysis, and know why certain solvent ratios result in better separation of a pair of molecules in paper chromatography experiments, learn the shortcomings an advantages of the various experimental procedures they learn (*Evaluation*)

Suggested Readings

1. Vogel's Qualitative Inorganic Analysis, A.I. Vogel, Prentice Hall
2. Vogel's Quantitative Chemical Analysis, A.I. Vogel, Prentice Hall.
3. Textbook of Practical Organic Chemistry, A.I. Vogel , Prentice Hall.
4. Practical Organic Chemistry, F. G. Mann. & B. C. Saunders, Orient Longman.

CHCF6106: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY-I LAB

(2 Credits)

Section A: 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 ΔH.
7. Ionic equilibria

pH measurements

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 82
   ii) Ammonium chloride-ammonium hydroxide
3. Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
2. Criteria of Purity: Determination of melting and boiling points.
3. Preparations: Mechanism of various reactions involved to be discussed.
   Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
   (a) Bromination of Phenol/Aniline
   (b) Benzoylation of amines/phenols
   (c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone

COURSE/LEARNING OUTCOMES

At the end of the Lab experimentsstudents will be able to:

CO1: Measure the heat capacity of a calorimeter for different volumes, the enthalpy of neutralization, ionization, hydration etc; they will learn to measure pH of aerated drinks, fruit juices etc., prepare buffers, purify organic compounds by crystallization, determine melting and boiling points of organic compounds, they will prepare organic compounds, carry out bromination of phenol/aniline etc. (*Knowledge*)

CO2: Understand the principles of the experiments they carry out as well as of the methodologies involved (*Comprehension*)

CO3: Measure enthalpy of neutralization of any given unknown salt, measure the pH of an unknown aqueous solution, prepare a buffer solution using any weak acid or base, determine the melting point or boiling point of an unknown organic compound (solid/liquid) etc. (*Application*)

CO4: Interpret the results they get of a set of measurements and draw relevant conclusions, they should be able to troubleshoot when results are not conclusive, they should be able to come up with mechanisms for the organic preparations they carry out, etc. (*Analysis*)

CO5: Design experiments to measure for instance, the enthalpy of solvation of a solute, or the method of preparation of an organic compound, measure its melting/boiling point, depending on whether it is a solid or a liquid etc. (*Synthesis*)

CO6: Deduce the optimal methods for measuring a property, analyze and interpret data correctly, describe mechanisms involved in preparation of organic compounds they synthesize etc. (*Evaluation*).

Suggested Books

1. A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
2. F. G. Mann & B. C. Saunders, Practical Organic Chemistry, Orient Longman (1960).
3. B.D. Khosla, Senior Practical Physical Chemistry, R. Chand & Co.

SCHOOL OF FUNDAMENTAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS

MARA0014: REAL ANALYSIS

(4 Credits - 60 hours)

Objective: *The objective of this course is to introduce to a student various algebraic properties of the real number system. Moreover, the present course also serves as an introductory course on principles of real analysis that undertakes all the key notion of any form of Mathematical analysis.*

Module I (14 hours)

Review of set theory, relations and functions, finite and infinite sets, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum.

Sequence of real numbers, bounded sequence, limsup, liminf, Cauchy sequences, Series, convergence of series, root and ratio tests, absolute convergence.

Module II (8 hours)

Limit, Continuity, types of discontinuity, Intermediate value theorem, Fixed point theorem, uniform continuity, Monotonic functions.

Module III (12 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.

Module IV (10 hours)

Riemann sums and Riemann integral, Riemann-Stieltjes Integrals, Improper Integrals

Functions of several variables, directional derivative, partial derivative, derivative as a linear transformation, inverse and implicit function theorems.

Module V (16 hours)

Metric spaces, open and closed sets, limit points, interior points, Euclidean space, compact spaces, Bolzano Weierstrass theorem, Heine Borel theorem.

Measurable sets and functions, Lebesgue outer measure, Lebesgue integral.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts of mathematical analysis like algebraic and order properties of real numbers, continuity, differentiability, integration etc. (*Knowledge*)

CO2: Understanding of the already mentioned concepts, students will be able to have a systematic understanding of the interface among these concepts (*Comprehension*)

CO3: Formulate the problems involving numerous practical situations and will be able to solve such problems (*Application*)

CO4: Analyze roles played by each such concept in a certain problem and will be able to apply properties of the pertinent concept (*Analysis*)

CO5: Have a clear understanding of where the hypothesis of a given problem undertakes such concepts whence solving the problem (*Synthesis*)

CO6: Learn the fundamental distinction between various rules applied for the solution of a problem and also which method suits a certain problem the most (*Evaluation*)

Suggested Readings

1. Principles of Mathematical Analysis (5th edition) – W. Rudin, McGraw Hill Kogakusha Ltd., 2004.
2. Mathematical Analysis (5th edition) – T. Apostol, Addison-Wesley; Publishing Company, 2001.
3. Introduction to Real Analysis (3rd edition) – R. G. Bartle and D. R. Sherbert, John Wiley & Sons, Inc.,New York, 2000.
4. The Elements of Real Analysis (3rd edition) – R. G. Bartle, Wiley International Edition, 1994.

MALA0015: LINEAR ALGEBRA

(4 Credits - 60 hours)

Objective: *The objective of the present course is to introduce to a student the preliminaries of linear algebra. This course also intends to provide the students the knowledge of properties of matrices which is plays a key role in applicable as well as computational mathematics.*

Module I (10 hours)

Vector spaces, subspaces, quotient spaces, linear dependence, basis, dimension of a vector space, Linear Transformations.

Module II (20 hours)

Algebra of Matrices, trace of matrices, rank and determinant of matrices, system of linear equations. Eigenvalues and eigenvectors, relation between characterstic and minimal polynomial, Cayley-Hamilton theorem, Diagonalizability.

Module III (10 hours)

Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms.

Module IV (15 hours)

Inner product spaces, properties of inner products and norms, Cauchy-Schwarz inequality, Orthogonality and orthogonal complemants, orthonormal basis, Gram-Schmidt process.

Module V (5 hours)

Quadratic forms, reduction and classification of quadratic forms.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts associated with linear algebra and the role played by the theory of matrices (*Knowledge*)
CO2: Understanding of the key concepts of linear algebra, students will have the knowledge of the various physical significance of these concepts (*Comprehension*)
CO3: Apply concepts like linear independence, basis in various engineering problems and will be able to handle such problems in an efficient manner (*Application*)
CO4: Analyze for instance, the solvability of a system of linear equations in the form of a matrix and can infer important results (*Analysis*)
CO5: Synthesize the class of system of linear equations as consistent and inconsistent systems (*Synthesis*)
CO6: Decide for example, under what condition a given linear transformation is diagonal and to what extent a given transformation can be diagonalized (*Evaluation*)

Suggested Readings

1. K. Hoffman and R. Kunze, Linear Algebra, Prentice Hall, 1984.
2. G.E. Shilov, Linear Algebra, Prentice Hall, 1998.
3. Linear Algebra, A Geometric Approach – S. Kumaresan, Prentice-Hall of India Pvt. Ltd., NewDelhi,2001.

MAAB0016: ABSTRACT ALGEBRA

(4 Credits - 60 hours)

***Objective**: The primary objective of the present course is to introduce to a student the basics of abstract mathematics, a notion that is inevitable in every branch of mathematics. Moreover, the present course also serves as the pre-requisite to topics like Galois theory and represent theory.*

Module I (20 hours)

Groups, subgroups, cyclic groups, permutation groups, Isomorphism's, cosets and Lagrange's Theorem, normal subgroups, quotient groups, group homomorphism's, fundamental theorem of finite abelian groups . Cayley's theorem, class equations, Sylow theorems, Direct products of groups, Solvable groups, Jordan-Holder theorem

Module II (20 hours)

Rings, ideals, prime and maximal ideals, quotient rings, Euclidean domain. principal ideal domain, unique factorization domain, Polynomial ring over a field, reducible and irreducible polynomials, irreducibility criteria.

Module III (15 hours)

Fields, finite fields, field extensions, Algebraic extensions, Galois Theory.

Module IV (5 hours)

Fundamentals of representation theory.

COURSE/LEARNING OUTCOMES

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

CO1: Understanding of the basic concepts associated with abstract algebra for example group, ring, field etc. (*Knowledge*)
CO2: Relate these concepts to study the symmetries of a polygon, rotation of a cube etc. (*Comprehension*)
CO3: Use these concepts in various problems arising in mathematical physics and many other theoretical problems like insolvability of a quintic (*Application*)
CO4: Analyze the problem by analyzing the properties of the related structure (*Analysis*)
CO5: Classify the set of problems depending upon the underlying structure (*Synthesis*)
CO6: Infer about the possible outcomes of the problem (*Evaluation*)

Suggested Readings

1. I. N. Herstein, Topics in Algebra, Wiley Eastern Limited, New Delhi, 1975.
2. N. S. Gopalakrishnan, University Algebra, Wiley Eastern, 1991.
3. J. A. Gallian, Contemporary Abstract Algebra, Narosa, 1995.
4. Dummit & Foote, Algebra, John Wiley & Sons, 2005.

MADE0017: DIFFERENTIAL EQUATIONS

(4 Credits-60 Hours)

***Objective:** The present course aims to introduce to a student the theory of ordinary differential equation which plays a key role in almost every physical situation. Apart from that, the course can also be viewed as an introductory course on partial differential equation.*

Module I (12 hours)

Classification of Differential Equations, Their origin and solution; Exact differential equation and integrating factors, special integrating factors, linear equation and Bernoulli equations. existence and uniqueness for initial Value problem: Peano and Picard theorem

Module II (14 hours)

Second order Linear Differential equations , dimension of the solution space for homogeneous equations, general solution for non-homogeneous Equations.; method of undetermined coefficients, method of variation of parameters. Power series solution about an ordinary point, solution about singular points, Frobenius method

Module III (8 hours)

BVP, Sturm-Liouville Problem, Orthogonality of Characteristic functions, Fourier series exp.

Module IV (26 hours)

Origin of Partial Differential Equation, Linear and quasi-linear partial differential equation, method of characteristics, Lagrange's and Charpit's method to solve first order PDE, Cauchy problem for first order PDE, Classification of PDEs(second order), Method of separation of variables for Heat, Wave and Laplace equation.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts associated with differential equations like linear and non linear differential equation, solution of a differential equation etc. (*Knowledge*)

CO2: Understanding of the above mentioned concepts, a student will also have a conceptual insight of the underlying mathematical analysis (*Comprehension*)

CO3: Formulate problems involving various physical situation and will be able to solve such problems (*Application*)

CO4: Analyze certain problems which are not solvable initially whereupon suggesting possible conditions for the solution of the same (*Analysis*)

CO5: Have a clear understanding of the necessity and sufficiency of the hypothesis related to a the solution of a certain problem (*Synthesis*)

CO6: Learn the fundamental distinction between various methods applied for the solution of the same problem and also when to apply which method (*Evaluation*)

Suggested Readings

1. S. L. Ross, Differential Equations, 3rd Edition, Wiley-India.
2. W. Strauss, Partial Differential Equations an introduction, 2nd Edition, John Wiley and Sons, Ltd.
3. Tye Myint U and L. Debnath; Linear PDE for scientist and engineers, Fourth edition,Birkhauser Boston

MAMT0018: MATHEMATICAL METHODS I

(4 Credits-60 hours)

Objective: *The present course basically deals with the various numerical and computational techniques of applied mathematics which are indispensable in other areas of Mathematics for instance, fluid dynamics, numerical linear algebra etc. Moreover, this course can also be viewed as an introduction to operation research.*

Numerical Analysis

Module I (10 hours)

Numerical solution of algebraic and Transcendental equations: Bisection method, Regula-Falsi methods and Newton-Raphson method; Error analysis; Rate of convergence of these methods. Solution of systems of linear algebraic equations: Gauss elimination method , Gauss-Jordan method, Gauss-Seidel methods, Error analysis.

Module II (6 hours)

Interpolation: Finite differences, Newton's forward and backward difference interpolations, Central difference interpolation, Lagrange's and Newton's divided difference interpolation, Hermite and spline interpolation.

Module III (15 hours)

Numerical differentiation and integration: Differentiation using interpolation formulae (Newton's forward and backward difference interpolation, Central difference interpolation, Lagrange's and Newton's divided difference interpolation), Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rule, Romberg method.

Module IV (14 hours)

Numerical solutions of ODE and PDE: Initial value problem for ODE of first and second order, Taylor series method, Picard's method, Euler and modified Euler methods, Runge-Kutta methods, Milne's and Adam's predictor and corrector methods, Finite difference solution of second order ODE and PDE.

Linear programming

Module V (15 hours)

Mathematical formulation of LPP, Solution of a LPP by graphical method, simplex method, Revised simplex method, Duality. Transportation and Assignment problem, Two person-zero sum games. Equivalence of Rectangular game and linear programming.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the basic methods associated with numerical integration and differentiation, linear programming problem etc. (*Knowledge*)
CO2: Gain the knowledge regarding the advantages and limitations of these methods (*Comprehension*)
CO3: Use these concepts in various engineering problems involving signal processing etc. to get the solution up to certain accuracy (*Application*)
CO4: Analyze various possible methods to obtain the solution (*Analysis*)
CO5: Predict the efficiency of one method over the other whereby relating various problems for which such methods are applicable (*Synthesis*)
CO6: Analyzing various methods of solution of a problem and predicting the degree of accuracy, a student will be able to determine the suitability of a certain method for a certain problem (*Evaluation*)

Suggested Readings

1. M. K. Jain, S. R. K. Iyengar, R. K. Jain, Numerical methods, Problems and solutions, NewAge International (P) Ltd., 1996.
2. S. D. Conte and Carl de Boor, Elementary Numerical Analysis - An Algorithmic Approach,3rd Edition, McGraw Hill, 1980.
3. K. E. Atkinson, Introduction to Numerical Analysis, 2nd Edition, John Wiley, 1989.
4. H. A. Taha, Operations Research: an Introduction, Macmillan, 1982.
5. Kanti Swarup, P. K. Gupta and M. M. Singh, Operations Research, Sultan Chand and Sons, 1985.

MATF0019: TOPOLOGY AND FUNCTIONAL ANALYSIS

(4 Credits-60 hours)

Objective: *The basic objective of the present course is to introduce to a student the notion of topology, the general framework under which every form of Mathematical analysis works. Apart from that, this course can also be treated as the beginner's course on functional analysis.*

Module I (11 hours)

Metric spaces, open and closed sets, limit points, interior points, convergence, Cauchy sequence, completeness, completion in metric spaces, separable spaces.

Module II (10 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 (8 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 (8 hours)

The countability axioms, the separation axioms, Urysohn Lemma, Urysohn metrization theorem. Tychonoff's theorem, Stone-Cech Compactification.

Module V (8 hours)

Local finiteness, the Nagata Smirnov Metrization theorem, paracompactness, the Smirnov Metrization theorem, space of continuous function.

Module VI (15 hours)

Normed linear spaces, properties of normed linear spaces, Banach space, Hahn-Banach theorem, Open mapping theorem, Closed graph theorem, Principle of uniform boundedness, 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.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the basic concepts like open and closed sets, norm of a vector etc. (*Knowledge*)
CO2: Conceive the knowledge regarding for instance how to measure the distance between two vectors, length of a vector etc. (*Comprehension*)
CO3: Apply these concepts in various fields of engineering and applied sciences (*Application*)
CO4: Analyze different topological spaces depending upon various properties possessed by these spaces (*Analysis*)
CO5: Understand criteria behind the classification of topological spaces and the necessity to have such classification (*Synthesis*)
CO6: Depending upon the classification of topological and normed spaces, a student will be determine which space to consider while dealing with a certain problem (*Evaluation*)

Suggested Readings

1. G. F. Simmons, Introduction to topology and modern analysis, 2nd Edition, Tata-Mcgraw-Hill,
2. J. R. Munkres, Topology, 2nd Edition, Prentice Hall.
3. E. Kreyszig, Introductory functional analysis with application, John Willey and Sons.

MACA0020: COMPLEX ANALYSIS

(4 Credits-60 Hours)

Objective: *The basic objective of the present course is to familiarize a student about another form of Mathematical analysis called complex analysis. Apart from being one of the most important branches of analysis at its own, the notion of complex analysis is crucial for those who intends to pursue research in the field of Operator theory.*

Module I (10 hours)

Complex numbers and their properties, Complex Plane, Polar form of complex numbers, Powers and roots, set of points in the complex plane. Complex function, Special power functions, Reciprocal function.

Module II (15 hours)

Limits and Continuity, differentiability and analyticity, Cauchy-Reimann equations, Harmonic functions, Exponential and Logarithmic functions, complex powers, Trigonometric and Hyperbolic functions.

Module III (20 Hours)

Complex integrals, Cauchy-Goursat Theorem, Cauchy's integral formula and their consequences, Taylor and Laurent series, Zeroes and poles, Residues and residue theorem and consequences, evaluation of real improper integrals.

Module IV (15 hours)

Entire function, Liouville's theorem, Maximum modulus principle, Schwarz Lemma, Schwarz-Pick Lemma, Open Mapping theorem. Conformal Mapping, Linear Fractional Transformations, Cross Ratio.

COURSE/LEARNING OUTCOMES

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

CO1: Understanding of the basic concepts associated with complex analysis like analytic function, complex integration etc. (*Knowledge*)

CO2: Have the conceptual understanding regarding the difference between real and complex function theory (*Comprehension*)

CO3: Use these concepts in various engineering problems involving circuit problems, fluid flow to name a few whereby solving these problems (*Application*)

CO4: Analyze different complex functions defined over certain domains (*Analysis*)

CO5: Synthesize complex functions satisfying common properties (*Synthesis*)

CO6: Evaluate various physical problems by means of the properties of complex functions and the associated domain (*Evaluation*)

Suggested Readings

1. S. Ponnusamy, Foundation of Complex Analysis, 2nd Edition, Alphascience International.
2. J. B. Conway, Functions of one Complex variable I, 2nd Edition, Springer.
3. Schaum's outlines, Complex variable, 2nd Edition.

MAMP0021: MEASURE THEORY AND PROBABILITY THEORY

(4 Credits-60 hours)

Objective: *The prime objective of this course is to introduce to a student the fundamentals of measure theory both as a general subject and as a framework of probability theory. Apart from that, this course may also be viewed as the introductory course on probability theory.*

Module I (12 hours)

Algebra of sets, Borel set, extension of measures, Lebesgue measure on : outer measure, measurable sets and Lebesgue measure.Extension of measure, Lebesgue-Stieltjes measures and distribution functions.

Module II (18 hours)

Measurable functions and Integration: Lebesgue integral, Monotone convergence theorem, extended monotone convergence theorem, Fatou's Lemma, dominated convergence theorem, Comparison of Riemann and Lebesgue integral. Radon-Nikodym Theorem and related results

Module II (10 hours)

Probability axioms, sample spaces, events, law of total probability, conditional probability, Bayes' theorem and independence.

Module IV (20 hours)

Random Variables, types of random variables, distribution functions, function of random variables, standard univariate discrete and continuous distributions and their properties; expectations, moments, moments generating functions; Chebyshev's inequality, joint, marginal and conditional distributions; covariance, correlation; Random vectors, functions of random vectors, strong and weak law of large numbers, central limit theorem.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the fundamental of measure theory like measurable sets and functions etc. (*Knowledge*)

CO2: Gain the knowledge regarding how the axioms of measure theory provides a framework of probability theory (*Comprehension*)

CO3: Apply concepts of measurable spaces to define and understand random variables, probability density function (*Application*)

CO4: Analyze how the notion of measure to explain some famous paradox such as Banach Tariski paradox (*Analysis*)

CO5: Synthesize different measure spaces depending upon certain axioms (*Synthesis*)
CO6: Formulate necessary framework while dealing with certain problems of probability theory depending upon axioms of measure (*Evaluation*)

Suggested Readings

1. R.B.Ash and C.Doleans Dade; Probability and Measure Theory, Academic press
2. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edn., Wiley, 1968.
3. V. K. Rohatgi and A. K. Md. E. Saleh, An Introduction to Probability and Statistics, 2nd Edn., Wiley, 2001.
4. Royden, H.L. and Fitzpatrick, P. M., Real Analysis, 4th Edition, Pearson, 2010
5. Halmos, P. R. Measure Theory (Springer-Verlag, 1974).

MAMD0022: MATHEMATICAL METHODS II

(4 Credits - 60 hours)

Objectives: *The basic idea of this course is to introduce to a student the concepts pertaining advanced mathematical techniques. The notion of Laplace and Fourier transform not only constitute transform calculus but also play a key role in other branches of science like Mathematical physics and signal processing.*

Module I (10 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; Weirstras Erdmann corner conditions

Module II (8 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 eigen functions, resolvent kernel.

Module III (12 hours)

Fourier Transform. Properties of Fourier Transform, Fourier sine and cosine transform, Inverse Fourier Transform, Application of Fourier transform to ordinary and partial differential equations of initial and boundary value problems.

Module IV (12 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 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.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the fundamental methods associated with calculus of variation and integral equation etc. (*Knowledge*)
CO2: Gain the knowledge regarding the efficiency of such methods to tackle various practical problems (*Comprehension*)
CO3: Use concepts like Laplace and Fourier transform in numerous problems occurring various disciplines of Engineering sciences (*Application*)
CO4: Analyze and classify differential equations (*Analysis*)

CO5: Synthesize different physical models depending upon the classification of the associated differential equations (*Synthesis*)

CO6: Evaluate for instance which class of differential equation is be solvable by applying transform calculus (*Evaluation*)

Suggested Readings

1. Gelfand and Fomin: Calculus of Variation (Dover Publications,2000)
2. A.S. Gupta: Calculus of Variation with Applications, Prentice-Hall of India (1999).
3. R.P. Kanwal: Linear Integral Equations, Theory and Techniques, Academic Press, New York, 1971.
4. S.G. Mikhlin: Linear Integral Equations, (Trans.) Hindustan Book Agency, 1960..
5. M.R. Spiegel: Theory and Problems of Laplace Transform
6. F.B. Hilderbrand: Methods of Applied Mathematics, (Dover Publications,1992)
7. N.N. Levedev, Special functions and their applications, (Dover Publications,1972)
8. G.E. Andrews, R.A. Askey, and R. Roy: Special Functions (Cambridge University Press,1999).

MACL0023: CLASSICAL MECHANICS

(4 Credits - 60 Hours)

Objective: *The fundamental objective of this course to familiarize a student with the notion of classical mechanics. Moreover, this course provides a much needed framework for those who intend to pursue research in other branches of Mathematics and Physics.*

Module I (20 hours)

Introduction to the ideas of constrained motion, Different classifications of constrains of motion, Holonomic and nonholonomic constraints, rhenomic and scleronomic dynamical constraints, Concept of degree of freedom.

Introduction to generalized coordinates, generalized velocities, Total Kinetic energy of a system of particles in terms of generalized velocity. Introduction to generalized momenta and generalized force. D"Alemberts principle and Lagrangian form of equation motion of a dynamical system of N particles. Calculus of variations, Euler-Lagrange equation, application of calculus of variations in dynamical problems,

Module II (12 hours)

Two dimensional motion of rigid bodies, Euler's dynamical equations of motion for a rigidbody, Motion of a rigid body about an axis, motion about revolving axis, Eulerian angles, Eulers theorem on the motion of a rigid body, infinitesimal rotations, rate of change of a vector, Coriolis force, Euler's equations of motion, force free motion of a rigid body.

Module III (18 hours)

Hamilton's principle, Lagrange's equations from Hamilton's principle, extension of Hamilton's principle to non-conservative and non-holonomic systems, conservation theorems and symmetry properties. Hamilton's equations of motion, conservation theorems and physical significance of Hamiltonian, Hamilton's equations from variational principle, principle of least action.

Module IV (10 hours)

Hamilton Jacobi Method : Hamilton - Jacobi equation, Time independent Hamilton - Jacobi equation, canonical transformation generated by Hamilton characteristic function, application of Hamilton - Jacobi equation in solving problems of mechanics.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the fundamentals of classical mechanics (*Knowledge*)

CO2: Gain the conceptual understanding of such notions (*Comprehension*)

CO3: Apply concepts of classical mechanics to model various practical situations (*Application*)

CO4: Analyze various physical motion by first forming the mathematical model and then studying the properties of such model (*Analysis*)

CO5: Synthesize different motion possessed by rigid bodies depending upon the properties of various motions like Lagrangian and Hamiltonian (*Synthesis*)
CO6: Evaluate various practical situation by discussing the properties of existing models (*Evaluation*)

Suggested Readings

1. Classical Mechanics (3rd edition) – H. Goldstein, Addison Wesley Publications, Massachusetts, 2002.
2. Lagrangian and Hamiltonian Mechanics by M.G. Calkin, World Scientific, Singapore. 1996
3. Takwale, R. G. & Puranik, P. S. Classical Mechanics (Tata-McGraw Hill, 1979, 41st reprint, 2010).
4. Yung-Kuo, L. Problems and Solutions on Mechanics (World Scientific, 1994)

MACS0101: CALCULUS

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of the present course is to introduce to a student the fundamental notions of calculus, for instance, integration and differentiation in case of function of a single variable. Apart from that, analogous notion in case of vector valued function will also be introduced.*

Module I (18 + 7 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, L'Hospital's rule, applications in business, economics and life sciences.

Module II (16 + 7 hours)

Reduction formulae, derivations and illustrations of reduction formulae of the type , volumes by slicing, disks and washers 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 + 6 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 (14 + 10 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, modeling ballistics and planetary motion, Kepler's second law.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts and principles of differential and integral calculus (*Knowledge*)
CO2: Understanding of the already mentioned concepts, students will be able to have some idea on curve tracing, conics and vector function with properties (*Comprehension*)
CO3: Apply these mathematical concepts in various physical problems and will be able to solve such problems (like application of integration in finding volumes) (*Application*)
CO4: Analyze certain problems which are not solvable initially whereupon suggesting possible conditions for the solution of the same (*Analysis*)
CO5: Have a clear understanding of the necessity and sufficiency of the hypothesis related to a the solution of a certain problem (*Synthesis*)
CO6: Learn the fundamental distinction between various methods applied for the solution of the same problem and also when to apply which method (*Evaluation*)

Suggested Readings

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

3. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
4. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.

MAAG0102: ALGEBRA

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of this course is to familiarize a student with the fundamentals of complex numbers and arithmetic inequalities. This course also introduces to a student the basic properties of matrices along with their application in various physical situations.*

Module I (12 + 5 hours)

Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications.

Module II (12 + 7 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 (14 + 8 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 (22 + 10 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, Eigen values, Eigen Vectors and Characteristic Equation of a matrix.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the fundamental concepts associated with complex number, set theory, number theory, linear algebra (*Knowledge*)
CO2: Recognize the various physical significance of these concepts (*Comprehension*)
CO3: Apply these concepts in various problems and will be able to use the basic properties of matrices along with their application in various physical situation (Application)
CO4: Analyze methods to obtain the solution (*Analysis*)
CO5: Solve those problems by using the basic concept and logical thinking (*Synthesis*)
CO6: Decide which method of solution is applicable to what type or class of problems and the advantages and demerits of other methods leading to the solution of the same problem (*Evaluation*)

Suggested Readings

1. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser, 2006.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007

MAER0103: ELEMENTARY REAL ANALYSIS

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of this course is to introduce to a student various algebraic properties of the real number system. Apart from that, the present course also serves as an introductory course on principles of Mathematical analysis and their application in various other discipline.*

Module I (20 + 10 hours)

Review of Algebraic and Order Properties of R, neighbourhood of a point in R, Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of R, The Archimedean Property, Density of Rational (and Irrational) numbers in R, Intervals. Limit points of a set, Isolated points, Illustrations of Bolzano-Weierstrass theorem for sets.

Module II (20+ 10 hours)

Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion.

Module III (20 + 10 hours)

Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

COURSE/LEARNING OUTCOMES

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

CO1: Learn and understand the basic concept associated with real number system, fundamental and principles of mathematical analysis (*Knowledge*)

CO2: Interpret these concepts in a practical manner apart from having conceptual understanding of the already mentioned concepts (*Comprehension*)

CO3: Use these concepts in various other disciplines (*Application*)

CO4: Analyze various possible methods to obtain the solution (*Analysis*)

CO5: Solve those problems by using the basic concept and logical thinking (*Synthesis*)

CO6: Predict which method suits a certain problem the most (*Evaluation*)

Suggested Readings

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Gerald G. Bilodeau , Paul R. Thie, G.E. Keough, An Introduction to Analysis, 2nd Ed., Jones & Bartlett, 2010.
3. Brian S. Thomson, Andrew. M. Bruckner and Judith B. Bruckner, Elementary Real Analysis, Prentice Hall, 2001.
4. S.K. Berberian, A First Course in Real Analysis, Springer Verlag, New York, 1

MADQ0104: DIFFERENTIAL EQUATIONS

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The present course aims to introduce to a student the theory of ordinary differential equation which plays a key role in almost every physical situation. The course focuses not only at how to formulate a physical problem using differential equation but also at different methods of solution.*

Module I (18 + 10 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 (20 +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 (22 + 10 hours)

General solution of homogeneous equation of second order, principle of super position 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, predatory-prey model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the theory of differential equation (*Knowledge*)
CO2: Understanding of the already mentioned concepts, students will be able to have a systematic understanding of the relationship among these concepts (*Comprehension*)
CO3: Formulate a physical problems using differential equation and find solution (*Application*)
CO4: Analyze certain problems which are not solvable initially whereupon suggesting possible conditions for the solution of the same (*Analysis*)
CO5: Have a clear understanding of the necessity and sufficiency of the hypothesis related to a the solution of a certain problem (*Synthesis*)
CO6: Learn the fundamental distinction between various methods applied for the solution of the same problem and also when to apply which method (*Evaluation*)

Suggested Readings

1. Belinda Barnes and Glenn R. Fulford, Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab, 2nd Ed., Taylor and Francis group, London and New York, 2009.
2. C.H. Edwards and D.E. Penny, Differential Equations and Boundary Value problems Computing and Modeling, Pearson Education India, 2005.
3. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
4. Martha L Abell, James P Braselton, Differential Equations with MATHEMATICA, 3rd Ed., Elsevier Academic Press, 2004

MACD0105: CALCULUS AND DIFFERENTIAL EQUATIONS

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of this course is to familiarize a graduate student with techniques in multivariable calculus and differential Equations. It aims to equip the students with standard concepts and tools from an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.*

Module I (17 + 10 hours)

a) Derivatives, higher order derivatives, successive differentiation and Leibnitz's rule and its applications; Mean value Theorem, Taylor's Theorem, tangents and normals, concavity and inflection points, curvature, L' Hospital's rule
b) 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.

Module II (11 +5 hours)

Standard methods of integration, integration of irrational function, reduction formulae,derivations and illustrations of the type

Module III (7 + 5 hours)

Applications of Integrals: Area of plane curves, volume and surface area of solids of revolution, parametrization of a curve, arc engths of parametric curves.

Module IV (12+5 hours)

Differential equations; 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 V (13 + 5 hours)

General solution of homogeneous equation of second order, principle of super position 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.

COURSE/LEARNING OUTCOMES

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

CO1: Systematically understand the fundamental concepts like limits, continuity, differentiability, integrability and theory of differential equation (*Knowledge)*

CO2: Understanding of the already mentioned concepts, students will be able to have a systematic understanding of the relationship among these concepts (*Comprehension*)

CO3: Apply these mathematical concepts in various physical problem and will be able to solve such problems. (like application of integration in finding volumes. Students also will be able to formulate a physical problems using differential equation and find solution (*Application*)

CO4: Analyze certain problems which are not solvable initially whereupon suggesting possible conditions for the solution of the same (*Analysis*)

CO5: Have a clear understanding of the necessity and sufficiency of the hypothesis related to a the solution of a certain problem (*Synthesis*)

CO6: Learn the fundamental distinction between various methods applied for the solution of the same problem and also when to apply which method (*Evaluation*)

Suggested Readings

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi
3. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India

MALG0106: ALGEBRA

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective*: The objective of this course is to familiarize a student with the fundamentals of complex numbers and arithmetic inequalities. This course also introduces to a student the basic properties of matrices along with their application in various physical situations.*

Module I (12 + 5 hours)

Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications.

Module II (12 + 7 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 (14 + 8 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 (22 + 10 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, Eigen values, Eigen Vectors and Characteristic Equation of a matrix.

Suggested Readings

1. Titu Andreescu and Dorin Andrica, Complex Numbers from A to Z, Birkhauser
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint
3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint

MAAL0107: ALGEBRA AND NUMERICAL METHODS

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of the present course is to introduce to a student the fundamentals of algebra and the basic properties of matrices along with their application in various physical situation. Also, this course gives a complete procedure for solving different kinds of problem that occur in their discipline numerically.*

Module I (14 + 5 hours)

Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications; expansion of cosx , 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 (13 + 7 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, Diagonalzing matrices

Module III (17 + 10 hours)

Binary operations, associative and commutative binary operations; 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 (16 + 8 hours)

Transcendental and Polynomial Equation: Bisection method, Regula Falsi method, Newton's method; Interpolation: Lagrange and Newton's methods, finite difference operators, Gregory forward and backward difference interpolation; Numerical Integrations: Trapezoidal rule, Simpson's rule , Simpson 3/8th rule, finding eigenvalues by iteration.

Suggested Readings

1. J. A. Gallian: Contemporary Abstract Algebra, Brooks Cole.
2. J. B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson
3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint
4. K. Hoffman and R. Kunze, Linear Algebra, Prentice Hall
5. M. K. Jain, S. R. K. Iyengar, R. K. Jain, Numerical methods for Scientific and Engineering Computation, 6th Ed. NewAge International (P) Ltd.

MADV0108: DIFFERENTIAL EQUATIONS, VECTOR CALCULUS AND GEOMETRY

(6 Credits- 60 hours Theory + 30 hours Tutorial)

Objective: *The objective of the present course is to introduce to a student the theory of partial differential equation, vector calculus and geometry. It aims to equip the students with standard concepts and tools from an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.*

Module I (20 + 10 hours)

Transformation of coordinate axis, pair of straight lines

Parabola, parametric coordinates, tangent and Normal, Ellipse and conjugate diameters with properties; general conics: tangents, condition of tangency, pole and polar, centre of a conic, equation of pair of tangents, reduction to standards forms, central conics, equation of axes and length of the axes, polar equation of a conic.

Module II (20 +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, gradient, curl and divergence

Module III (20 +10 hours)

Simultaneous linear differential equations, total differential equations.

Partial differential equations of first order, Lagrange's solutions, some special types of equations which can be solved by methods other than the general method, Charpit's general methods of solution.

Suggested Readings

1. Differential Equation, H.T.H. Piaggio Differential Equations G.Bell & Sons Ltd. 1921
2. Analytical Geometry of two and three dimension and vector calculus , R.M.Khan
3. Ordinary and partial differential equations, M.D.Raisinghania, S.Chand and Co.

LSEC0018: ENGLISH COMMUNICATION

(2 Credits- 30 Hours)

Objective: *The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills.*

Module I: Introduction

Theory of Communication, Types and modes of Communication

Module II: Language of Communication:

Verbal and Non-verbal (Spoken and Written)
Personal, Social and Business
Barriers and Strategies
Intra-personal, Inter-personal and Group communication

Module III: Speaking Skills

Monologue, Dialogue, Group Discussion
Effective Communication/ Mis- Communication
Interview, Public Speech

Module IV: Reading and Understanding

Close Reading, Comprehension, Summary, Paraphrasing
Analysis and Interpretation
Translation (from Indian language to English and vice-versa)
Literary/Knowledge Texts

Module V: Writing Skills

Documenting, Report Writing, Making notes, Letter writing

Suggested Readings

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul,Dr Brati Biswas

DEPARTMENT OF SOCIAL WORK

MASTER OF SOCIAL WORK (MSW)

Semester 1

Type	Course Code	Course Name	Category	Credits	Page
Theory	SWHI0001	History, Ideologies and Fields of Social Work	DC	4	242
	SWHG0002	Human Growth and Development	DC	4	244
	SWSG0004	Social Work Practice with groups	DC	3	245
	SWSC0005	Social Work Practice with Communities	DC	3	246
	Elective 1				
	PCEC0013	Eastern Approaches to Psychology and Counselling	SE	3	295
	EDET0015	Education Technology	SE		332
	SWSP0028	Society and Social Problems	DE		270
	Elective 2 : One course to be opted				
	MCMN0025	Media in Northeast India	SE	3	384
	EDLR0007	Leadership and Social Responsibility	SE		322
	SWIS0006	Introduction to Indian Society, Polity and Economics	DE		247
	LSET0019	English Language Teaching	SE		404
Practicum	SWFR6001	Concurrent Field Work and Rural Practicum	DC	4	276
Total Credits				**24**	

Semester 2

Type	Course Code	Course Name	Category	Credits	Page
Theory Practicum/ Lab	SWIN0007	Social Work Practice with individuals and Families	DC	3	249
	SWSA0008	Social Analysis and Strategies for Social Change	DC	4	250
	SWRM0009	Social Work Research Methodology and Statistics	DC	4	252
	SWWA0034	Social Welfare Administration Development and Management of Organisations	DC	3	275
	Elective 1 : One course to be opted				
	SWIS0006	Introduction to Indian Society, Polity and Economics	DE	3	247
	PCPD0007	Personality Development	SE		286
	MCRC0026	Rural Communication	SE		384
	Elective 2 : One course to be opted				
	PCSP0006	Introduction to Social Psychology	SE	3	284
	EDPC0016	Peace Education and Conflict Management	SE		334
	SWSP0028	Society and Social Problems	DE		270
	LSNE0020	North-East Indian Literature in English	SE		405
	SWCA6010	Computer Applications for Social Sciences (Lab)	SC	2	277
	SWFW6003	Concurrent Field Work II	DC	4	278
Total Credits				**26**	

Semester 3

Type	Course Code	Course Name	Category	Credits	Page
Theory	SWSL0011	Social Justice, Human Rights and Social Legislations	DC	3	253
	SWDM0012	Environmental Studies and Disaster Management	DE	3	255
	SWCP0013	Conflict Management and Peace Building	DE	3	255
	Specialization Courses: One area of concentration to be opted				
	Community Development				
	SWRD0014	Community Development: Rural and Urban	DE	4	256
	SWGD0015	Governance and Community Development	DE	4	258
	Family and Child Welfare				
	SWFW0016	Family Centred Social Work Practice	DE	4	259
	SWSC0017	Social Work Practice with Children	DE	4	260
	Medical and Psychiatric Social Work				
	SWMW0018	Medical Social Work	DE	4	261
	SWMS0019	Mental Health and Social Work	DE	4	262
	Management of Development Organisations				
	SWMD0030	Development Organisations: Establishment and Management	DE	4	271
	SWDO0031	Policies For Development Organisations - Urban, Rural and Tribal Communities	DE	4	272
Practicum	SWFW6004	Continuous Field Work I	DC	3	278
	SWRP6005	Research Project Phase I	DC	2	279
	SWST6008	Study Tour	DC	P/NP	
Total Credits				**22**	

Semester 4

Type	Course Code	Course Name	Category	Credits	Page
Core	SWIS0020	Introduction to School Social Work	DC	3	263
	SWPR0029	Project cycle Management and Resource Mobilisation	DC	4	270
	SWFW6006	Continuous Field Work II	DC	4	278
	SWRP6007	Research Project Phase II	DC	4	279
	SWBP6009	Block Placement	DC	P/NP	NA
Electives	**Specialization Courses: One area of concentration to be opted**				
	Community Development				
	SWHM0027	Community Health and Population Management	DE	4	268
	SWPD0022	Community Development Practice with Disempowered Communities	DE	4	264
	Family and Child Welfare				
	SWDW0024	Development Concerns and Women Empowerment	DE	4	265
	SWFS0025	Families With Special Needs	DE	4	266
	Medical and Psychiatric Social Work				
	SWPS0026	Psychiatric Social Work	DE	4	267
	SWHM0027	Community Health and Population Management	DE	4	268
	Management of Development Organisations				
	SWOS0032	Organisational Structure and Behaviour	DE	4	273
	SWHR0033	Human Resource Management	DE	4	274
Total Credits				**23**	

DEPARTMENT OF PSYCHOLOGY AND COUNSELLING

BACHELOR OF ARTS – HONOURS IN PSYCHOLOGY

Semester 1

Type	Course Code	Course Name	Credits	Page
IC	LSGE0004	General English I	4	395
DC	PCBP0101	Basic Psychological Processes	4	304
	PCEX0105	Experimental Psychology	3	308
IE / SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHE0010	History of English Literature I - Elizabethan to Romantic period	4+4	398
	EDFE0101	Foundations of Education		357
	MCHE0107	History and Evolution of Media		387
	Open Elective : One course to be chosen from the following			
	LSFN0012	Functional English	3	400
	EDLE0105	Life Skills in Education		362
	PCPG0107	Personal Growth		310
	MCPC0105	Professional Communication		385
Total Credits			**22**	

Semester 2

Type	Course Code	Course Name	Credits	Page
IC	LSGE0005	General English II	4	395
DC	PCDP0102	Developmental Psychology	4	306
	PCBP0106	Basic Psychological Theories	3	309
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHL0011	History of English Literature II: Victorian to Contemporary Period	4+4	399
	EDPF0102	Philosophical Foundations of Education		358
	MCMS0113	Media and Society		392
	Open Elective: One course to be chosen from the following			
	LSCW0013	Creative Writing in English	3	401
	EDGE0106	Gender Education		361
	PCPA0108	Psychology of Personal Adjustment		312
	MCBP0106	Basics of Photography		386
Total Credits			**22**	

Semester 3

Type	Course Code	Course Name	Credits	Page
IC	LSAE0007	Alternative English I	4	396
DC	PCCP0103	Counselling Psychology	4	307
	PCBP0110	Bio Psychology	3	313
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSAD0033	English Essays - Addison to Dickens	4+4	414
	EDPB0107	Psychological Bases of Education		365
	MCLE0111	Media Law and Ethics		390
	Open Elective: One course to be chosen from the following			
	EDPE0109	Population Education	3	368
	PCPP0111	Peace Psychology		315
	LSCO0035	Communication Skills		416
	MCDP0114	Desktop Publishing II		392
Total Credits			**22**	

Semester 4

Type	Course Code	Course Name	Credits	Page
IC	LSAT0009	Alternative English II	4	397
DC	PCBA0112	Basic Abnormal Psychology	4	316
	PCCA0113	Child and Adolescent Development Psychology	3	316
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSLW0036	Life Writing-Biographies, Memoirs and Letters	4+4	416
	EDEI0110	Development of Education in India		369
	MCMN0115	Media in North East India		393
	Open Elective: One course to be chosen from the following			
	EDEC0112	Early Childhood Care and Education (ECCE: A Perspective)	3	371
	LSSK0038	Soft Skills		418
	PCCM0114	Community Psychology		317
	MCBP0106	Basics of Photography		386
Total Credits			**22**	

Semester 5

Type	Course Code	Course Name	Credits	Page
IC		Scientific Methodology		
		Environmental Studies		
DC		Social Psychology		
		Field Work		
		Psychology Practicum I		
DE	**One Course to be chosen from the following**			
		Health Psychology		
		Environmental Psychology		
Total Credits				

Semester 6

Type	Course Code	Course Name	Credits	Page
DC		Psychological Testing		
		Psychology Practicum II		
		Project Work		
DE	**Any two courses to be chosen from the following**			
		Positive Psychology		
		Organisational Behaviour		
		Advanced Abnormal Psychology		
Total Credits				

MASTER OF SCIENCE - PSYCHOLOGY (PSYCHOLOGICAL COUNSELLING)

Semester 1

Type	Course Code	Course Name	Category	Credits	Page
Theory	PCFC0016	Foundations of Professional Counselling	DC	4	298
	PCLS0002	Life Span Development	DC	4	280
	PCCP0017	Theoretical Perspectives for Counselling Psychology	DC	4	301
	PCIG0005	Process and Skills of Individual and Group Counselling I	DC	3	283
	Elective 1				
	PCEC0013	Eastern Approaches to Psychology and Counselling	DE	3	295
	EDET0015	Educational Technology	SE		332
	SWSP0028	Society and Social Problems	SE		270
	Elective 2 : One course to be opted				
	MCMN0025	Media in Northeast India	SE	3	384
	EDLR0007	Leadership and Social Responsibility	SE		322
	SWIS0006	Introduction to Indian Society, Polity and Economics	SE		247
	LSET0019	English Language Teaching	SE		404
Practicum	PCIG6001	Individual and Group Counselling - Practicum	DC	2	318
	PCPG6002	Personal Growth I	DC	P/NP	318
Total Credits				**23**	

Semester 2

Type	Course Code	Course Name	Category	Credits	Page
Theory	PCIG0008	Process and Skills of Individual and Group Counselling II	DC	3	287
	PCMH0004	Concepts of Mental Health and Illness	DC	4	281
	PCCY0009	Child and Youth Counselling	DC	4	289
	PCRM0010	Research Methodology and Statistics in Social Science	DC	4	291
	Elective 1 : One course to be opted				
	SWIS0006	Introduction to Indian Society, Polity and Economics	SE	3	247
	PCPD0007	Personality Development	DE		286
	MCRC0026	Rural Communication	SE	3	384
	Elective 2				
	SWSP0028	Society and Social Problems	SE	3	270
	EDPC0016	Peace Education and Conflict Management	SE		334
	PCSP0006	Introduction to Social Psychology	DE		284
	LSNE0020	North-East Indian Literature in English	SE		405
Practicum	PCCY6003	Child and Youth Counselling - practicum	DC	2	319
	PCFW6004	Field Work	DC	2	319
	PCPG6005	Personal Growth II	DC	P/NP	318
Total Credits				**25**	

Semester 3

Type	Course Code	Course Name	Category	Credits	Page
Theory	PCPT0018	Psychological Testing	DC	4	303
	PCMF0012	Marriage and Family Counselling	DC	4	293
	PCAT0014	Addiction and Trauma Counselling	DC	3	296
	PCDR0015	Disability Studies and Rehabilitation Psychology	DC	3	296
Practicum	PCMC6006	Marriage and Family Counselling - Practicum	DC	2	319
	PCCS6007	Case Study and Documentation	DC	2	319
	PCRP6008	Research Project Phase I	DC	2	320
	PCSI6009	Summer Internship	DC	P/NP	320
	PCST6012	Study Tour	DC	P/NP	321
Total Credits				**20**	

Semester 4

Type	Course Code	Course Name	Category	Credits	Page
Internship	PCSI6010	Supervised Internship	DC	8	320
Project	PCRP6011	Research Project Phase II	DC	8	320
Total Credits				**16**	

DEPARTMENT OF EDUCATION

BACHELOR OF ARTS - HONOURS IN EDUCATION

Semester 1

Type	Course Code	Course Name	Credits	Page
IC	LSGE0004	General English I	4	395
DC	EDFE0101	Foundations of Education	4	357
	EDTP0103	Theories and Principles of Education	3	359
IE / SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHE0010	History of English Literature I - Elizabethan to Romantic Period	4+4	396
	PCBP0101	Basic Psychological Processes		357
	MCHE0107	History and Evolution of Media		387
	Open Elective : One course to be chosen from the following			
	LSFN0012	Functional English	3	400
	EDLE0105	Life Skills in Education		362
	PCPG0107	Personal Growth		310
	MCPC0105	Professional Communication		385
Total Credits			**22**	

Semester 2

Type	Course Code	Course Name	Credits	Page
IC	LSGE0005	General English II	4	395
DC	EDPF0102	Philosophical Foundations of Education	4	358
	EDES0104	Education and Society	3	361
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHL0011	History of English Literature II: Victorian to Contemporary Period	4+4	399
	PCDP0102	Developmental Psychology		306
	MCMS0113	Media and Society		392
	Open Elective: One course to be chosen from the following			
	LSCW0013	Creative Writing in English	3	401
	EDGE0106	Gender Education		361
	PCPA0108	Psychology of Personal Adjustment		312
	MCIC0110	Introduction to Computer Application		389
Total Credits			**22**	

Semester 3

Type	Course Code	Course Name	Credits	Page
IC	LSAE0007	Alternative English I	4	396
DC	EDPB0107	Psychological Bases of Education	4	365
	EDHR0108	Human Rights Education	3	367
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSAD0033	English Essays - Addison to Dickens	4+4	414
	PCCP0103	Counselling Psychology		307
	MCLE0111	Media Law and Ethics		390
	Open Elective: One course to be chosen from the following			
	EDPE0109	Population Education	3	368
	PCPP0111	Peace Psychology		315
	LSCO0035	Communication Skills		416
	MCDP0114	Desktop Publishing II		392
Total Credits			**22**	

Semester 4

Type	Course Code	Course Name	Credits	Page
IC	LSAT0009	Alternative English II	4	397
DC	EDEI0110	Development of Education in India	4	369
	EDET0111	Educational Thinkers	3	370
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSLW0036	Life Writing- Biographies, Memoirs and Letters	4+4	416
	PCBA0112	Basic Abnormal Psychology		316
	MCMN0115	Media in North East India		393
	Open Elective: One course to be chosen from the following			
	EDEC0112	Early Childhood Care and Education (ECCE): A Perspective	3	371
	LSSK0038	Soft Skills		418
	PCCM0114	Community Psychology		317
	MCBP0106	Basics of Photography		386
Total Credits			**22**	

Semester 5

Type	Course Code	Course Name	Credits	Page
IC		Scientific Methodology		
		Environmental Studies		
DC		Measurement and Evaluation in Education		
		Educational Technology		
		Foundations of Curriculum Development		
DE	**One Course to be chosen from the following**			
		Guidance and Counselling		
		Special and Inclusive Education		
Total Credits				

Semester 6

Type	Course Code	Course Name	Credits	Page
DC		Teaching Learning Methods and Pedagogy		
		Teacher Education		
		Project Work		
DE	**Any two courses to be chosen from the following**			
		Educational Management and Administration		
		Psychological Testing		
		Distance and Adult Education		
Total Credits				

MASTER OF ARTS - EDUCATION
(EDUCATIONAL LEADERSHIP / EDUCATIONAL PSYCHOLOGY)

Semester 1

Type	Course Code	Course name	Category	Credit	Page
Theory	EDFE0011	Philosophical Foundations of Education	DC	4	323
	EDEP0012	Fundamentals of Educational Psychology	DC	4	325
	EDTE0013	Emerging Trends in Education	DC	3	328
	EDDE0014	History and Development of Education in India	DC	3	330
	Elective Group I				
	PCEC0013	Eastern Approaches to Psychology and Counselling	SE	3	295
	EDET0015	Educational Technology	DE		332
	SWSP0028	Society and Social Problems	SE		270
	Elective Group II				
	MCMN0025	Media in Northeast India	SE	3	384
	EDLR0007	Leadership and Social Responsibility	DE		322
	SWIS0006	Introduction to Indian Society, Polity and Economics	SE		247
	LSET0019	English Language Teaching	SE		404
Practicum	EDJG6002	Journaling – a Technique for Personal and Academic Growth	DC	3	372
Total Credits				**23**	

Semester 2

Type	Course Code	Course name	Category	Credit	Page
Theory	EDSF0017	Sociological Foundations of Education	DC	4	335
	PCRM0010	Research Methodology and Statistics in Social Science	DC	4	
	EDTK0018	Theory of Knowledge	DC	3	338
	Specialisation Courses: One area of Concentration to be opted				
	Educational Leadership				
	EDEL0019	Developing Educational Leadership	DC	3	339
	Educational Psychology				
	EDDL0020	Human Development and Learning	DC	3	341
	Elective Group I				
	SWIS0006	Introduction to Indian Society, Polity and Economics	SE	3	347
	PCPD0007	Personality Development	SE		286
	MCRC0026	Rural Communication	SE		384
	Elective Group II				
	PCEC0013	Eastern Approaches to Psychology and Counselling	SE	3	
	EDPC0016	Peace Education and Conflict Management	DE		334
	SWSP0028	Society and Social Problems	SE		270
	LSNE0020	North-East Indian Literature in English	SE		405
Practicum	EDES6003	Educational Seminar I	DC	2	373
	SWCA6010	Computer Applications for Social Sciences (Lab)	SE	2	
	EDSV6004	School Visits		2	373
Total Credits				**26**	

Semester 3

Type	Course Code	Course name	Category	Credit	Page
Theory	EDCI0021	Curriculum Development and Instruction	DC	3	343
	EDTP0022	Principles and Techniques of Teaching and Pedagogy	DC	3	345
	EDTE0023	Teacher Education	DC	3	347
	EDME0024	Measurement and Evaluation in Education	DC	3	349
	Specialization Courses:				
	Educational Leadership				
	EDPL0025	Educational Law and Government Policy	DC	3	351
	EDFM0026	Financial Management and Accounting	DC	3	352
	Educational Psychology				
	EDLE0027	Life Span Development and Education	DC	3	353
	EDLI0028	Learning and Individual Differences	DC	3	355
Practicum	EDDI6005	Dissertation Phase I	DC	2	374
	EDES6009	Educational Seminar II	DC	2	374
	EDSA6006	School Audit	DC	2	374
Total Credits				**23**	

Semester 4

Type	Course Code	Course name	Category	Credit	Page
Theory	EDOC0029	Organisational Communication	DC	3	375
	Specialization Courses:				
	Educational Leadership				
	EDEA0030	Educational Administration	DC	3	377
	EDSR0031	Ethics and Social Responsibility in Education	DC	3	378
	Educational Psychology				
	EDSP0032	Counselling Skills for Educational Psychologists	DC	3	379
	EDCA0033	Child and Adolescent Mental Health	DC	3	380
Practicum	EDDI6007	Dissertation Phase II	DC	4	382
	EDIN6008	Internship	DC	3	383
Total Credits				**16**	

DEPARTMENT OF MASS COMMUNICATION

BACHELOR OF ARTS – HONOURS IN MASS COMMUNICATION

Semester 1

Type	Course Code	Course Name	Credits	Page
IC	LSGE0004	General English I	4	395
DC	MCHE0107	History and Evolution of Media	4	387
	MCCM0108	Communication Theories and Models	3	387
IE / SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHE0010	History of English Literature I - Elizabethan to Romantic Period	4+4	378
	EDFE0101	Foundations of Education		357
	PCBP0101	Basic Psychological Processes		304
	Open Elective : One course to be chosen from the following			
	LSFN0012	Functional English	3	400
	EDLE0105	Life Skills in Education		363
	PCPG0107	Personal Growth		310
	MCPC0105	Professional Communication		385
Total Credits			**22**	

Semester 2

Type	Course Code	Course Name	Credits	Page
IC	LSGE0005	General English II	4	395
DC	MCMS0113	Media and Society	4	392
	MCFM0109	Traditional Folk Media	3	388
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSHL0011	History of English Literature II : Victorian to Contemporary Period	4+4	399
	EDPF0102	Philosophical Foundations of Education		358
	PCDP0102	Developmental Psychology		306
	Open Elective: One course to be chosen from the following			
	LSCW0013	Creative Writing in English	3	401
	EDGE0106	Gender Education		361
	PCPA0108	Psychology of Personal Adjustment		312
	MCIC0110	Introduction to Computer Application		386
Total Credits			**22**	

Semester 3

Type	Course Code	Course Name	Credits	Page
IC	LSAE0007	Alternative English I	4	396
DC	MCLE0111	Media Laws and Ethics	4	390
	MCIJ0112	Introduction to Journalism	3	391
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSAD0033	English Essays I -Addison to Dickens	4+4	414
	EDPB0107	Psychological Bases of Education		365
	PCCP0103	Counselling Psychology		307
	Open Elective: One course to be chosen from the following			
	EDPE0109	Population Education	3	368
	PCPP0111	Peace Psychology		315
	LSCO0035	Communication Skills		416
	MCDP0114	Desktop Publishing II		392
Total Credits			**22**	

Semester 4

Type	Course Code	Course Name	Credits	Page
IC	LSAT0009	Alternative English II	4	397
DC	MCMN0115	Media in North East India	4	393
	MCHE0116	History and Evolution of Media	3	394
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	LSLW0036	Life Writing-Biographies, Memoirs and Letters	4+4	416
	EDEI0110	Development of Education in India		369
	PCBA0112	Basic Abnormal Psychology		316
	Open Elective: One course to be chosen from the following			
	EDEC0112	Early Childhood Care and Education (ECCE): A Perspective	3	371
	LSSK0038	Soft Skills		418
	PCCM0114	Community Psychology		317
	MCBP0106	Basics of Photography		386
Total Credits			**22**	

Semester 5

Type	Course Code	Course Name	Credits	Page
IC		Scientific Methodology		
		Environmental Studies		
DC		Visual Communication		
		Advertising		
		Introduction to Video Production		
DE	**One Course to be chosen from the following**			
		Animation & VFX		
		Community Media		
Total Credits				

Semester 6

Type	Course Code	Course Name	Credits	Page
DC		Graphic Designing		
		Communication for Development		
		Internship		
		Media Project		
DE	**Any Two courses to be chosen from the following**			
		Film Studies		
		Web Designing		
		Media Entrepreneurship		
Total Credits				

DEPARTMENT OF LANGUAGE STUDIES

BACHELOR OF ARTS - HONOURS IN ENGLISH

Semester 1

Type	Course Code	Course Name	Credits	Page
IC	LSGE0004	General English I	4	395
DC	LSHE0010	History of English Literature I - Elizabethan to Romantic Period	4	396
	LSPD0014	Poetry, Prose and Drama - Elizabethan to Restoration Period	3	402
IE / SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	EDFE0101	Foundations of Education	4+4	357
	PCBP0101	Basic Psychological Processes		304
	MCHE0107	History and Evolution of Media		357
	Open Elective : One course to be chosen from the following			
	LSFN0012	Functional English	3	400
	EDLE0105	Life Skills in Education		362
	PCPG0107	Personal Growth		310
	MCPC0105	Professional Communication		385
Total Credits			**22**	

Semester 2

Type	Course Code	Course Name	Credits	Page
IC	LSGE0005	General English II	4	395
DC	LSHL0011	History of English Literature II: Victorian to Contemporary Period	4	399
	LSPF0015	Poetry, Prose and Fiction: Augustan to Romantic Period	3	402
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	EDPF0102	Philosophical Foundations of Education	4+4	358
	PCDP0102	Developmental Psychology		306
	MCMS0113	Media and Society		392
	Open Elective: One course to be chosen from the following			
	LSCW0013	Creative Writing in English	3	401
	EDGE0106	Gender Education		361
	PCPA0108	Psychology of Personal Adjustment		312
	MCIC0110	Introduction to Computer Application		386
Total Credits			**22**	

Semester 3

Type	Course Code	Course Name	Credits	Page
IC	LSAE0007	Alternative English I	4	396
DC	LSAD0033	English Essay - Addison to Dickens	4	414
	LSPR0034	Poetry - Restoration to Romantic Period	3	415
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	EDPB0107	Psychological Bases of Education	4+4	365
	PCCP0103	Counselling Psychology		307
	MCLE0111	Media Law and Ethics		390
	Open Elective: One course to be chosen from the following			
	EDPE0109	Population Education	3	368
	PCPP0111	Peace Psychology		315
	LSCO0035	Communication Skills		416
	MCDP0114	Desktop Publishing II		392
Total Credits			**22**	

Semester 4

Type	Course Code	Course Name	Credits	Page
IC	LSAT0009	Alternative English II	4	397
DC	LSLW0036	Life Writing-Biographies, Memoirs and Letters	4	416
	LSLC0037	Literary Criticism: Aristotle to I. A. Richards	3	417
IE/SE	**Subsidiary 1 and 2: Two courses to be chosen from the following**			
	EDEI0110	Development of Education in India	4+4	369
	PCBA0112	Basic Abnormal Psychology		316
	MCMN0115	Media in North East India		393
	Open Elective: One course to be chosen from the following			
	EDEC0112	EDEC0112 Early Childhood Care and Education (ECCE): A Perspective	3	371
	LSSK0038	Soft Skills		418
	PCCM0114	Community Psychology		317
	MCBP0106	Basics of Photography		386
Total Credits			**22**	

Semester 5

Type	Course Code	Course Name	Credits	Page
IC		Scientific Methodology		
		Environmental Studies		
DC		Post-Colonial writings		
		Modern English Drama		
		American Literature		
DE	**One Course to be chosen from the following**			
		Indian English Literature		
		English Language and Linguistics I		
Total Credits				

Semester 6

Type	Course Code	Course Name	Credits	Page
DC		African Literature		
		Indian Diasporic Wrings in English		
		Project Work		
DE	**Any two courses to be chosen from the following**			
		Literary and Cultural Theory: 20th Century and After		
		Women and Literature		
		English Language and Linguistics 2		
Total Credits				

MASTER OF ARTS - ENGLISH

Semester 1

Type	Course Code	Course name	Category	Credit	Page
Theory	LSEP0021	Chaucer to Elizabethan Period – Poetry, Drama and Romance	DC	4	406
	LSLS0022	Literary and Social History of England -Chaucer to Elizabethan Period	DC	3	407
	LSSD0023	Shakespearean Drama I – Comedy and History Plays	DC	4	407
	LSRP0024	Rhetoric and Prosody		2	408
	Elective I One course to be chosen				
	LSTS0025	T.S. Eliot	DE	3	409
	LSTH0026	Thomas Hardy	DE		409
	Elective II One course to be chosen				
	MCMN0025	Media in Northeast India	SE	3	384
	EDLR0007	Leadership and Social Responsibility	SE		322
	SWIS0006	Introduction to Indian society, polity and economics	SE		247
	LSET0019	English Language Teaching	DE		404
Seminar	LSSM6005	Seminar and Presentation I	DC	1	418
Total Credits				**20**	

Semester 2

Type	Course Code	Course name	Category	Credit	Page
Theory	LSRR0027	Restoration to Romantic Period – Poetry and Drama	DC	4	410
	LSLC0028	Literary Criticism – Plato to F.R. Leavis	DC	4	411
	LSSH0029	Shakespearean Drama II – Tragedy and Tragi-Comedy	DC	4	412
	LSAL0030	Approaches to Language and Literary Research	DC	3	412
	Elective I One course to be chosen				
	LSTR0031	Classics in Translation	DE	3	413
	LSIW0032	Indian Women Writers	DE		414
	Elective II One course to be chosen				
	SWSP0028	Society and Social Problems	SE		270
	EDPC001**6**	Peace Education and Conflict Management	SE		334
	PCSP0006	Introduction to Social Psychology	SE		284
	LSNE0020	North-East Indian Literature in English	DE		405
Seminar	LSSP6006	Seminar and Presentation II	DC	1	419
Total Credits				**20**	

Semester 3

Type	Course Code	Course name	Category	Credit	Page
Theory	-	Victorian to Post-Modern Period – Poetry, Drama & Fiction	DC	4	-
	-	Post-Colonial Literature – Poetry, Drama & Fiction	DC	3	-
	-	American literature – Poetry, Drama & Fiction	DC	3	-
	-	Literary and Critical Theory	DC	4	-
	-	Gender and Literature	DC	2	-
	Specialisation Course: Language and Linguistics				
		Linguistics and Stylistics 1	DC	3	-
	Specialization Paper: European Literature				
	-	Contemporary European Literature 1	DC	3	-
	Specialization Paper: African Literature				
	-	Colonial and Post- Colonial African Literature 1	DC	3	-
Project	-	Project Phase I	DC	2	-
Total Credits				**21**	

Semester 4

Type	Course Code	Course name	Category	Credit	Page
Theory	-	Indian Writing in English – Poetry, Drama & Fiction	DC	4	-
	-	South-Asian Literature	DC	4	-
	Specialization Paper: Language and Linguistics				
	-	Linguistics and Stylistics 2	DC	3	-
	Specialization Paper: European Literature				
	-	Contemporary European Literature 2	DC	3	-
	Specialization Paper: African Literature				
	-	Colonial and Post- Colonial African Literature 2	DC	3	-
Project	-	Project Phase II- Dissertation	DC	8	-
Total Credits				**19**	

DEPARTMENT OF SOCIAL WORK

SWHI0001: HISTORY, IDEOLOGIES AND FIELDS OF SOCIAL WORK
(4 credits – 60 hours)

Objective: *This course is intended as an introduction to Social Work. It introduces the student to the history and philosophy of social work, its methodologies and fields. It leads the student to appreciate Social Work as a profession and to recognise the need and importance of Social Work Education, Training and Practice.*

Module I: Introduction to Social Work (10 hours)

a) Concepts and Definitions: – Social Work, Social Service, Social Reform, Social Defence, Social Welfare, Social Policy, Social Action, Social Legislation, Social Advocacy and Social Education
b) Principles, Objectives and Scope of Social Work; Introduction to Social Work as practiced today in India.

Module II: History and Ideologies of Social Work (15 hours)

a) Historical development of Social Work in England, USA, India
b) U.K. and USA: The Elizabethan poor law, 1601, Charity Organisation Society 1869, The Settlement House Movement, (USA), The Poor Law Commission of 1905, The Beveridge Report 1941
c) Post-Independence Era -Training in India, New developments, Social Reforms, Social Movements, State policies for development- Fundamental Rights and Directive principles
d) Religio-Philosophical ideologies, Gandhian Philosophical Foundation to Social Work in India.

Module III: Social Work Profession (15 Hours)

a) Social work profession: Concept of profession, Applicability of the concept of social work profession in India as developed in U.S.A.
b) Professional values, code of ethics, skills of social worker.
c) Social work education: growth of social work education, social work curriculum, objectives of field work ,and supervision.
d) Professional organizations: Indian association of professional social workers, national association of social worker, International/Indian Council of Social Worker, International Association of Schools of Social Work,National Association of Social Workers

Module IV: Social Work Fields and Methods (10 hours)

a) Fields of Social Work: Family and child welfare, Youth development, Industrial social work, Correctional administration, Medical and psychiatric social work, Community development, Human and Child Rights, etc.
b) Methods of Social Work: social work practice with individual, Group work and Community; Social Action, Social work Research, Social welfare administration and social legislation;
c) Integrated approach to social work; Systems Approach to Social work practice.

Module V: Contemporary Concerns in Social Work (10 hours)

Contemporary Concerns in Social Work: Contextualizing Interventions, Theoretical perspectives for social work practice; Factors influencing practice. Ideologies for social change in India – understanding reform movements.

Suggested Readings

1. Gore.M.S, Social Work and Social Work Education, Asia, Publication house, Mumbai, 1965
2. Jainendra Kumar Jha, Practice of Social work, Anmol Publications, New Delhi, 2002,
3. Joshi.S.C, The Handbook of Social work, Akansha Publishing House, New Delhi, 2004.
4. Paul Chowdhury, Introduction to Social Work, ATMA RAM and SONS, Delhi, 2000.
5. Sanjay Bhattacharya, Social work – An Integrated Approach, Deep and Deep Publications Pvt Ltd, New Delhi, 2003
6. Walsh Joseph, Theories of of Direct Social work practice, Thomson Brooks, Cole, 2006
7. Allan, June, Bob Pease and Linda Briskman (ed.). Critical Social Work – An Introduction to Theories and Practices, Rawat Publications, Jaipur, 2003.

8. Bhattacharya, Sanjay, Social Work Interventions and Management, Deep and Deep, New Delhi, 2008
9. Bogo, Marion, Social Work Practice – Concepts, Processes and Interviewing, Rawat Publications, Jaipur, 2007
10. Cox, David andManoharPawar, International Social Work – Issues, Strategies and Programs, Vistar Publications, New Delhi, 2006
11. Desai, Murli, Ideologies and Social Work, Rawat Publications, Jaipur, 2002
12. Dominelli, Lena, Social Work: Theory and Practice for a Changing Profession, Polity Press, London, 2004
13. Skidmore AR and Milton G Thackeray, Introduction to Social Work, Prentice Hall, New Jersey
14. Lukose PJ. Social Analysis: A Guide for the Social Workers, Media House, New Delhi, 2016.

SWHG0002: HUMAN GROWTH AND DEVELOPMENT

(4 credits - 60 hours)

Objectives:

- *To gain an understanding of human psychology, knowledge of the developmental stages and personality theories related to human beings;*
- *To get an understanding of the concept of health, principles of healthy living, major diseases and mental disorders affecting an individual;*
- *To understand the role of institutions and agencies in dealing with the promotion of health.*

Module I: Meaning of Growth and Development (15 hours)

a) Meaning of growth, development and maturity, Principles of human development
b) Approaches to the study of human development: biological, maturational, psychoanalytic, behavioural, cognitive-developmental, ecological, Social
c) Influence of socialization and development - family, social groups, institution, community and culture.

Module II: Developmental Stages and Personality Theories (15 hours)

a) Physical, Emotional, Cognitive and Social aspects of the following developmental stages with special reference to Indian conditions – Infancy, Babyhood, early childhood, late childhood, adolescence, early adulthood, late adulthood, middle age, old age
b) Personality theories – Freud, Jung, Adler, Erikson, Rogers, Maslow

Module III: Mental health (12 hours)

a) Concept of Normalcy and abnormality
b) Symptoms, Causes and treatment of the following disorders - neuroses, psychoses, Somatoform disorder, personality disorder and mental retardation

Module IV: Physical Health (12 hours)

a) Concept of health, hygiene, WHO definition of health; nutrition, malnutrition and its impact on growth
b) Communicable and non-communicable diseases - Symptoms, causes, treatment, prevention and control of some common diseases – communicable: T.B., Leprosy, STD, HIV, Typhoid, Chickenpox, Malaria, Hepatitis; non communicable: Hypertension, Diabetes, Cancer, Malnutrition and deficiency diseases

Module V: Role of the Professional Social Worker (6 hours)

Institutions and agencies intervening in human growth and development- family, education, Health care systems

Suggested Readings

1. Berk, Laura E. Development through the Lifespan, 5th edition. Allyn and Bacon. London: 2009
2. Ahuja, Niraj., A Short textbook of Psychiatry, Himalaya Publishing House. New Delhi: 2005
3. Bhattacharya, Sanjay Dr. 2008. Social Work: Psycho-Social and Health Aspects. New Delhi: Deep and Deep.

4. Butler Gillian, McManus Freda, Psychology – A Very Short Introduction. Oxford University Press. New York: 1998
5. Carson C. Robert, Kutcher N. James, Minela Susan, Hooley M. Jill, Abnormal Psychology. 13th Edition. Pearson Education. 2010
6. Chaube S.P., Abnormal Psychology, Educational Publishers
7. Ciccarelli K. Saundra, Meyer E. Glean., Psychology – South Asian Edition. Pearson. India: 2008
8. Clifford T. Morgan, Richard A. King, John R. Weisz, John Schopler, Introduction to Psychology, Tata Mc.Graw Hill Edition.
9. Coleman James. C, Abnormal Psychology and Modern Life, D.B. Taneporevela. Mumbai: 1975
10. Dandapani S., General Psychology, Neelkamal Publications Pvt. Ltd. Hyderabad: 2007
11. Diagnostic and Statistical Manual of Mental Disorders – 4th Edition. DSM – IV-TR. American Psychiatric Association. Washington DC:2000
12. Feist Jess, Feist J. Gregory, Theories of Personality, 7th Edition. McGraw Hill. Primis: 2008
13. Fernald/Fernald, Munn's Introduction to Psychology, 5th Edition, AITBS Publishers: India
14. Feshback Seymour, Weiner Bernard, Bohart Arthur, Personality. 4th Edition. D.C. Health and Company. Lexington: 1996
15. Hurlock, Elizabeth, Developmental Psychology, Tata Mc Graw Hill. New York: 2001
16. James D. Page, Abnormal Psychology, Tata Mc Graw Hill Edition.
17. Kaplan Saddock, Synopsis of Psychiatry. 7th Ed. BI Waverly Pvt. Ltd. New Delhi: 1994
18. Park. J.E and Park. K, Text Book of Preventive and Social Medicine, Bansaridas Bhanot. Jabalpur: 2003
19. Robert A. Baron, Psychology, 5th Edition. Pearson. Prentice Hall: 2001
20. Steinberg, Laurence, Adolescence, McGraw Hill Inc. New York: 1993
21. WHO, The ICD – 10 Classification of Mental and Behavioural Disorders, Diagnostic Criteria for Research, AITBS Publishers and Distributors (Regd.). Delhi: 2004

SWSG0004: SOCIAL WORK PRACTICE WITH GROUPS

(3 credits - 45 hours)

Objectives:

- *To understand the concept of groups and its importance and influence on individuals*
- *To understand social group work as a method of social work and its applications in various settings*
- *To identify and acquire the skills needed to work with groups effectively*

Module I: The Concepts (7 hours)

Concept of group: definition, group identity, cohesion, characteristics, significance and types; Life as a process of adjustment with different types of groups; Group as an instrument of change.

Module II: Methods of Social Group Work (11 hours)

Social group work as a method of social work: definition, focus, values, principles, assumptions, ethics, characteristics and purpose of social group work; Historical evolution of social group work. Models of Group Work.

Module III: Process and Phases of Social Group work (11 hours)

Group work process and phases: Stages/Phases of Group formation: Pre-group, initial, treatment, and critical phase, evaluation and termination; process and factors of group formation; formulation of goals and identification of problems to work

Module IV: Group Dynamics and Skills for Social Group Work (8 hours)

Group Dynamics: leadership, isolation, decision making, teamwork, contagion, conflict, communication, relationships and bonding; Role of the group worker: enabler, stimulator, supporter, guide, educator, resource person, therapist and supervisor. Knowledge and Skills for the Group Worker: facilitation, programme planning, recording and documentation- recording in Group Work, use of sociometry and sociogram in assessing groups.

Module V: Social group work Settings (8 hours)

Social Group Work in Different Settings: Concept and dynamics of Self Help Groups, group work therapy in community settings, in institutional settings like hospitals, rehabilitation centres, children's home, old age homes, welfare settings, educational and youth development settings.

Suggested Readings

1. Cooper, Cary L, Theories of Group Processes, London: John Wiley and Sons, 1976
2. Douglas, Tom, Group Work Practice, London: Tavistock Publications, 1976
3. Douglas, Tom, Basic Group Work, London: Tavistock Publications, 1978
4. Ely, P.J. and M.K.McCullough, Social Work with Groups, London: Routtedge and Kegan Paul, 1975
5. Kanopka G, Social Group Work – A Helping Process, Engelwood Cliff: Prentice Hall (later version), 1963
6. Siddiqui, H.Y, Group Work: theories and practice; India, Pakistan, Bangladesh and Srilanka, Jaipur: Rawat Publications, 2007
7. Toseland, W. and Rivas, R.S. An Introduction to Groups Work Practice, Boston: Allyn and Bacon, 2000
8. Trecker, H.B., Social Group, New York: Association Press, 1975.

SWSC0005: SOCIAL WORK PRACTICE WITH COMMUNITIES

(3 credits – 45 hours)

Objective: *This course aims at acquainting the student with the concept of the community and its dynamics and to understand community organisation as a method of social work and as an effective tool for development. The course also deals with the role of social action in social work and community organization.*

Module I: Concepts of Community (10 hours)

Concepts of Community: Understanding community: definition, concept, structure and functioning; urban, rural and tribal communities; community from a practitioner's perspective; Dynamics of human rights, leadership, power and empowerment in the community with particular reference to tribal communities.

Module II: Community Organization (12 hours)

Community Organization: definition, scope, philosophy, principles: generic and specific, relevance in context; community organization and community development; Approaches to Community Organization and Community Development. Skills for community organization. Application of community organization and social action in tackling developmental issues

Module III: Phases of Community Organization (9 hours)

Process or phases of community organization - Study and survey, analysis, assessment, discussion, organization, action, reflection, modification continuation. Models of Community Organization: Locality development, social planning model, social action model, Saul Alinsky Model.

Module IV: Social Action (7 hours)

Social action – history in India, concept, objectives, purpose and principles; process of social action and scope in India; Rights based approach, Radical social work - contributions by Saul Alinsky, Paulo Freire, Mahatma Gandhi and Siddique.

Module V: Community Development (7 hours)

Concept and models, rural development, urban development, tribal development, Ministries and their role towards socio-economic development of communities, role of social workers in community development.

Suggested Readings

1. Bhattacharya, Sanjay, Social Work an Integrated Approach, Deep and Deep, New Delhi, 2006
2. Christopher, A.J., and Thomas William, Community Organization and Social Action, Himalaya Publications, New Delhi, 2006
3. Freire, Paulo, Education for the Oppressed, Seaburg Press, New York, 1970
4. Freire, Paulo, Cultural Action for Freedom, Penguin, HarmondsWorth, 1972

5. Kumar, Somesh, Methods for Community Participation – a Complete Guide for Practitioners, Vistaar Publications, New Delhi, 2002
6. Prasad, Ankit, Social Welfare and Social Action. New Delhi: Mittal Publications
7. Ross. M.G., Community Organisation. Theories, Principles, and Practices, Harper and Row, New York, 1955
8. Siddqui, H.Y.., Working with Communities, Hira Publication, New Delhi, 1997
9. Skidmore, A. Rex and Milton. G. Thackeray, Introduction to Social Work, Prentice Hall, New Jersey, 1976
10. Shrivasta, S. K (1988) Social Movements for development, Allahabad : Chugh Publications
11. Siddique, H.Y. (1984) Social Work and Social Action, New Delhi : Harnam Publications
12. Zastrow H. Charles –The Practice of Social Work – A Comprehensive Worktext, BROOKS/COLE – Cengage Learning Publications, 9th Edition
13. Alinsky Saul (1971) Rules for Radicals : A Practice Primer for Realistic Radicals, Vintage
14. RM Mac Iver and Charles H Page, Society – An Introductory Analysis, Surjeet Publications

SWIS0006: INTRODUCTION TO INDIAN SOCIETY, POLITY AND ECONOMICS

(3 credits - 45 hours)

Objectives: *The course work envisages imparting ability for critical analysis and reflections on social realities among the students of Don Bosco Institute of Social Sciences taking into consideration relationship between social, psychological, technological, economics and political aspects of society.*

Introduction and Summarization: (5 hours)

a) Introduction and orientation (2 hours) on the relevance Foundation Course in Social Sciences. Understanding economics, politics, culture, psychology and technology in relation to society.
b) Summarization and Conclusion at the end of the course work (3 hour).

Module I: Society, culture and Identity (12 hours)

a) Society, community and social institutions. Social Stratification-Identity, Gender, Caste, Class, Ethnicity and Tribe.
b) Culture, traditions and modernity: values, ethics, secularization.
c) Marginalization, Conflict and Social Change.

Suggested Readings

1. Ahuja, Ram. (2009). Society in India. Jaipur: Rawat.
2. Béteille, André. (2011). Caste, Class and Power: changing Patterns of Stratification in a Tanjore Village. (2nd ed). New Delhi: Oxford University Press.
3. Castell, Manuel. (2010). The Power of Identity: The Information Age: Economy, Society and Culture. (Vol. 2). Singapore: Blackwell Publishing Ltd.
4. Chaudhury, S. (2007). The Bodos: Emergence and Assertion of an Ethnic Minority. Shimla: Indian Institute of Advance Study.
5. Giddens, Anthony. (2001). Sociology. Cambridge: Cambridge University Press.
6. Maibang T. and M.C. Behera. (eds). (2007). Tribal Studies: Emerging Frontiers of Knowledge. New Delhi: Mittal Publication.
7. Marshal, G. and John Scott. (2009). Oxford Dictionary of Sociology. New York: Oxford University Press.
8. Singh, Y. (2004). Modernization of Indian Tradition. Jaipur. Rawat.

Module II: Economics and Development (9 hours)

a) Economics: Concepts and definitions. Economic problem. Demand and Supply, National Income, Standard of Living, Per-capita income; Poverty and its measurements.
b) Economic Systems: Capitalism, Socialism, Communism and Mixed Economy.
c) Global Economy and Global Institutions: the World Bank, IMF and WTO. Globalization and Indian Economy.
d) Multinational Companies (MNCs) and their effects in the domestic economy.
e) National Economic Policy, Welfare State, Underdevelopment and Development.
f) Natural Resources, Agriculture, Infrastructure and Sustainable Development.
g) Growth, Development and Social Justice.

Suggested Readings

1. Boyes, W. and Michael M. (2005). Textbook of Economics: Indian Adaptation. (6th ed). New Delhi: Houghton Mifflin Co.
2. Deepashree, and Vanita Aggarwal. (2007). Macroeconomics. New Delhi: Tata McGraw-Hill Publishing Company Ltd.
3. Hayami, Y. and Yoshinisa Godo. (2010). Development Economics: From the Poverty to the Wealth of Nations. (3rd ed). New Delhi: Oxford University Press.
4. Mankiw, N. Gregory. (2008). Principles of Economics. Manson OH: South West Cengage Learning.
5. Pieterse, J. N. (2010). Development Theory. (2nd ed). New Delhi: Sage.
6. Schotter, A. (2009). Microeconomics; A modern Approach. Manson OH: South West Cengage Learning.
7. Sen, A. (1999). Development as Freedom. New York: Oxford University Press.

Module III: Indian Development Experiences (9 hours)

a) India as a developing world. India's experience of colonialism- process and impact on agriculture.
b) Independence movement and aspiration for self-rule. Rise of self-reliance and economic nationalism.
c) Post independence trajectory on agriculture and rural development. Land Reforms and the Green Revolution.
d) Globalization and its effects on agriculture and industrialization.
e) Indian Poverty scenario pre and post-independence. Suresh Tendulkar Committee Report.
f) Labour and employment in India- the conditions of informal sector workers, social security for unorganized sector.
g) Population, Poverty, Employment, Education and Health Issues in India. Policy trends and indicators.
h) Science and Technology: Growth, Development and Climate Concerns in Indian context.

Suggested Readings

1. Behera, M. C. (ed). (2004). Globalization and Development Dilemma: Reflection from North East India. New Delhi: Mital Publications.
2. Desai, S. B et al… (2010). Human Development in India: challenges for a Society in Transition. Hyderabad: Oxford University Press.
3. Dréze, J. and Amartya Sen. (eds). (2011). Indian Development: Selected Regional Perspectives. New Delhi: Oxford University Press.
4. Goldin, I. and Kenneth R.(2006). Globalization for Development: Trade, Finance, AID, Migration and Policy. Jaipur: Rawat Publication and The World Bank.
5. Hayami, Y. and Yoshinisa Godo. (2010). Development Economics: From the Poverty to the Wealth of Nations. (3rd ed). New Delhi: Oxford University Press.
6. Pieterse, J. N. (2010). Development Theory. (2nd ed). New Delhi: Sage.
7. Sesgagiri, N. (ed). (2013). Survey of Rural India: A Comprehensive Study of Gram Panchayat and Community Development Block. (Vol. 26). New Delhi: Gyan.
8. Singh, S. (eds). (2003). Strategies for Sustainable Rural Development. New Delhi: Deep and Deep Publications Pvt. Ltd.
9. Singha K. (ed). (2010). Rural Development in India: Retrospect and Prospects. New Delhi: Concept Publishing Company, Pvt. Ltd.

Module IV: Politics and Indian Political System (10 hours)

a) Politics and political systems. State: origins and its elements. Political thoughts: Behaviouralism, and post-behavioralism, liberalism, idealism, anarchism and Marxism.
b) Sovereignty, power, authority, legitimacy, liberty, equality and justice
c) Rights, Duties and Citizenship – Indian context.
d) Making of India- political nationalism, India as a nation of diversity, federalism. Idea of state and nation – Gandhi, Nehru and Ambedkar.
e) The Constitution of India- History, the Constituent Assembly. Philosophy of the Indian constitution from Gandhian, Nehruvian and Ambedkarite perspectives.
f) Decentralized governance: philosophy and practice: a critical appraisal from experiences
g) Social movements through networking transnational.

Suggested Readings

1. Abbas, H. (2010) Indian Government and Politics. New Delhi: Dorling Kindersley (India) Pvt. Ltd.
2. Ananth, V.K. (2010). India since Independence: Making Sense of Indian Politics. New Delhi: Dorling Kindersley (India) Pvt. Ltd.
3. Government of Tamil Nadu. Political Science. (http://www.textbooksonline.tn.nic.in/Books/12 / Std12-PolSci-EM.pdf)
4. Johari, J.C. (2006). Contemporary Political Theory: New Dimensions, Basic Concepts and Major Trends. New Delhi: Sterling Publishers Pvt. Ltd.
5. Schrems, John. (2007). Understanding Principles of Politics and the State. Maryland. University Press of America.

SWIN0007: SOCIAL WORK PRACTICE WITH INDIVIDUALS AND FAMILIES

(3 credits - 45 hours)

Objectives:

- *To understand social case work as a method of social work practice and its application in the field*
- *To equip learners with theoretical knowledge to work with individuals and families.*
- *To equip learners with values, skills and attitudes and develop competencies necessary for working with individuals and families.*

Module I: Introduction to nature and development of social casework (10 hours)

a) Historical development of case work as method of social work, meaning and nature of social case work, underlying assumptions of social case work, principle and ethics of social case work, important concepts in social casework

b) Components of casework - person, problem, place and process

Module II: Approaches to casework practice (10 hours)

a) Social Diagnostic and Functional approaches to casework
b) Psycho-social approach to casework
c) Problem solving approach to casework practice
d) Task centred casework

Module III: Process and technique of social casework (15 hours)

1. Phases of casework intervention: intake and assessment, diagnosis, intervention, Monitoring and Rehabilitation, Termination and Follow up.
2. Techniques of casework intervention - Counselling, Supportive Techniques, Enhancing Resources Techniques
3. Tools – Observation, Listening, Relationship, Interview, Home Visit, Collateral Visit
4. Casework recording: Types and Format
5. Similarities and differences between Casework and Counselling, Casework and Psychotherapy

Module IV: Social Casework Practice (10 hours)

a) Application of Social Case Work in different settings and Clientele groups- Casework with children in adoption, correctional, mental health settings, Child guidance clinic, Schools, Geriatric care and aged and the terminally ill people, crisis situations like conflicts, disaster and other calamities and other socially and economically disadvantaged groups; Socio-cultural factors affecting the casework practice in India.
b) Family casework
c) Relationship of casework method with other methods of social work.

Suggested Readings

1. Biestek Felix, The Casework Relationship, Unwin University Books, London, 1968
2. Government of India, Encyclopedia in Social Work, Publication Division (Social Welfare Ministry), New Delhi, 1987
3. Hamilton, Gordon, The New York School of Social Work : Theory and Practice of Social Case Work, Columbia University Press, New York and London, 1970

4. Holis, Florence and Woods, Mary E., Casework – A Psychosoical Therapy, Fantom House, New York, 1981
5. Kadushin, Alfred, The Social Work Interview, Colulmbia University Press, New York, 1990
6. Keats, Daphne, Interviewing – A Practical Guide for Students and Professionals, Viva Books Pvt. Ltd., New Delhi, 2002.
7. Mathew Grace, An Introduction to Social Case Work, Tata Institute of Social Sciences, Bombay, 1992
8. Nelson Jones, Richard, Practical Counselling and Helping Skills, Harper and Row, London, 1984
9. Nursten, Jean, Process of Case Work, Pitman Publishing Corporation, 1974
10. O'Hagan, Kieran, Kingsley, Jessica, Competence in Social Work Practice – A Practical Guide for Professionals, London, 2003
11. Perlman, Helen Harris, Social Case Work – A Problem Solving Process, University of Chicago Press, London, 1964
12. Rameshwari Devi, Ravi Prakash, Social Work Methods, Practices and Perspectives (Models of Casework Practice), Vol. II, Ch.3, Mangal Deep Publication, Jaipur, 2004
13. Richmond, Mary, Social Diagnosis, Free Press, New York, 1970
14. Thompson, Neil, People Skills, 2nd Ed., Palgrave Macmillan, New York, 2006
15. Aptekar Herbert, The Dynamics of Casework and Counselling, Houghton Mifflin Co., New York, 1955.
16. Babara, J. G., Beyond Case Work, London, 1991
17. Fisher Joe, Effective Case Work Practice – An Elective Approach, MacGraw Hill, New York, 1978
18. Garrett, Annett, Interviewing – Its Principles and Methods, Family Service Association of America, New York, 1972
19. Lishman, Joyce, Communication in Social Work, Palgrave MacMillan, New York, 1994
20. Sena, Fine and Glass, Paul H., The First Helping Interview Engaging the Client and Building Trust, Sage Publications, New York, 1966
21. Sheafor, Bradford, Horejsi, Charles, Horejsi, Gloria, Techniques and Guidelines for Social Work Practice, Allyn and Bacon, London, 1997
22. Timms, Noel, Social Case Work, Routledge and Kegan Paul, London, 1966

SWSA0008: SOCIAL ANALYSIS AND STRATEGIES FOR SOCIAL CHANGE

(4 credits - 60 hours)

Objectives:

- *To provide an understanding on different theoretical perspectives underpinning social work practice*
- *To identify and assess the advantages and disadvantages of different social work*
- *To enable the learners to engage in informed discussion on a range of perspectives relating to social work practice*
- *To capacitate learners to understand and compare different social work perspectives and locate the perspectives underpinning practice in the current global and national economic and political contexts.*
- *To learn the role of communication and mass media in development and social change.*
- *To equip the learners with skills for developmental communication and social change.*

Part A: Perspectives for Social Analysis

Module I: Introduction (2 hours)

Meaning and concept of social work perspective, its importance and implications for practice

Module II: Theoretical Perspectives for understanding social problems (6 hours)

Social problems, human systems and social work response- structural-functionalist perspective, conflict perspective, symbolic interactionist perspective

Module III: Social Work Perspectives (24 hours)

a) Ecosystems perspective and generalist social work practice model; Concept of Role; Conceptual systems in social work practice

b) Strengths perspective: Philosophy, concept and principles; Preparation for strengths approach to practice; Assessing clients' strengths
c) Empowerment Perspective: Concept and practice principles; Human Rights Perspective: Rights Based Approach
d) Radical Perspectives: Marxist approaches - Critical and structural social work; Freirian and Liberation theological perspectives - Conscientization and adult education; Feminist approach
e) Anti-discriminatory and anti-oppressive perspectives
f) Indian perspectives: Gandhi, Ambedkar and Tribal/Indigenous perspectives

Module IV: Politics of Social Work Practice (8 hours)

Global and national economic and political contexts; Paradigms and models of practice

Part B: Communication for Change and Development

Module V: Media for Social Change (16 hours)

a) Communication: Theories, Elements and Barriers of communication;
b) Types: Verbal and Non-verbal communication; Development Communication – Purpose and Content. Social Marketing, Participatory communication;
c) Media Analysis: Critical analysis of Mass Media. Representation of gender, caste and tribal/ indigenous groups in mass media
d) Use of media for Development Communication: Folk media - Puppetry, Participatory theatre, Grassroots comics, Social media- Backpack Journalism

Module VI: Skill Training in development communication (4 hours)

Effective Public Speaking, Meeting, Conference, Seminars; Effective written communication, Designing of Posters and other low cost participatory media.

Suggested Readings

1. Goldstein, H. (1973). Social work practice: a unitary approach; Columbia: University of South Carolina Press.
2. Hearn, G. (1974). Social work treatment: an approach to interpersonal helping. Aldine
3. Mooney, L. A., Knox, D., and Schacht, C. (2000). Understanding Social Problem, (2nd Edition). USA: Wadsworth/Thomson Learning.
4. Mullaly, R.. (1993). Structural social work: ideology, theory and practice. Toronto: McClelland and Stewart Inc. The Canadian Publishers,
5. Miley, K. K., O'melia, M., and Dubois, B. L. (1995). Generalist Social Work Practice: An Empowering Approach; Boston: Allyn and Bacon
6. Nash, M., Munford, R., and O'Donoghue, K. (Eds). (2005). Social Work Theories in Action. London: Jessica Kingsley
7. Pardeck, J.T. (1996). Social work practice: an ecological approach. Westport, CT: Greenwood Publishing Group.
8. Payne, M. (1997). Modern Social Work Theory, (2nd Ed). Chicago: Lyceum Books
9. Pincus, A., and Minahan, A. (1993). Social work practice: model and method. Illinois: F.E. Peacock Publishers.
10. Powell, F. (2001). The politics of social work. New Delhi: Sage
11. Saleeby, D. (Ed.) (2002). The strengths perspective in social work practice, (3rd Ed). Boston: Allyn and Bacon
12. Saulnier, C. F. (1996). Feminist theories and social work: approaches and applications. NY: Haworth Press
13. Gray, M., Coates, J., and Bird, M.Y. (2008). Indigenous social work around the world: towards culturally relevant education and practice. Burlington: Ashgate
14. Mapp, Susan C. (2008). Human rights and social justice in a global perspective: an introduction to international social work. New York: OUP
15. Freire, P. (1972). Cultural Action for Freedom New York: Penguin Books.
16. Freire, P. (n.d.). Education as Practice of Freedom. New York: Penguin Books.

17. Sharma D (2004). Mass Communication theory and Practice in the 21st Century. New Delhi: Deep and Deep
18. Ahuja BN and Chabra SS (1992). Development Communication. New Delhi: Surjeet

SWRM0009: SOCIAL WORK RESEARCH METHODOLOGY AND STATISTICS
(4 credits-60 hours)

Objectives:

- *To understand the significance of research and application of statistics in social work practice.*
- *To understand the research process and acquire the attitudes and skills essential for social work.*
- *To develop skills for interpretation, documentation and presentation of results of the research.*
- *To familiarize with statistical methods and techniques needed for social work research.*
- *To understand the process of report writing and publication.*

Module I: Introduction to Social Work Research (10 hours)

Research and Social Work Practice- Philosophical Foundations of Research. Natural and social science research - characteristics and scientific attitude. Social work research as a social research - relevance, ethics and values. Scope of social work research - basic and applied research.

Module II: Research designs, approaches and types (10 hours)

a) Research designs: Descriptive, Exploratory and Experimental: meaning, scope, characteristics, application in social work setting.
b) Research Approaches: Qualitative and Quantitative Research: meanings, scope, methods, steps, sampling, data collection, analysis, interpretation and reporting. Strengths and weaknesses.
c) Evaluative research: Programme and projects evaluation: concept, types, steps, reports.
d) Participatory research and action research: concepts, scope, application and steps.

Module III: Steps in Research Process (15 hours)

a) Problem Formulation: Identifying research issue, formulating research topic and problem, review of literature (library work), theoretical framework, formulating objectives, clarifying concepts, variables - conceptual and operational, formulating hypothesis.
b) Population and Sampling: Inclusion and exclusion criteria of population, the logic of sampling size and techniques: probability and non-probability sampling.
c) Tools for data collection: Levels, Types of measurements, reliability and validity of tools. Constructing tools for data collection: questionnaire, interview schedule, scales. Quantification of qualitative data.
d) Sources, Collection and Analysis of Data: Secondary and primary sources. Data collection data editing, coding, master sheet, analysis, report writing. Using computer for data analysis: coding, analysis- graphs and results.

Module IV: Introduction to Statistics (15 hours)

1. Statistics: Definitions, Uses and Limitations. Classification and tabulation of data, univariate and bivariate, diagrammatic and graphic presentations. Measures of central tendency, Mean, Median and Mode and their uses; Measures of variability - range, variance and standard deviation.
2. Correlation: Meaning and computation of coefficient of correlation as product moment, Spearman's Rank Correlations, interpretation of correlations.
3. Test of Hypotheses: Basics, Probability distribution, normal distribution. t-test, Chi-Square Test

Module V: Application of Statistics and Reporting Research (10 hours)

a) Application of Statistics in Social Work Research.
b) Ethical guidelines in social work research.
c) Professional writing.
d) Introduction to software packages for statistical analysis.

Suggested Readings

1. Ahuja, Ram, Research Methods, Rawat, Jaipur, 2001
2. Alston, M. Bocoles, W., Research in Social Workers- An Introduction to the Methods, Rawat, Jaipur, Indian Edition 2003

3. Baker, T.L., Doing Social Research, McGraw Hill, Singapore, 1994
4. Dooley, D., Social Research Methods, Prentice Hall of India Pvt. Ltd., New Delhi, 1997
5. Goode, W.J. and Hatt, P.K., Methods in Social Research, McGraw Hill Singapore, 1981
6. Grinell, R. M., (Jr.), Social Work Research and Evaluation, F.E. Peacock Pub. Inc., Illinois, 1988
7. Gupta, C.B., Introduction to Statistical Methods, Vikas Publishing House, 1995
8. Gupta, S.C., Fundamentals of Statistics, Himalaya Publishing House, Delhi, 1997
9. Gupta, S.P., Statistical Methods, Sultan Chand and Sons, New Delhi 1997
10. Jacob, K.K., Methods and Fields of Social Work in India, Asia Publishing, Bombay, 1996
11. Kothari, C.R., Research Methodology: Methods and Techniques, 2nd edition reprint, New Age International New Delhi, 2004
12. Krishnaswamy, O.R., Methodology for Research in Social Science, Himalaya, Bombay, 1993
13. Laldas, D.K., Practice of Social Research, Rawat, Jaipur, 2000
14. Mikkelsen, B., Methods for Development Work and Research-A New Guide for practitioners, Sage, New Delhi, 2005
15. Ramchandran, P., Social Work Research and Statistics, Allied Publishers, Bombay, 1968
16. Rubin, A. and Babbie, E., Research Methods for Social Work, 4th edition, Wadsworth, West, Brooks/Cole and Schirmer, 2001
17. Sarantakos, S., Social Research, Palgrave Macmillan, New York, 2005
18. Sharma, B.A.V., Prasad, R.D. and Satyanarayana, C., Research Methods in Social Sciences, Sterling, New Delhi, 2002
19. Sharma, K.R., Research Methodology, National Publishing House, Jaipur, 2002
20. Wilkinson, T.S. and Bhandarkar, P.L., Methodology and Techniques of Social Research, Himalaya, Bombay, 1984
21 Young, p., Scientific Social Surveys and Research, Asian Students edition, Asia Publishing House, Japan, 1960

SWSL0011: SOCIAL JUSTICE, HUMAN RIGHTS AND SOCIAL LEGISLATIONS

(3 credits–45 hours)

Objectives:

- *To provide an understanding on social legislation and social action with relevance to social work practice;*
- *To develop an understanding about various social welfare legislations with specific reference to different groups of people;*
- *To understand the provisions of the legal system and the mechanisms available in the country for addressing issues of social change.*

Module I: Social Justice and Human Rights (7 hours)

Meaning of Justice, Forms of Justice, Theories of Justice, Law and Social Justice, Human Rights and Social Justice, Issues in Social Justice.

Module II: Social Legislation and Social Work (7 hours)

a) Understanding concepts of law, social justice and social legislation, Legislation as an instrument of social justice and control.
b) The Constitution of India: preamble and fundamental rights; Directive Principles of State Policy
c) Classification of law: civil and criminal law. Relevance of law and legal systems to social work practice, partnership and interface between social workers and legal system.

Module III: Reformatory Law and Laws related to Protection of Human Rights (7 hours)

a) Major provisions of the law for the protection of human rights, Structure, functions and powers of National and State Human Rights Commissions.
b) Major provisions in Indian Penal Code (IPC) related to family violence, murder, suicide, rape.
c) Meaning of cognizable and non-cognizable offences and conditions and procedures for bail; Importance and Procedures for filing a First Information Report (FIR)

Module IV: Social legislations: Major Provisions (20 hours)

a) Laws Related to Children: Juvenile Justice Act, Laws relating to Adoption and Guardianship, Child Marriage Restraint Act, Prohibition and Regulation of Child Labour Act. Protection Of Children from Sexual Offences (POCSO) Act Laws Related to Family: Personal laws and the Civil law related to Marriage, Divorce, Maintenance and Succession; Law against Domestic Violence; Law of Family Court. Laws Related to Women: Immoral Trafficking Prevention Act (ITPA), The Sexual harassment of Women at Workplace (Prevention, Prohibition, Redressal) Act, 2013. Medical termination of pregnancy, Prohibition against Prenatal diagnostic tests (for sex determination). Laws Related to Scheduled Castes and Scheduled Tribes: Protection of Civil Rights; Law against Atrocities. Laws Related to Disabled: Mental Health Act, Persons with Disabilities Act, National Trusts Act. Laws Related to Workers: Minimum wages, Workmen's compensation. Laws Related to Consumers and Citizens: Consumer protection, Food adulteration, Right to information, Project affected persons.

b) Protection of Children from Sexual Offences Act (POCSO) and Sexual harassment of women in workplace act.

Module V: Justice System and Legal Aid provisions (4 hours)

a) Agencies of the justice system: police, judiciary, correctional systems, their structure and functions

b) Structure and jurisdiction of courts: district and sessions courts, high court, Supreme Court. Distinction between civil and criminal courts; Consumer courts Special courts/tribunals – accident, corruption

c) Concept of legal aid, Lok Adalat; Public Interest Litigation (PIL)

Suggested Readings

1. Samaddar Ranabir (Ed), State of justice in India-issues of social justice, sage publication, 2009.
2. Acharya, Basu Durga Das : Introduction to the Constitution of India, New Delhi : Prentice Hall of India Pvt.Ltd., (7th. Edition)
3. Ahuja, Ram: Criminology, Jaipur : Rawat Publications
4. Biju, M. R , Human Rights in a Developing Society, New Delhi : Mittal Prakashan, 2005
5. Diwan, Paras and Diwan, Peeyush, Child and Legal Protection, New Delhi : Deep and Deep Publications, 1994
6. Flavia ,Give us this Day, Our Daily Bread, Procedures and Case Law on Maintenance, 1997
7. Gaikwad, P. E, Law Basic Concepts, Pune : YASHADA,2004
8. Galanter, Marc, Law and Society in Modern India, Delhi : Oxford University Press, 1992
9. Gangrade, K.D, Social Legislation in India (Vol-1 and Vol.2), Delhi : Concept Publishing Company.
10. Gaur K. D, A TextBook on the Indian Penal Code, Delhi: Universal Law Publication Co. Ltd., 2004
11. Kant, Anjani,Women and the Law, New Delhi : APH Publication Corporation., 1997
12. Matthew, P. D, Constitution of India Simplified, New Delhi : Indian Social Institute, 1993
13. Pradhan, V. P, The Indian Constitution, New Delhi :Ombudsman Publishing House, (1st Edition).
14. Prakash, Ravi, Constitution of Fundamental Rights and Judicial Activism in India, Jaipur : Mangal Deep Publications
15. Purohit, B. R. and Joshi, Sandeep (Ed)) Social Justice in India, Jaipur : Rawat Publication, 2003
16. Qureshi, M. A, Muslim Laws of Marriage, Divorce and Maintenance, New Delhi : Deep and Deep Publications, 1992
17. Sastry, T. S. N, India and Human Rights, Delhi : Concept Publishing Company, 2005
18. Saxena, D. R, Law Justice and Social Change, New Delhi : Deep and Deep Publications, 1996
19. Shah, Ghanshyam,Social Justice- A Dialogue, Jaipur : Rawat Publication, 1998
20. Sharma, S. S, Legal Aid to the Poor, New Delhi : Deep and Deep Publications, 1993
21. Siddiqi, Fatima E. and Ranganathan Sarala:Handbook on Women and Human Rights – A Guide for Social Activists (Part 1 and Part 2), New Delhi : Kanishka Publication.
22. Singh, Alka, Women in Muslim Personal Law, New Delhi :Rawat Publications, 1992
23. Singh, Shiv Sahai,Unification of Divorce Laws in India.1992
24. South Asia Human Rights Documentation Centre. HandBook of Human Rights and Criminal Justice in India, New Delhi : Oxford University Press, 2006

SWDM0012: ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

(3 credits–45 hours)

Objectives:

- *To understand the interrelatedness of human life and environment;*
- *To develop an understanding of problems arising out of environmental degradation and globalization;*
- *To study the role of social work practice in tracking environmental issues and disaster management.*

Module I (10 hours)

a) Concepts: Environment and Ecology; the Interrelatedness of living organisms and natural Resources

b) Global Environmental Crisis and its linkages to the development process. Global warming, Environmental politics and resource development regimes; Sustainable development: Management and Conservation changes.

Module II (10 hours)

a) State of India's Environment: Waste Management; Pollution – Air, Water, Soil, Noise; Laws Related to environment.

b) Social Work and Environment: Environment Education, Environment Ethics, Promotion Environment Movements, Environment Management – EIA.

Module III (10 hours)

a) Disaster: Definition, Natural and Human made disasters; multiple causes and effects; Stages of disaster; Development and Disaster; Preventive Measures.

b) Models of Disaster: Crunch Model and Release Model

Module IV (15 hours)

a) Disaster Management and phases. Pre- disaster: prevention, preparation, education vulnerability and preparedness. Actual Disaster: contingency, short term and long term plans, search, relief, rescue, recovery and restoration. Post Disaster: rehabilitation and commemorations.

b) Role of Social workers and Voluntary agencies: role of social work professionals at different levels: resource mobilization, working with other professionals, working with government and voluntary organizations. Voluntary agencies working on disaster management.

Suggested Readings

1. Abbasi S.A., Wetlands of India: Ecology and Threats Vol. 1-3, 1997.
2. Dorr Donal, Social Justice Agenda: Justice, Ecology, Power and the Church, 1990.
3. Goel P.K., Environmental Guidelines and Standards in India, 1996.
4. Madhav Godgil; Ramachandra Guha, Ecology and Equity: The use and abuse of nature in contemporary India, 1995.
5. Neugeboren Bernard, Environmental Practice in the Human Services: Integration of Micro and Macro Roles, Skills and Contexts, 1996.
6. Shukla S.K., Srivastava P.R., Human Environment: An analysis, 1992.
7. Shukla S.K., Srivastava P.R., Environmental Pollution and Chronic Diseases.

SWCP0013: CONFLICT MANAGEMENT AND PEACEBUILDING

(3 credits–45 hours)

Objectives:

- *To develop an understanding of the concepts related to peace and conflict theories;*
- *To know about the different approaches towards conflict resolution and the impact of violence on specific groups;*
- *To understand specific issues related to North East and the rise of different groups and conflict movements in North East India.*

Module I: Understanding Peace and Conflict (15 hours)

Meaning and Definition; Gandhi's Approach to Peace and Nonviolence; Positive and Negative Peace. Introduction to Peace and Conflict Studies- meaning and definition of Conflict theories- Frustration-Aggression Theory; Social Learning and Social Identity Theory; The Enemy System Theory; The Human Needs Theory; Protracted Social Conflict; Reconstructive and Transformative Peacebuilding and Peacemaking

Module II: Conflict Resolution Techniques (8 hours)

Unofficial Approach to Conflict; Role of Civil Society/ Organizations; Third-Party Mediation; Role of Track II and Multi-Track Approach in Conflict Resolution; Role of Media, Peace Journalism; UN Arbitration.

Module III: Types of Violence (12 hours)

Structural violence, social violence, communal violence, and political violence - Terrorism, Insurgency, Extremism, Militarisation.

Module V: State Identity and Conflict in North East India (10 hours)

Society in North east – Basic Demography, Social Groups; The Naga Conflict; Post colonial political Movements in Assam; Issues of Asomiya Identity, Bodo Identity and Other smaller identities; ethnic identity Issues; Rise of Insurgency in North-east; Boundary Conflict; AFSPA; Inner Line Permit.

Suggested Readings

1. Bhaumik Subir, Troubled Periphery
2. Boasson, Charles, In search of Peace Research (edited by Peter van den Dungen) Macmillan. London: 1991
3. Boulding, Kenneth, The War Trap in Richard Falk et al. Toward a Just world Order, Boulder: West view 1982.
4. Choudhury Sujit, The Bodos: Emergence and Assertion of an Ethnic Minority, IIAS Shimla
5. Galtung, Johan, The True Worlds: Free Press. New York 1980
6. Hazarika Sanjay, Stranger in the Mist.
7. Lawler, Peter, A question of Values: Johan Galtung's Peace Research, Boulder: Lynne Rienner. 1995,
8. Machel Graca, Impact of Armed Conflict on Children. 1996
9. Mack, Andrew, Peace Research in the 1980's, Australian National University. Canberra:1985
10. Maitra Kiranshankar, The Noxious Web: Insurgency in NE India, Kanishka Publication, 2001
11. Patomki, Heikki, The Challenge of Critical Theories: Peace Research at the start of the New Century, Journal of Peace research, vol. 38, no. 6, 723-737, 2001,
12. David P. Barash and Charles P. Webel, Peace and Conflict Studies (second edition), Sage, 2002
13. Johan Galtung, Carl G. Jacobson, Searching for Peace: the Road to TRANSCEND (second edition) Pluto Press, 2002
14. Sanjib Baruah, Durable Disorder; Understanding the Politics of Northeast India, OUP, 2005
15. Singh, Koireng, Aheibam, Ethnicity and Inter Community Conflict: A Case of Kuki Naga in Manipur, Akansha Publication, 2008
16. The Hague Agenda for peace and Justice for the 21st Century, 777 UN Plaza, New York, 1999

SWRD0014: COMMUNITY DEVELOPMENT: RURAL AND URBAN

(4 credits – 60 hours)

Objectives:

- *To understand the concept, approaches and principles of Urban Community Development*
- *To gain knowledge about the existence of slums, and pavement dwellers well as their concerns.*
- *To develop an in-depth understanding of rural communities.*
- *To provide knowledge of the various methods, programmes strategies and developmental efforts towards community development.*
- *Understand, Rural social systems and their problems*
- *To Understand the challenges for interventions by community workers*

Module I: Community Development and Rural Community Development (15 Hours)

Concept and definition and objectives of community development: Approaches, philosophy and principles of rural development and rural community development. Rural development and rural community development. Rural demography, social structure, economic structure, political structure, Rural community: Characteristics.

Module II: History of Rural community development in India (10 Hours)

Pioneering period: Sriniketan, Marthandam, Gurgaon. Probation trial period:Firka, Nilokheri and Etawh projects

Module III: Urbanization and Urbanism (10 hours)

Concept and characteristics, urbanization and economic development. Urbanization and industrialization. Urbanisation and social problems. Urban ecology: growth of cities, characteristics of town, Metropolis. Megapolis, satellite towns, -commuter town / bedroom community- Suburbs- Edge cities- Multi-polar cities- Metropolitan areas. Leisure time theories and leisure time in cities.

Module IV: Urban Development and Urban Community Development (15 hours)

Urban development and urban community development: origin of urban community development in India. concept and principles, meaning, Need, scope, and Structure; Approaches to community development in urban area: Welfare, extension project of central welfare Board, Hyderabad project, Baroda Project .

Module V: Slums (10 hours)

Definition-causes, characteristics, theories of slums, consequences. Slums in Indian cities, slum clearance board. Pavement dwellers: employment for pavement dwellers, Urban poverty and its impact. Major agencies engaged in urban community development.

Suggested Readings

1. Desai, A. R. Rural Sociology in India, Bombay: Popular Prakashan, (1961)
2. Narang, Ashok. Indian Rural Problems,: Murari Lal and Sons, New Delhi (2006)
3. Shah, Dilip. Rural Sociology, ABD Publisher, India : (2005)
4. Butter W Edgar . Urban Sociology- A Systematic Approach,: Harper and Row Publishers, New York, (1976)
5. Loornis and Beegle. Rural Sociology (The Strategies of change), Englewook, Cliffs, New Jersey : Prentice Hall, Inc, (1957)
6. Sharma, K Rajendra. Rural Sociology,: Atlantic Publishers and Distributors, New Delhi (2004)
7. Sharma Ramnath Indian Rural Sociology,: Munshiram Manoharlal Publishers Pvt. Ltd. New Delhi (1979)
8. Doshi S L Rural Sociology: Rawat Publications, Jaipur (2002)
9. Singh S, Rural Sociology Prakashan Kendra Lucknow (1980)
10. Bhanti, Raj. Social Development (Analysis of some social work and field), Himanshu Publication, New Delhi, (2001)
11. Dasgupta, Bilap. Village Society and Labour Use,: Oxford University Press, New Delhi.
12. Doshi, S.L. and Jain, P.C. Social Anthropology,: Rawat Publications, New Delhi (2001)
13. Dubey, S.C. Indian Society, National Book Trust in India, New Delhi.
14. Jain, Netra Pal. Rural Reconstruction in India and China(A comparative study), Writers and Publishers Corporation, (1970)
15. Khadria, Binod (1999) The Migration of Knowledge workers, New Delhi, London : Sage Publications
16. Khan, Mumtaz Ali. Scheduled Caste and their status in India,: Uppal, Publishing House, New Delhi, (1980)
17. Mishra, Anil Kant, Rural Tension in India, Discovery Publishing House, New Delhi : (1998)
18. Mishra, Omprakash (Ed.) Forced Migration, Manak Publication, Delhi : (2004)

SWGD0015: GOVERNANCE AND COMMUNITY DEVELOPMENT

(4 credits – 60 hours)

Objectives:

- *Understand the context, meaning and relevance of decentralised governance for urban, rural and tribal areas.*
- *Develop knowledge about the structure and functioning of governing bodies at various levels.*
- *Understand contemporary issues and challenges in accessing governance bodies for people's development.*

Module I: Rural Governance (15 hours)

a) Democratic Decentralization: Meaning, objectives and importance, Governance : meaning and structures.

b) Concept and Evolution of Panchayati Raj: Historical development of the concept, National level committees in the evolution of Panchayati Raj (Balwantrai Mehta, Ashok Mehta, Singhvi committees)

c) The Constitutional Amendment of 73rd Amendment, Review of 73rd Constitutional Amendment

Module II: The Functions of Panchayati Raj Institutions (15 hours)

Structure, functions and powers at each level, revenue sources, committees in village level Panchayati Raj bodies, gram sabha (including mahila gram sabha), Its role and importance, Community participation in governance. PESA (Panchayat Extension in Scheduled Areas) : Context of its emergence and its significance; issues and challenges in its implementation.

Module III: Urban Governance: Urban Local Self Government in India (15 hours)

a) Types of Urban Local Self Government in India, Municipal Corporation, Municipal Council/Nagar Palika; Sources of Revenue; Structure, powers and functions at each level, Committees and their functions, System of elections to Urban Local Self Government, Relation of Urban Local Self Government with bodies of Governance at the state level issues.

b) 74th Constitutional Amendment Review of content and implementation

Module IV: Role of Urban LSG bodies in Urban Development (15 hours)

a) Contemporary Issues and Potentials through Local Self Government

b) Women's participation; participation of marginalized groups (SC and ST and minorities); political parties; autonomy and control; factionalism in governance.

c) Challenges in developing partnerships between elected bodies, bureaucracy and civil society.

Suggested Readings

1. Gender, Alochana, Women and Panchayat Raj, Alochana Centre for Documentation and Research on Women, Pune : (2007),
2. Chahar, S.S. (Ed.) Governance of Grassroots Level in India, New Delhi: (2005), Kanishka Publishers
3. Devas, Nick and Others, Urban Governance, Voice and Poverty in Developing World, London : Earthscan, (2006)
4. Haldipur, R.N. Paramahamsa V R K (Eds.) Local Government Institutions in India, National Institute of Community Development, Hyderabad : (1970)
5. Hooja, Prakash and Hooja, Meenakshi, Democratic Decentralization and Planning, Rawat Publications, Jaipur, (2007)
6. Jain, S. C. Community Development and Panchayat Raj, Allied Publishers Pvt. Ltd, Madras: (1967)
7. Kumar, Krishna, Direct Democracy and Village Governance,: Deep and Deep Publication, New Delhi.
8. Lele, Medha. Kotwal, Kulkarni, Vandana Power and Empowerment,: Alochana Centre for Documentation and Research on Women, Pune.
9. Mishra, S.N., Mishra Sweta and Pal, Chaitali Decentralized Planning and Panchayati Raj Institutions, Mittal Publications, New Delhi : (2000)
10. Palenithurai, G. (Ed.) New Panchayati Raj System – Status and Prospects, Kanishka Publishers, New Delhi (1966)
11. Sharma, B. D. Taming the Transition in Scheduled Areas, Sahyog Pustak Kutir, New Delhi: (2001)

12. Singh, Amita (Editor) Administrative Reforms (towards sustainable practice), Sage Publications, New Delhi: (2005)
13. Singh, U. B. Urban Administration in India, Serial Publications, New Delhi: (2004)
14. Baluchamy, S. Panchayat Raj Institutions,: Mittal Publication, New Delhi (2004)

SWFW0016: FAMILY CENTERED SOCIAL WORK PRACTICE

(4 credits - 60 hours)

Objectives:

- *To understand family and marriage as social institutions and to analyze the legislations with regard to marriage and divorce in India.*
- *To understand the dynamics of family relationships*
- *To analyse the institution of family within the context of globalised economic and political system.*
- *To become familiar with the Governmental efforts for strengthening families and to identify techniques and interventions required for working with family.*

Module I: Family and Marriage as Social Institutions (14 hours)

a) Concept of family, Origin of family, Types of family, Functions of family, Family dynamics – power, myths, role, relationship. Concept of marriage, types of marriage.
b) Constitutional legislations on family, marriage and divorce in India

Module II: Equity and equality -Dynamics of Family Relationships (13 hours)

a) Equity and equality, Gender and patriarchy: Implications of the patriarchal social structure.
b) Crisis of violence against women: Global, national, local.

Module III: The Family in the context of Globalization (16 hours)

a) Review of changing situations in family, marriages and marital relationship
b) Alternative Family and Marriage Patterns and Structures. Dual earner/career families, Single parent families, female headed households, Childless families, Reconstituted/ step families, Homosexual families, Consensual unions, and live in relationships
c) Displacement and disaster generated changes in the family (war, conflict, riots and natural calamities) and its implications: vulnerability of families, marginalized families due to poverty, caste

Module IV: Social Work with families: interventions, techniques and skills (17 hours)

a) Family life cycle, Family centred social work – problem solving approach, Life enrichment programmes – developmental approach, Programmes for family empowerment and protection of human rights.
b) Efforts of government in strengthening families – Policy, Legislation and programmes, Micro-credit, component plan, Schemes for families, Public Distribution System,
c) Health – Family Welfare Programme, Health Insurance.

Suggested Readings

1. Burgess, Ernest W., Locke Harvey J., Thomes Mary Margare. The Family from Traditional to companionship (4th edition), New York :Van Nostrand Reinhold Co. 1978
2. Chowdhury, Aparajita. Carson and Carson. Family Life Education in India: Perspectives, Challenges and Applications. Rawat Publications: Jaipur, 2006
3. Desai,Murli. Family and Intervention – Some Case Studies. Mumbai: TISS. 1986
4. Elliott and Merril. Social Disorganization. New York : Harper and Brother Pub. 1960.
5. Gore, M S. Urbanization and Family Change. Mumbai : Poplar Prakashan. 1968
6. Green Arnold W. Sociology (Analysis of life in Modern Society), MacGraw Hill Book, Co. 1964
7. Harris, C. C. The Family an Introduction. London : George Allen and Unwin Ltd. 1969
8. Jayapalan N. Indian Society and Social Institutions – Vol. I. New Delhi : Atlantic Publishers and Distributors. 2001
9. Kumar, S., Chacko, K. M. Indian Society and Social Institution. New Delhi: New Heights Publishers and Distributors. 1985
10. Lal, A. K. The Urban Family : A Study of Hindu Social System, Concept. New Delhi : Publishing Company. 1989

11. Larlton E, Munson. Social Work with Families – Theory and Practice. New York :1970
12. Lavania, Vinita. Childless Couples: Social Consequences of Sterility and Infertility. New Delhi: Rawat Publications. 2006
13. Nichols,Michall P. and Richard, C. Family Therapy Concepts and Methods (2nd edition). London : Allyn and Bacob. 1991
14. Singh, Yogendra,Social Stratification and Change in India. New Delhi : Manohar The Free Press, 1983
15. Williamson, Robert C. Marriage and Family Relations. Sydney: John Wiley and Sons, Inc. 1967

SWSC0017: SOCIAL WORK PRACTICE WITH CHILDREN

(4 credits - 60 hours)

Objectives:

- *To understand the process of socialization of a child and children's health; both mental and physical well-being.*
- *To analyze the difficult situations faced by children in the present context.*
- *To know the national and international efforts for child welfare and the child related laws.*
- *To understand and acquire the skills for working with children.*

Module I: Understanding Child and Socialization process (12 hours)

a) Understanding Child- Definitions and Concepts.
b) Concept and process of socialization, Theories of socialization, Child rearing practices.
c) Agents of socialisation – family, neighbourhood, school, peer group, mass media, religion. Socialization of children with special needs- special schools.

Module II: Children's Health (14 hours)

a) General Health of Children: common diseases, malnutrition problem, infant mortality and morbidity, health of adolescent girls.
b) Child Mental Health: Concept of mental health, child mental health and psycho-social development. Mental health needs and mental health problems in children of various age groups, mental health disorders related to children: Learning Disabilities, emotional disorders, conduct disorder, pervasive developmental disorder

Module III: Children in Difficult situations (13 hours)

Street child, destitute, children in conflict with law, abandoned, orphaned, child abuse, child labour, child trafficking, natural calamity affected children, children in conflict situation, HIV-AIDS affected and infected children, tribal child, child beggar, child prostitute, children from poverty infested groups, special problems of girl child.

Module IV: Child Welfare Policies, Programmes and Acts (15 hours)

Constitutional Provisions, National Policy for Children, UNCRC, National Charter for Children, , National Action Plan for Children, Commissions for Protection of Child Rights and State policy for children, Juvenile Justice (Care and Protection of Children) Act, 2000, Guardianship and Wards Act, Hindu Adoption and Maintenance Act, Central Adoption Regulatory Agency (CARA guidelines), Child Labour (Prohibition and Regulation) Act 1986. Current initiatives- ICDS, ICPS, SSA and RTE, NRHM: School Health Programme.Developmental services (for example, non-formal education, bridge schools) Remedial services (e g. residential care, child guidance clinic),

Module V: Skills in Working with Children (6 hours)

Communication – individual and group, use of creative activities, skills in behaviour modification techniques, skills in advocacy and campaigning for children, relationship building skills.

Suggested Readings

1. Anandaraj, Hannah. Children at Risk. Hyderabad: Neelkamal Publications. 2007
2. Banerjee, B. G. Child Development and Socialisation. New Delhi : Deep and Deep Publication. 1987
3. Baroocha, Pramila Pandit. Handbook on Child. New Delhi : Concept Publishing Com. 1999
4. Berk, Laura E. Child Development (8th edition). New Delhi: Pearson Prentice Hall. 2009

5. Bhalla, M. M. Studies in Child Care, Delhi : Published by NIPCCD. 1985
6. Bossare, James H. S. The Sociology of Child Development. New York : Harper and Brothers. 1954
7. Chandra Kulshreshtha Jinesh. Child Labour in India. New Delhi : Ashish Publishing House. 1978
8. Chaturvedi, T. N. Administration for Child Welfare. New Delhi : Indian Institute of Pub. 1979
9. Choudhari, D. Paul. Child Welfare / Development, Delhi : Atma Ram and Sons. 1980
10. Ghathia, Joseph. Child Prostitution in India. New Delhi : Concept Publishing Company. 1999
11. Gokhale, Sharad D. and Sohoni, Neera K. Child in India, Mumbai : Somaiya Pub. 1979
12. Gopalakrishnan B. Rights of Child. Jaipur: Aavishkar Publishers. 2004
13. Hugh, Jolly. Diseases of Children. Oxford: The English Language book society and Blackwell Scientific Publications. 1981
14. Hurlock, Elizabeth B. Child Development, New Delhi : Tata McGraw Hill Pub; Com; Ltd. 1968
15. Kumar, Arvind. Fundamentals of Child Rights: Concepts, Issues and Challenges. Lucknow: Laxmi Shikshan Sansthan. 2002
16. Nanda, V. K. Nutrition and Health for child Development, New Delhi : Anmol Publication Pvt. Ltd. 1998
17. Pandya, K. C. Element of Child Development. New Delhi : Kalyani Pub. 1988
18. Pimpley, P. N., Singh K. P., A. Mahajan. Social Development Process and Consequences. Jaipur : Rawat Publication. 1989
19. Rao, M. Koteshwar. Exploited children, New Delhi : Kanishka Publishers, Distributors. 2000
20. Sharma and Sharma. Child Psychology. Atlantic Publishers: New Delhi. 2006
21. Skinner, Charles E., Harriman, Phillip L. Child Psychology: Child Development and Modern Education. Surjeet Publications: New Delhi, 2008

SWMW0018: MEDICAL SOCIAL WORK

(4 credits - 60 hours)

Objectives:

- *To understand the relevance and the need for social work in the field of health*
- *To gain insight into the impact of ill health on the individual and his social system*
- *To understand and develop competence about the roles and functions of medical social workers in various settings*

Module I: Historical overview (15 hours)

Medical Social work:- Historical development of medical social work in Western countries and in India, Social workers in General health Care system in India, Challenges in the field of medical social work in India.

Module II: Disease, illness and sickness and concept of care (15 hours)

Illness as a social problem and its effect on the individual, family and community. The concept of patient as a person, Social and emotional factors involved in disease, Social Work with terminally ill, social work with dying and bereaved, Palliative Care, Hospitalization and its implications on patient and the family members, rights of Patients, Modern trends in treatment of illness. Care in different medical settings – hospitals, outpatient departments, emergency, crisis care, hospice, special clinics.

Module III: Skills (10 hours)

Skills and qualities of Medical social Worker. Teamwork and multidisciplinary approach in the treatment of illness. Role and functions of a medical Social worker, Organization and administration of medical social work department in hospitals. Assessment and Diagnosis- Interviews, Reporting and Record maintenance. Medical Social Worker and Public Relations.

Module IV: Medical Social Work in different departments in hospitals (20 hours)

Medical Social Work in different Departments in hospitals: Oncology, Nephrology, Reproductive Health, family welfare and family planning, Sexual health (STD, HIV/AIDS),Geriatrics, Diabetology, Cardiology, Accident, disability and burns department

Suggested Readings

1. Anderson R. and Bury M.. Living with Chronic Illness – the Experience of Patients and their Families. Unwin Hymman. London: (eds.) 1988
2. Bajpai P.K.. Social Work Perspectives in health.: Rawat Publications. New Delhi (Ed.) 1997
3. Barlett H.M.. Social Work Practice in the Health Field. New York: National Association of Social Workers. 1961
4. Dimatteo, M. Robin and Leslie R. Martin.. Health Psychology.: Dorling Kindersley (India) Pvt. Ltd. New Delhi, 2007
5. Field M.. Patients are People – A Medical – Social Approach to Prolonged Illness. Columbia University Press. New York: 1963
6. Narasimhan, M. C. and Mukherjee A.K. Disability – A Continuing Challenge. Wiley Eastern Ltd. New Delhi: . 1987
7. Pathak S. H. Medical Social Work in India. New Delhi: DSSW. 1961
8. Pokarno K.L. Social Beliefs, Cultural Practices in Health and Diseases. Rawat Publications. New Delhi: 1996

SWMS0019: MENTAL HEALTH AND SOCIAL WORK

(4 credits - 60 hours)

Objective: *The main purpose of this course is to enable students understand the concept of mental health and relevance of social work in the field of mental health. It would also provide an opportunity to be oriented about various mental illness affecting people and the significance of community mental health.*

Module I: Understanding mental health and mental illness (13 hours)

Mental health: A Conceptual Framework: Historical background of the concept. Definitions of mental health components. Mental health in the changing society. Concept of normal and abnormal behaviour. psychiatry – definition, history and growth of psychiatry. Traditional and modern attitude towards psychiatric illness. Symptomatology – Disorders of perception, thought, speech, memory, emotion.

Module II: Psychiatric assessment (13 hours)

Assessment in psychiatry. Psychiatric interviewing, case history recording and mental status examination (MSE). Classification in psychiatry- need, types - ICD and DSM.

Module III: Major Psychiatric disorders (21 hours)

Prevalence, etiology, clinical manifestation, course and outcome and different treatment modalities of the following disorders:

a) Neurotic and somatoform disorders – Phobia, anxiety disorders, Obsessive compulsive disorders, dissociative (conversion) disorders, somatoform disorders
b) Mood (affective) disorders
c) Organic mental disorders – dementia, (Alzheimers), Amnesic syndrome, delirium
d) Schizophrenia and Delusional disorders
e) Disorders of adult personality and behaviour _ paranoid, schizoid and histrionic personality disorders. Gender identity disorders, disorders of sexual preference
f) Disorders of psychological development – developmental disorders of speech and language and scholastic skills; learning disability, mental retardation, pervasive developmental disorders – autism, Rett's and Asperger's syndrome
g) Behavioural and emotional disorders in childhood and adolescence – Hyperkinetic and conduct disorders, anxiety, phobia and depression
h) Disorders due to substance use

Module IV: Community mental health (12 hours)

Community psychiatry – concept and meaning, evolution of community psychiatry; Community mental health in India, Social – cultural factors in psychiatric disorders with special reference to India, culture bound syndrome.

Suggested Readings

1. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders. 4th Edition. DSM –IV-TR. APA. Washington DC: 2000.
2. Carlson R. Neil, Foundations of Physiological Psychology. 6th Ed. Pearson Education. India: 2007.
3. Chaube S.P., Abnormal Psychology, Educational Publishers.
4. Clifford T. Morgan, Richard A. King, John R. Weisz, John Schopler, Introduction to Psychology, Tata Mc. Graw Hill Edition.
5. Colman. M. Andrew, Oxford Dictionary of Psychology. Oxford University Press. New York: 2009 (3rd Ed).
6. Correy Gerald. Theory and Practice of Counseling and Psychotherapy. Student Manual. 8th Ed. Brooks Cole Cengage Learning. USA: 2005.
7. Fernald/Fernald, Munn's Introduction to Psychology, 5th Edition, AITBS Publishers, India.
8. James D. Page, Abnormal Psychology, Tata McGraw Hill Edition.
9. Kring M. Ann, Johnson L. Sheri, Davison C. Gerald, Neale M. John, Abnormal Psychology. 11th Ed. Wiley India Pvt. Ltd. New Delhi: 2010.
10. Kumar Updesh, Mandal .Manas. (Editors), Suicidal Behaviour. Assessment of People-at-Risk. Sage Publications India Pvt. Ltd. New Delhi: 2010.
11. Maxmen S. Jerrold, Ward G. Nicholas, Essential Psychopathology and its Treatment. 2nd Ed. Revised for DSM IV. W.W. Norton and Company. New York: 1995.
12. Mishra. A.K., Psychology of Aging. Sublime Publications. Jaipur: 2007.
13. Patel Vikram, Thara R.(Editors), Meeting the Mental Health Needs of Developing Countries. NGO Innovations in India. Sage Publications. New Delhi: 2003.
14. Ranjana, Cognitive Psychology. RBSA Publishers. Jaipur: 2010.
15. Robert A. Baron, Psychiatry, 5th Edition, Pearson Education.
16. Robert C. Carson, James N. Kutcher, Susan Minela, Jill M. Hooley, Abnormal Psychology, 13th edition, Pearson Education.
17. Santrock W. John, Educational Psychology 2nd Ed. Tata McGraw- Hill Edition. New Delhi: 2006.
18. Scileppi A. John, Teed L. Elizabeth and Torres D. Robin, Community Psychology. A common sense approach to mental health. Prentice Hall. USA: 2000.
19. Shepherd, Michael et al..Childhood Behaviour and Mental Health. University Press. London: 1971.
20. World Health Organization, The ICD 10 Classification of Mental and Behavioural Disorders, Clinical Description and Diagnostic Guidelines; Oxford University. Press, Geneva: 1992.

SWIS0020: INTRODUCTION TO SCHOOL SOCIAL WORK

(3 credits - 45 hours)

Objectives:

- *To develop analytical skills in understanding the educational system of schools*
- *To develop an understanding of the theoretical perspectives in the area of School Social Work*
- *To understand the concept of Child Mental Health and develop skills in social work intervention*

Module I (7 hours)

School as a field of Social Work practice- school as a living environment within the community; historical development of school social work models and theoretical perspectives in school social work.

Module II (8 hours)

Child Mental Health - concept of mental health, child mental health and psychosocial development. Mental health needs and mental health problems in children of various age groups.

Module III (15 hours)

Social work prospects in the schools- Preventive- early detection of disabilities in the children - early intervention programmes for children. Remedial- understanding and helping pupils with problems. Detection and referral of behaviour problem children, helping children cope with stress, crisis resolution. Case management, case coordination, collaboration, case conference, consultation.

Developmental- promoting psychosocial competence in children life skills for children. School social work practice- promote partnership of schools, families and communities.

Module IV (15 hours)

Learning Disabilities- introduction, subtypes, academic skills deficit and language problems of children with learning disabilities, education mandate for children with disabilities school policies. pointers for classroom identification assessment and diagnosis- multidisciplinary approach, assessment report, support services, working with learning disabled, skill requirements of a social worker.

Suggested Readings

1. Alderson, J. Models of School Social Work Practice in R Sarri and Maple leds School in the Community, National Association of Social Workers, Washington DC, 1972
2. Robert, Constable; Mc Donald Shirley; Flynn, John P. School Social Work Practice, Policy and Research perspective, Lyceum Books, Inc., Chicago, 1999
3. Arlien, Johnson. School Social Work- its contribution to professional education. National Association of Social Workers, New York, 1962
4. NASW standards for social work services in schools, National Association of Social Workers, New York, 1979
5. Nelson, C. A job analysis of the characteristics of the School Social Workers. Princeton Press, New Jersey, 1990.

SWPD0022: COMMUNITY DEVELOPMENT PRACTICE WITH THE DISEMPOWERED COMMUNITIES

(4 credits - 60 hours)

Objectives:

- *To understand histories, meanings and issues of marginalization, oppression and disempowerment of vulnerable communities such as the dalits, tribes and the indigenous peoples and women ;*
- *To build capacity for critical reflection and analysis of community development issues pertaining to the disempowered;*
- *To build upon the existing understanding of community dynamics, structures and experiences; and*
- *To strengthen skills and capacity for intervention at different levels taking an "empowerment" and anti-oppressive stance.*

Module I: Power, Privilege and Oppression (12 Hours)

Conceptual Frameworks and Theoretical Perspectives; Systems Theory; Critical Theories; Understanding oppression, privilege and oppression.

Module II: Political economy of the Dalit Development (12 Hours)

Social stratification; Caste; Casteism; Colonialism and State; Ambedkar and the annihilation of Caste

Module III: Political Sociology of the Tribes and Tribal Development (12 hours)

Perspectives on Tribes; History of Tribes/Adivasis in India; Evolution of Tribal Policy; Administration and Local Governance; Politics of Tribal Welfare and Development

Module IV: Specific Identity Constructs and Populations at Risk (12 hours)

Gender and Sexism- Gender, Culture, and Society; Race, Sexuality, and Culture (Intersections); Gendered Relations; Health, Sex, and Gender.

Module V: Towards an emancipatory community development practice (12 hours)

Critical Social Work; Anti-oppressive Approach; Structural Social Work

Suggested Readings

1. Chacko, P.M. (Ed.), Tribal Communities and Social Change
2. Freire, A. M. A., and Macedo, D. (Eds.) (1995). The Paulo Freire reader. New York: Continuum.
3. Freire, P. (1990). Pedagogy of the oppressed. (M. B. Ramos, Trans.) New York: Continuum.
4. Freire, P. (1969/1998). Education for critical consciousness. New York: Continuum.

5. Freire, P. (1998). Pedagogy of freedom: Ethics, democracy, and civic courage. (P. Clarke, Trans.) Lanham, MD: Rowman and Littlefield Publishers, Inc.
6. Freire, P., and Macedo, D. P. (1995). A dialogue: Culture, language, and race. Harvard Educational Review, 65(3), .
7. Fultner, B. (ed.) (2012). Jurgen Habermas: Key Concepts. Rawat Publications. Jaipur
8. Ghurye, G.S., The Scheduled Tribes
9. J.S. Bhandari et al (ed.), Tribes and Government Policies
10. Prasad, Archana. Against Ecological Romanticism
11. Rath, G.C. (Ed.), Tribal Development in India
12. Sharma, B.D. Planning for Tribal Development
13. Taylor, D. (ed.) (2011). Michael Foucault: Key Concepts. Rawat Publications. Jaipur
14. Elwin, V. The Philosophy of NEFA
15. Feminist Legal Theory (Bartlett and Kennedy eds. 1991)
16. Critical Race Feminism: A Reader (Wing ed. 1997)
17. Ortner, S. (1974) —Is Female to Male as Nature is to Culture?‖ in M.Rosaldo and L. Lamphere (eds.), Women, Culture and Society, Stanford University Press, pp. 67-88.
18. Moore, H.L. (1988), Feminism and Anthropology, Ch.2, Cambridge: Polity Press, pp. 12-41.
19. Kimmel M. 2000, The Gendered Society. Introduction and Chapters 1, 2 and 4.
20. Hollway, W. (1984) 'Gender difference and the production of subjectivity', in Helen Crowley and Susan Himmelweit (eds.) Knowing Women, p240 - 275, Oxford: Polity.

SWDW0024: DEVELOPMENT CONCERNS AND WOMEN EMPOWERMENT

(4 credits - 60 hours)

Objectives:

- *To develop an understanding of the feminist perspective and methodology*
- *To understand the status of women in the social, political and economic trend*
- *To develop an understanding of the women's problems and issues*
- *To know the national and international efforts for the welfare of women and gender parity*

Module I (20 hours)

Feminism - Introduction to Women's Studies; Feminist Theory – Theoretical Perspective, Concepts and Debates; Feminist Research Methodology; Feminist Economics.

Module II (8 hours)

Women in Indian Society - the changing profile - women in early India, pre-colonial period and modern India, Women's Movement and its impact, The history of women's education.

Module III (20 hours)

Concerns relating to Women – social, economic and political determinants of women's health; women's right and legal advocacy; violence against women; women in conflict areas; migration, displacement, disaster – impact on women; women and climate change; working women in organized and unorganized sector; women and globalization, PRIs and women in India, reproductive technology, women empowerment.

Module IV (12 hours)

Women Empowerment - Policies and programmes for poverty alleviation and economic empowerment of women, micro-finance, SHGs, cooperatives, SEWA, gender budgeting, Women Reservation Bill, Towards Gender Equality Report, CEDAW, National Commission for Women, State Commission for Women, National Policy for Women Empowerment, Social Work Practice in women centric organization and agencies.

Suggested Readings

1. Kumar, Radha. (1993). The History of Doing. New Delhi: Zubaan.
2. Ferber, A , Marriane. Nelson, A, Juie. (2003). Feminist Economics Today: Beyond Economic Man. London: The United Chicago Press Inc.
3. Gordon, L. P. (2002). Violence against Women. New York: Nova Publishers.

4. Kumar, Girish (ed.). (2009). Health Sector Reforms in India. New Delhi: Manohar
5. Harding, Sandra G(ed.). (2004). The Feminist Standpoint Theory Reader. New York: Routledge.
6. Lalkima, C. Lalneihzovi. (2009). Changing Status of women in north-eastern states. New Delhi: Mittal Publications.
7. Pandya, Rameshwari. Patel, Sarika. (2010). Women in the Unorganised Sector of India. New Delhi: New Century Publications.
8. Mies, M.,Shiva, V. (1993). Ecofeminism. London: Zed Books.
9. Agnes, Flavia. (2004). Law and Gender Inequality: The Politics of Women's Rights in India. Delhi: Oxford University Press.
10. Arya, Sadhna. Roy, Anupama. (2006). Poverty Gender and Migration. New Delhi: Sage Publications.
11. Ramazanouglu,Caroline.Holland, Jannet.(ed) (2002).Feminist Methodology: Challenges and Choices. London: Sage Publications Inc.
12. Addlakha, Renu. (2008). Deconstructing Mental Illness: An Ethnography of Psychiatry, Women, and the Family. New Delhi: Zubaan.
13. Ganesamurthy, V,S. (2008).Empowerment of Women in India: Social, Economic and Politcal. New Delhi: New Century Publications.
14. Datar, Chaya. (2003). Integrating activism and academics. In Jain, Devika and Rajput, Pam (Eds.), Narratives from the Women's Studies Family: Recreating Knowledge (pp. 136-149). New Delhi: Sage Publication.

SWFS0025: FAMILIES WITH SPECIAL NEEDS

(4 credits - 60 hours)

Objectives:

- *To understand the context, responses and practice framework for special-care-needs families*
- *To imbibe and become familiar with practice principles, values and ethics while dealing with families with special needs*
- *To develop skills required for meaningful intervention and care-planning for families with special needs*

Module I: Understanding the context (15 hours)

a) Understanding early childhood development: Disabilities, diseases, gender; Issues of care planning for children, Youths, women, men with special care needs; Special needs of families in Northeast India: families in conflict, disasters, displacement, superstition, homelessness and poverty.

b) Emerging concerns of seniors and elderly: global, national and regional contexts.

Module II: Understanding the Responses (15 hours)

Understanding the theoretical foundations for Social Work Support, counseling, resource coordination and advocacy services for families with special care needs; Overview of service systems for special needs groups; Issues, challenges and practice approaches with children and parents in Adoptions and Foster care, Clients and care-providers in Institutional care; Adoption system: pregnant women, adoptive parents and adopted children; Disability, Pregnancy, LGTBs, geriatric care, Long-term care needs of terminally ill; Social Work Practice principles and values in these settings.

Module III: Advanced Practice Skills (30 hours)

a) Case/Care Management of families with special needs :terminally ill person, mental health care, addictions, long-term care, aging, HIV/AIDS, disabilities, occupational services, child welfare, and immigrant/refugee families; Assessment; Care planning, and Resource linkages: programmes, schemes and services.

b) Family Therapy: Communication-pattern approach; Family sub-system approach; Cognitive Behavioral Approach: cognitive restructuring, contingency contracting, skills.

c) Working with Parents in families with special needs: Child Development Knowledge and Care, Positive Interactions with Child, Responsiveness, Sensitivity, and Nurturing, Emotional Communication, Disciplinary Communication, Discipline and Behavior Management, Promoting Children's Social Skills or Prosocial Behavior, Promoting Children's Cognitive or Academic Skills

Suggested Readings

1. Bhuimali, A. (2009). Rights of disabled women and children in india. New Delhi: Serials Publications.
2. Bindra, A. (2010). HIV/AIDS health care and human rights. Delhi: Mangalam Publishers
3. Boyd-Franklin, N., Steiner, G.L., and Boland, M.G. (1995). Children, Families, and HIV/AIDS: Psychosocial and Therapeutic Issues. The Guilford Press.
4. Burke, Peter (2008). Disability and Impairment: Working with Children and Families. Jessica Kingsley Publishers
5. Cambridge, P., and Carnaby, S. eds. (2005). Person centred planning and care management with people with learning disabilities. Philadelphia: Jessica Kingsley Publishers
6. Cosis-Brown, H., and Cocker, C. (2011). Social Work with Lesbians and Gay Men. New Delhi: Sage
7. Dasgupta, S., and Lal, M. (eds.) (2007). The Indian family in transition: reading literary and cultural texts. New Delhi: Sage.
8. Emmatty, L.A. (2009) An insight into dementia care in india. New Delhi: SAGE
9. Gorman, J.C. (2004). Working with challenging parents of students with special needs. New Delhi: Sage
10. Grobman, L.M., and Bourassa, D.B. (2007). Days in the Lives of Gerontological Social Workers: 44 Professionals Tell Stories from "Real-Life" Social Work Practice with Older Adults. White Hat Communications
11. Humphrey, G.M., and Zimpfer, D.G. (eds.) (2012). Counselling for grief and bereavement, 2nd ed. New Delhi: Sage.
12. Lobo, A., and Vasudevan, J. (2002). The penguin guide to adoption in india. Delhi: Penguin Books.
13. McInnis-Dittrich, K. (2008). Social Work With Older Adults (3rd Edition). Pearson
14. McKenzie, R.B. (1998). Rethinking orphanages for the 21st century. New Delhi: Sage
15. Nayar, U.S. (ed.). (2012). Child and adolescent mental health. New Delhi: Sage.
16. Riddick-Grisham, S., and Deming, L. (2011). Pediatric life care planning and case management, second edition. Taylor and Francis Group
17. Satia, J., Misra, M., Arora, R., and Neogi, S. (2013). Innovations in maternal health: case studies from india. New Delhi: Sage
18. Singhal, A., and Rogers, E.M. (2003). Combating aids: communication strategies in action. New Delhi: Sage.
19. Srivastava, V. (2010). Women ageing: social work intervention. Guwahati: Rawat Publications.
20. Venkatesan, S. (2005). Children with developmental disabilities: a training guide for parents, teachers and caregivers. New Delhi: Sage
21. Webb, Nancy Boyd. (2003). Social work practice with children (2nd ed.). New York: Guilford.
22. Yuen, Francis K.O. (2005). Social Work Practice with Children and Families: A Family Health Approach (Haworth Health and Social Policy). Routledge
23. Zastrow, C.H. (2009). Social work with groups. New Delhi: Cengage.

SWPS0026: PSYCHIATRIC SOCIAL WORK

(4 credits – 60 hours)

Objectives:

- *To be oriented to the field of psychiatric social work and comprehend the roles and responsibilities of psychiatric social workers;*
- *To familiarize with the practice of psychiatric social work in varied mental health settings and the application of different therapeutic interventions;*
- *To be equipped with the skills and techniques for practice and design programmes for the care of the mentally ill.*

Module I: Psychiatric Social Work and its application in the field (15 hours)

Psychiatric social Work - Definition and historical development in UK, USA and India. Present status and challenges in the field. Multi-disciplinary team approach in the treatment of psychiatric illness. Role and functions of psychiatric social worker in the team. Psychiatric social worker in the field of community mental health. Skills and techniques used in psychiatric social work practice.

Module II: Rehabilitation and practice of psychiatric social work in various clinical settings (13 hours)

Psychiatric rehabilitation - definition, principles and strategies. The concept of social diagnosis and social work interventions in psychiatric settings.- psychiatric departments /hospitals/clinics, halfway homes, day care centres, child guidance clinics and de- addiction centres.

Module III: Therapeutic approach to mental illness (20 hours)

Treatment and after care of mentally ill patients, application of social work methods in the treatment of mental disorders. Various therapeutic methods: Psychotherapy, Electroconvulsive Therapy, Occupational Therapy, Group Therapy, Client Centered Therapy, Gestalt Therapy, Reality Therapy, Behaviour Therapy, Play Therapy, Rational Emotive Therapy, Therapeutic Community, Motivational Enhancement Therapy and Psychoeducation.

Module IV: Policies and programmes in the field of mental health (12 hours)

Mental health policies and legislation in India - National Mental Health Programmes. Designing and implementing programmes on mental health in communities, monitoring and evaluation of programmes. Research – qualitative and action research on mental health issues.

Suggested Readings

1. Bhattacharya, Sanjay Dr., Social Work: Psycho-Social and Health Aspects. Deep and Deep New Delhi: 2008
2. Carson C. Robert, Kutcher N. James, Minela Susan, Hooley M. Jill, Abnormal Psychology. 13th Edition. Pearson Education. 2010
3. Francis, C. M., Promotion of Mental Health with Community Participation. The Center for Health Care Research and Education. Kerala: 1991
4. Hudson Barber, Social Work with Psychiatric Patients. Macmillian Publishers. New Delhi: 1960
5. Maxmen S. Jerrold, Ward G. Nicholas, Essential Psychopathology and its Treatment, 2nd Edition. W.W. Norton and Company. USA: 1994
6. Murphy Joseph, Dr., The Power of Your Subconscious Mind, Embassy Books Distributors. India: 2010
7. Patel Chhaya, Social Work Practice – Religio – Philosophical Foundations. Essays in Honour of Professor Indira Patel. Rawat Publications. Jaipur: 2009
8. Patel Vikram, Thara R.., Meeting the Mental Health Needs of Developing Countries – NGO Innovations in India. SAGE Publications. New Delhi: 2003
9. Pritchard Colin, Mental Health Social Work, Routledge. USA: 2006
10. Rukadhikar A., Rukadhikar P., Mental disorders and You, Psychiatric Centre. Miraj: 2007
11. Scileppi A. John, Teed L. Elizabeth, Torres D. Robin, Community Psychology, A Common Sense Approach to Mental Health, Prentice Hall. New Jersey: 2000
12. Segal, E. A., Gerdes, K.E. and Steiner, S., Professional Social Work.. Rawat Publications. New Delhi: 2010
13. Stroup H. Herbert, An Introduction to the Field. 2nd Edition, Surjeet Publications. New Delhi: 2008
14. Verma, Ratna, Psychiatric Social Work in India. Sage Publications. New Delhi: 1991

SWHM0027: COMMUNITY HEALTH AND POPULATION MANAGEMENT

(4 credits - 60 hours)

Objectives:

- *To equip students with an understanding of health and epidemiology.*
- *To analyse health and population related policies and programmes in relation to the development and its implications in social work practice.*
- *To impart knowledge of community health, people's participation, vital health indicators and demographic data and its uses in health planning process- at national and regional levels.*
- *Impart understanding of prevention, counseling and management of HIV/AIDS patients.*

Module I (15 hours)

Meaning and Scope of Health and Epidemiology: Concepts and Models of Health and Disease. Factors associated with health and diseases. Concepts of sickness, illness and diseases. Environmental Health, Nutritional Health, Occupational Health, Mental Health and Reproductive Health, Tribal Health.

Module II (13 hours)

Health Statistics and health Indicators: Morbidity and Mortality: MMR, IMR, TFR. Communicable and non-communicable diseases. HMIS – computer systems, data sources, collection, analysis and uses. Primary Health Care, and Public and Community Health Services: Structure, Organization, and Community Participation. Physical and psychological aspects of community health. Aspects of Community Health: drugs and alcoholism. Preventive and promotive health care in Indian context.

Module III (12 hours)

Health and Population Policies: Health Policy: Alma Ata Declaration, National Health Policy, Mental Health Act, NRHM, Assam Public Health Act. Population Policy. Population dynamics- national and the North East context.

Module IV (12 hours)

Health Education, Consumer Health and Health Products: Meaning, importance, principles and components of health education. IEC for health: mass media, audio-visual. Agencies for Health Education Programmes-Voluntary and Government. Analysis of Health Education in India. Formal and Informal health care providers, Modern and traditional practices, safe and risk health behavior and practices. Quackery, Consumer Law on health, consumer agencies.

Module V (8 hours)

Role of Social Work in dealing with HIV/AIDS infected and affected persons- skills and abilities. Laws and provisions, and social reality for persons with HIV/AIDS. Preventive, Promotive and Rehabilitative programmes.

Suggested Readings

1. Abelin, T., Brzenski Z.J., and Carstairs, V.D., Measurement in Health Promotion and Protection, WHO, Copenhagen,1987
2. AIDS Prevention through Health promotion by WHO, end of pub.
3. Alderson, M., An Introduction to Epidemiology, 2nd edition, . Mac-Millan, London, 1983
4. Anssi. Perakyla, AIDS Counselling – Institutional Interaction and Clinical Practice, Cambridge, University Press, 1995
5. Bhore, J., Report of the Health Survey and Development Committee. Vol. 2., Government of India., New Delhi, 1946
6. Dutta, I. and Bawari, S., Health and Healthcare in Assam: A Status Report, CHEAT and OKD, Mumbai, 2007
7. Francis, C.M., Pomotion of Mental Health with community participation- The center for Health Care Research and Education, Kerala,1991.
8. Government of India (GOI). Operational Guidelines for Programme Managers and Service Providers for Strengthening STI/RTI Services, GOI, Ministry of Health and Family Welfare, New Delhi, 2011
9. Green L.W and Anderson, C.L., Community Health 5th edition, Times Mirror Mosby, St. Louis 1986
10. Park,K., Park's Textbook of Preventive and Social Medicine, 20th edition, Bhanot, 2009
11. Thomas, G., AIDS and Family Education – Gracious Thomas, Rawat, Jaipur, 1995
12. Thomas, G., Sinha, N.P. and Thomas, K.J. AIDS'S Social Work and Rawat, Jaipur, 1997

SWSP0028: SOCIETY AND SOCIAL PROBLEMS

(3 credits – 45 hours)

Objective: *This course is intended to introduce the student to the basic sociological concepts - concept of society, social institutions and social dynamics and to give sociological insights and social perspective on Indian society, its structures, history and problems and thus sensitize them to the need to acquire suitable skills to deal with social issues. These issues will be studied with a special reference to the North Eastern Region of India.*

Module I: Basic Sociological Concepts and Theories (15 hours)

a) Concept of Society and Culture; Social institutions, Social groups, Social Control, Social Change, Social Mobility, Social Deviance, Gender –some concepts and theories.
b) Approaches to Understand Society - Functionalist approach, Conflict/ Dialectical approach, Structuralism and Postmodernism

Module II: Major Social Institutions, Social Structure and Social Stratification (15 hours)

a) Marriage, Family, Religion, Education, Economy, Politics - Structure and functions.
b) Caste, class, ethnic groups, power and authority
c) Social stratification: Marxist, Functionalist and Weberian approaches

Module III: Social Problems (15 hours)

Social Problems - Causes and Consequences; Major Social Problems - Poverty, Casteism, Unemployment, substance abuse, problems concerning Women and Children, Delinquency, Development Induced Migration and Displacement, Ecological Problems, Child Labour, Insurgency, Militancy, Ethnic Conflicts.

Suggested Readings

1. Giddens, Anthony, Sociology, Cambridge Press, Polity, 2001
2. Giddens, Anthony, Social Theory and Modern Sociology, Stanford University Press, 1987
3. Gupta, Dipanker (ed.), Social Stratification, Oxford University Press, New Delhi. 1997
4. Menon, N. Gender and Politics in India, Oxford University Press, New Delhi. 1999
5. Madan, G.R., Indian Social Problems (Vol I and II), Allied Publications , New Delhi, 1997
6. Ram, Ahuja, Indian Social Systems, Rawat Publications, New Delhi, 1993.
7. Sharma, K.L., Indian Social Structure and Change, Rawat Publications, Jaipur, 2007
8. Singh, Naunihal, Population and Poverty, Mittal Publications, New Delhi, 2002
9. Sudhir, H. et al. (ed.), Dimensions of Social Issues in India's North East, 2007

SWPR0029: PROJECT CYCLE MANAGEMENT AND RESOURCE MOBILISATION

(4 Credits - 60 hours)

Objective: *The course is developed to enable students*

- *To understand the importance and process of planning*
- *learn the methodology for planning and formulating projects using the Logical Framework Analysis*
- *Develop an understanding of the problems and issues faced by the poor and the marginalized*
- *Develop relevant programme management competencies, leadership skills and analytical capabilities*
- *Develop an insight into the different strategies and approaches commonly adopted by Development Organisations for project management*
- *Learn Skills to develop project proposals, implement, monitor and evaluate project, enhance process documentation and reporting skills*
- *Develop an understanding and skills to mobilize resources and develop insight into the compliance of legal requirements in project management*

Module I: Overview (8 hours)

a) Planning for projects; importance and scope, stakeholders involved in planning.
b) Overview of Project Cycle Management: Identification, Design, Implementation, Review, Monitoring, Evaluation, Identification of the best practices.

Module II: Project Identification and Project Design (15 hours)

a) Needs assessment: Situational analysis, Data collection, Methods and Tools, Observation, Interview, Focus Group Discussion.
b) Research: Principles of Participation and Participatory Methods.
c) Capacity assessment: Human, Social, Natural, Physical, Economic and Cultural.
d) Stakeholders analysis: User groups, interest groups, beneficiaries, decision makers; Primary and Secondary Stakeholders.
e) Identifying appropriate stakeholders at different level of participation
f) Formulation of objectives: Problem analysis, problem tree analysis

Module III: Logical Framework Analysis (12 hours)

Terms, Purpose, Structure; Objectives, Assumptions and their assessment; Indicators and Means of Verification; Activities, Activity Schedule, Proposal Planning and Budget

Module IV: Monitoring and Evaluation (7 hours)

The need, monitoring, reviewing and evaluation, learning the lessons; documentation, reporting; Critical Path Method (CPM) of Monitoring

Module V: Resource Mobilization (10 hours)

Internal and External Resources; Fundraising - principles, sources, ethics, methods and their implications.

International sources for Funding - Concept note; application, procedure and FCRA, record keeping, documentation and legal compliance

Module VI: Corporate Social Responsibility as a source of Funding (8 hours)

Concept and Definitions, Scope and Challenges, Role of Government and NGO in CSR, Triple Bottom line Approach of CSR: Economic, Social, Environmental Stakeholders, Social Preferences: Customer, Employees, Communities, and Investors

Suggested Readings

1. Blackman, R. (2003). Project Cycle Management. UK: Tearfund. (Downloaded available at www.tearfund.org/tilz)
2. Preskill, H., & Russ-Eft, D. (2005). Building Evaluation Capacity. London: Sage Publications.
3. Capezio, P. (2000). Powerful Planning Skills. Mumbai: Jaico Publishing House.
4. Smith, S. (2002). Plan to Win. New Delhi: Kogan Page India.
5. Dale, R. (2001). Evaluation Frameworks for Development Programmes and Projects. New Delhi: Sage Publications.
6. Loehle, C. (2000). Thinking Strategically. New Delhi: Foundation Books.
7. Padaki, V. (1995). Development Intervention and Programme Evaluation. New Delhi: Sage Publications.
8. Lukose P J, A to Z in Project Cycle Management: A Results Based Approach, Media House , New Delhi, 2015.

SWMD0030: DEVELOPMENT ORGANISATIONS - ESTABLISHMENT AND MANAGEMENT

(4 credits - 60 hours)

Objective: *This course takes the student of this specialisation through the processes and policies that have to be kept in mind when establishing a development organisation, The course also gives an insight into the managerial skills required for managing such an organisation.*

Module I: Basic concepts of Management (20 hours)

Concept, Nature and Process of Management; Managerial Skills and Level of Management; Functions of Management: Planning, Organizing, Leading and Controlling; Theories and principles of Management

Module II: Development Organizations: Concept and historical growth (15 hours)

Concept of Development Organizations; Historical growth of Development Organizations; Functions and types of Development Organizations; Development organizations as voluntary organizations/ non-governmental organizations, civil society organisations, community based organization, faith based organizations, charity based organizations; Voluntary Action: ideological basis of voluntary organization; changing context of voluntary organizations; Various forms of organising - Societies, Cooperatives, Trusts and Trade unions

Module III: Perspectives and Policies (10 hours)

a) Evolution of perspectives in development organizations, the rights based approach
b) International and National policies for voluntary sector: NGO-Government interface;
c) Transparency, accountability and credibility of the NGO sector

Module IV: Establishment and Management of Development Organisations in India (15 hours)

a) Registration; Procedure and Laws
b) Formation of an Organisation: Relevant Legislations- Society's registration Act 1860,, Companies Act 1956 and 2013 , Public Trust Act, 1882, and the Indian Trusts (amendment) Act, 2016, Indian Cooperatives society Act, 1904 and 2013, The Foreign Contribution (Regulation) Act, 2010, Income tax Act, 1961 (12A, 80 G), the shops and establishments Act 1953
c) Taxation and Income tax Exemption for Development Organizations

Suggested Readings

1. Brody, R., Effectively Managing Human Service Organizations. New Delhi: Sage.
2. Bryson, J.M., Strategic Planning for Public and Nonprofit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement. Jossey-Bass.
3. Dadrawala, N.H., The Art of Successful Fund Raising. New Delhi: CAP
4. Mukherjee, K.K. and Mukherjee, S., A Guide Book for Strengthening Voluntary Organizations. Ghaziabad: Gram Niyojan Kendra.
5. Nanavatty, M.C., and Kulkarni, P.D., NGOs in the Changing Scenario. New Delhi: Uppal Publishing House.
6. Netting, F.E., & O'Connor, M.K., Organization Practice: A Social Worker's Guide to Understanding Human Services. Allyn and Bacon.
7. Padaki, V., & Vaz, M., Management Development and Nonprofit Organizations. New Delhi: SAGE
8. Pynes, J.E., Human Resources Management for Public and Nonprofit Organizations. Jossey-Bass.
9. Sidel, M. and Zaman, I., Philanthropy and Law in South Asia. New Delhi: APPC
10. Smith, D.H., Grassroots Organizations. Thousand Oaks, CA: Sage.
11. Lukose PJ, Inclusive Development: A Human Rights Approach, Media House, New Delh, i2014.

SWDO0031: POLICIES FOR DEVELOPMENT ORGANISATIONS - URBAN, RURAL AND TRIBAL COMMUNITIES

(4 credits-60 hours)

Objectives: *This Course enables a student*

- *To develop an understanding about the social policies and decision making process of the government in planning for development in India.*
- *To understand the Governmental efforts for development of Rural, Tribal and Urban communities*
- *To understand and analyze Governance issues at local, regional, state and national levels*

Module I: Introduction to Social Policies (12 hours)

Meaning and Definition of Policy and social policy; History and process of Social Policy development in India; Evolution of planning – Planning commission , NITI Aayog .

Module II: Policies and Schemes in Urban Areas (12 Hours)

Challenges for urban development; Urban poverty management; Urban governance systems; Government schemes and policies

Module III: Policies and Schemes in Rural Areas (12 Hours)

Challenges for rural development; Rural poverty management; Rural governance systems - decentralization processes; Government schemes and policies

Module IV: Policies and Schemes in Tribal Areas (12 Hours)

Challenges for tribal development; Poverty management; Governance systems; Government schemes and policies

Module V: Issues of Governance and Planning (12 hours)

Issues of Development and Displacement; Diversity and Citizenship Issues

Suggested Readings

1. Akhup, A., Identities and their struggles in Northeast India (TAS 2). Kolkata: Adivaani.
2. Bodhi, S.R.,Social Work in India: Tribal and Adivasi Studies- Perspectives from Within. Kolkata: Adivaani.
3. Choudhary, D.P., Voluntary efforts in social welfare and development. New Delhi: Siddarth
4. Dahl, R., Who Governs? New Haven: Yale University Press.
5. Goel, S.L. & Jain, R.K., Social welfare administration, Vol.I-II. New Delhi: Deep & Deep Publication.
6. Jacob, K.K., Social Policy in India. Udaipur: Himalaya Publications.
7. Shivaramkrishnan, K.C., Kundu, A. & Singh, B.N., Handbook of Urbanization in India. New Delhi: Oxford University Press.
8. Mishra, R. ,Globalisation and the welfare state. London: Edward Elgae.
9. Sendoc, B., Role of Banks in Tribal Development II.
10. Sharma, B.D., Tribal Development- The concept and the Frame.
11. Sharma ,B.D., Planning for Dispersed Tribals. Kurukshetra.
12. Singh, B., Tribal Development at Cross Road : A Critique and a Plea, Man In India.
13. Turner, M., & Hulme, D., Governance Administration and Development : Making the State Work. London: Macmillan

SWOS0032: ORGANISATIONAL STRUCTURE AND BEHAVIOUR

(4 credits - 60 hours)

Objective: *Understanding the structure and functioning of an organisation is essential for establishment and management of any development organisation. This course introduces the student to organisational structure and management. It also familiarizes the student with the skills and legall base for managing the workforce of an organisation.*

Module I: Organizational Structure (10 hours)

a) Organizational Structure: Definition, Concept and Nature Formation of Organizational Structure
b) Types of organizational Structure

Module II: Basic concepts in Organisational Behaviour (10 hours)

Organizational Behaviour: concept and theories; Models of Organizational Behavior: Development and Types; Organisation Climate, Culture and Team building; Employee counseling, Work life balance, managing occupational stress

Module III: Basic skills for Organisational Development (10 hours)

Leadership - traits, typology and theories; Motivation: need, significance, theories, methods and practices; Communication - concept, significance, modes, channels, impact

Module IV: Legal Base for Practice (15 hours)

a) Legislations for industrial relations-Factories Act, 1948, Industrial Dispute Act,1947, Industrial Employment Standing Orders Act, 1946,
b) Legislations related to Wages – Minimum Wages Act,1948, Payment of Wages Act, 1936, Equal Remuneration Act, 1976, The Payment of Bonus Act, 1965, Payment of Gratuity Act , 1972
c) Equal Opportunities, Protection of Rights & Full Participation) Act,1995
d) Provisions related to employees behaviour : discharge, misconduct, domestic enquiry and disciplinary action; sexual harassment at workplace,
e) Legislations related to employment- Inter-state Migrant Worker's Act,1979, Contract Labour Act, 1970

Module V: Liberalization, Privatization, Globalization (LPG) and the workforce (15 hours)

LPG and its impact on industry; Industrial restructuring and the employee response-emerging concerns; International Labour organisation and international commitment; Impact of changing economic scenario on workers and work organisations – downsizing, displacement, rehabilitation, employment, employee benefits,

Suggested Readings

1. Daft, R.L. (2004). Organization: Theory and Design. Mason: OH: South Western Publishing.
2. Jacoby, S.M. (ed.). (1994). The Workers of Nations: Industrial Relations in Globalised Economy. New York: Oxford University Press.
3. Mallick, P.L. (2002). Industrial Law. Lucknow : Eastern Book Company
4. Mathis, R. L., & Jackson, J.H. (1997). Human Resource Management. U.K: Prentice Hall International.
5. Pareek. U., & Rao, T.V. (1992). Designing and Managing HR Systems. New Delhi: Oxford & IBH Publishing.
6. Ramnarayan, S., Rao, T.V., & Singh, K. (1998). Organization Development: Interventions and Strategies. New Delhi: Sage Publications.
7. Robbins, S.P. (2002). Organizational Behaviour (10th ed.). New Delhi: Prentice Hall of India.
8. Silvera, D.M. (1990). Human Resource Management: The Indian Experience. New Delhi: New India Publications.
9. Sivananthiran, .A., & Venkatratnam, C.S. (2003). Best Practices in Social Dialogue. New Delhi: ILO.
10. Veena, A.K., Kochan R.D., & Lansbury, R.D. (1995). Employment Relations in the Growing Asian Economics. London : Routledge.

SWHR0033: HUMAN RESOURCE MANAGEMENT

(4 Credits - 60 hours)

Objectives: *This Course is designed to enable students*

- *to understand the concepts of Human Resource Management*
- *to understand the processes in Human Resource management and Development*

Module I: Introduction to Human Resource Management (15 hours)

Human Resource Management: Concept, Objectives, Nature, Scope, Importance and functions, Evolution, Goals and Approaches

Module II: Human Resource Development (15 hours)

a) Human Resource Development: concept, goals, approaches, and management of change
b) HRD sub systems: Human resource planning, recruitment, selection, induction, retention, performance management, retirement and redeployment, exit strategies

Module III: Human Relations in Organisations (15 Hours)

Industrial organisation as a sub-system of society; Human relations in industry - history, determinants, reflectors and prospects ; Role of State as third party in industrial relations, Collective bargaining; Trade unionism – historical development, strengths and weaknesses, law relating to trade unions; Problems and status of Trade unionism in post globalisation period.

Module IV: Policy base for Human Resource Development (15 hours)

a) Inclusive HR Policies and practices: Recruitment, Selection and Induction, Capacity Building, Compensation, Retention and Separation
b) Development of Human resources: Capacity Building, Training and Development, Communication and Leadership.
c) Human Resource Planning : concept and processes, job analysis

Suggested Readings

1. Aswathappa, K., Organization Behaviour. New Delhi: Himalaya Publishing House
2. Aswathappa, K., Human Resource and Personnel Management: Text and Cases, New Delhi: Tata McGraw Hill.
3. Aswathappa, K.,Human Resource Management. New Delhi: Tata McGraw Hill.
4. Bedian, A. G., & Glueck, W.F. ,Management, Japan: Dryden Press.

5. Bosotia, G.R.,Human Resource Management. Jaipur: Mangal Deep Publications.
6. Chhabra, T.N. , Human Resource Management. New Delhi: Dhanpat Rai.
7. Chopra, R.K. , Management of Human Resources. Bareilly: V. K. Publishing House.
8. D'Cenzo, D.A., & Stephen, P. R., Human Resource Management. New Delhi: John Wiley & Sons.
9. Heing, W., & Koontz, H., Management: A Global Perspective. New Delhi: MCGraw Hill.
10. Ian, B., & Holden, L., Human Resource Management. Delhi: Macmillan.
11. Newstrom, J.W. & Keith, D., Organizational Behavior – Human Behavior at Work, (11th Ed.). New Delhi: Tata McGraw Hill.
12. Kondalkar, V.G., Organizational Behaviour. New Delhi: New Age International.
13. Prasad, L. M., Organizational Behaviour. New Delhi: S. Chand & Sons.
14. Robbins, S. P. , Organizational Behaviour, New Delhi: Prentice - Hall.
15. Saiyadain, M.S., Human Resource Management. New Delhi: Tata McGraw-Hill.
16. Sekaran, U., Organizational Behaviour: Text and Cases. New Delhi: Tata McGraw Hill.
17. Singh, B.P., & Singh, A. K., Essentials of Management. New Delhi: Amexcel Books.
18. Singh, B.P., & T.N Chhabra. , Management Concepts and Practices. New Delhi: Dhanpat Rai.

SWWA0034: SOCIAL WELFARE ADMINISTRATION, DEVELOPMENT AND MANAGEMENT OF ORGANISATIONS

(3 credits - 45 hours)

Objectives:

- *To develop an understanding of social welfare administration as a method of social work*
- *To understand the various components of social welfare administration*
- *To understand the nature of social policy in the social, political and economic context*
- *To familiarize the students with the concepts of management and development*

Module I: Social Welfare Administration (15 hours)

a) Trajectory of Social Welfare Administration from the framework of Charity, Welfare, Development (Colonialisation and after)
b) Social Welfare Administration: Definition, Characteristics, Social Welfare Administration as a Method of Social Work;
c) Distinction between Social Welfare Administration, Public Administration and Social Security Administration;
d) Models of Social Welfare Organizations
e) Establishment, Objectives and Importance of Central Social Welfare Board and State Social Welfare Board
f) Social Welfare Programmes for Rural Development, Urban Development , Children, Youth, Women, Widows, Elderly and Differently-able with special focus for North East

Module II: Management of an Organisation (15 hours)

a) Elements of Administrative Process: Planning, Organizing, Direction, Coordination, Supervision, Communication, Public Relations and Networking
b) Management Concepts: Definition, Principles, Functions and Significance of Management for Social Work
c) Programme Management: Strategic Planning (Vision, Mission, Goals and Objectives), Implementation, Monitoring, Evaluation, Documentation and Reporting
d) Human Resource Managemnt Selection of Staff, Orientation, Placement, Service Conditions, Promotions, Discipline, Welfare Programmes for Staff, Performance Appraisal Systems and Separation from the Organisation
e) Finance Management: Programme Finance and Administrative Finance, Budgeting, Accounting, Book Keeping, Auditing and Financial Reporting.
f) Office Governance Systems and Structures: Constitution of Governing Body, Notice of Meetings, Agenda of Meeting, Writing Minutes/ Proceedings and Maintenance of Records;
g) Registration of Development Agencies, Laws relating to Societies Registration Act 1860, Trusts and Non-Profit Organizations under Indian Companies Act: Foreign Contribution Regulation Act 1976 and Income Tax Rules applicable to Development / Charitable Organisations under Income Tax Act 1961

Module III: Development Perspectives (10 hours)

a) Development Concepts: Definition, Indicators of Development (Developed, Underdeveloped and Developing Countries), Social Development and Sustainable Development Goals
b) UN Organizations for Development and their Strategies; Community Driven Development Principles and Development Process
c) Concept, Nature and Types of Development Organizations; Role of these Development Organisations with specific reference to North East India

Module IV: Introduction to Social Policy and Social Welfare Programmes (5 hours)

a) Social Policy: Concept, Goals, Scope and Context
b) Social Policy Approaches: Welfare, Development and Human Rights

Suggested Readings

1. Chowdry, Paul, Social Welfare Administration, Atma RRam and Sons, Delhi, 1992
2. Sankaran and Rodrigues, Handbook for the Management of Voluntary Organisations, Alpha Publications Chennai, 1983
3. Kulkarni, P.D., Social Policy and Social Development in India Association of schools of social work in India
4. Fred, Luthans, Organization Behaviour, III and IV edition
5. Rao, Subba, GCV. Family Law in Law, S. Gogia and Company, Hyderabad, 1999
6. Sulivan, Michael, Sociology and Social Welfare, Allen and Unwin, Winchester, USA, 1987
7. Reider, Dale, Evaluating Development Programmes and Projects, Second edition, Sage Publications, 2004
8. Gupta, N.S. Organization Theory and Behaviour. Delhi, 2009
9. Chatvervedi, A.N, Rights of the Accused under Indian Constitution.: Deep and Deep Delhi. 1984
10. Donnisson, D & Chapman,Social Policy and Administration. London. 1989

SWFR6001: CONCURRENT FIELD WORK AND RURAL PRACTICUM

(4 credits)

CONCURRENT FIELD WORK I

The field work practice in the first semester consists of orientation visits, lab sessions for skills training and placement. In the first semester, the focus of field work is the community. The students are placed in communities and in NGOs, service organizations and government agencies working with communities, and in those settings where they can be exposed to the community and community issues. The students get a close feel of the community and community settings, understand the dynamics and issues in the community and become aware of the sensitivities of people while working with them. They also get a firsthand experience of the programmes and projects implemented in the communities by NGOs and government agencies and the impact that these have on the community. They also interact with the agency personnel and the community members to understand the tension between tradition and change that the communities in the region are likely to experience, and how it is handled. They, with the help of the agency and the field work supervisor, identify an issue and work on it following the principles of community organization. The students are expected to be creative and innovative in assisting the agency and community in whatever way possible.

Normally a student spends fifteen hours over two days per week in field work. However, keeping in mind the peculiar situation of transport and communications in the region and the expenses involved, the field work practice may be arranged in other convenient ways as the department deems fit.

After each session of field work the students write a report of their activities and submit to the concerned field work supervisor. The supervisor conducts individual and group field work conferences regularly.

At the end of the semester the student submits a summary report for the semester and a viva voce examination is conducted.

RURAL CAMP

Students are to arrange a rural camp generally at the end of the first or second semester. The duration of the rural camp shall generally be ten days excluding days of travel. At the end of the camp each student shall submit a written report to the department in a specified format. Performance at the Rural Camp shall be considered for evaluation of the Field Work during the second semester.

The objectives of the rural camp are:

- To apply the acquired skills of group work and community organisation
- in communities.
- To understand and assess the problems faced by the rural population.
- To involve positively in the communities to help to remove some of these problems.

SWCA6010: COMPUTER APPLICATIONS FOR SOCIAL SCIENCES (Lab)

(2 credits)

Objectives:

The objectives of this course are

- *To learn the basic computer applications those are useful for a social worker.*
- *To learn and do data analysis for research using a Statistical Analysis Package*
- *The data analysis of modules IV and V may be carried out in any Statistical Analysis Package or using spreadsheets. If required the Statistical Analysis Package may be introduced in a separate workshop.*

Module I (6 hours)

Word Processing: Meaning, Features, advantages; Structure of a Word Processor window; Creating document, saving opening and printing, find and replace. Creating table; Mail merge - main document, data source and merging

Module II (8 hours)

Spreadsheet Package: Cell, rows and columns; Range, structure of a spreadsheet window; Creating, saving opening and printing a spreadsheet, creating tables, charts; data analysis using formulae in a spreadsheet.

Module III (5 hours)

a) Presentation package: Creating presentations in a presentation package, text, tables, charts, Animation, running slide show, saving the slides, printing presentations
b) Internet and browsing, E-Mail, blogging, use of Internet in Research

Module IV (10 hours)

Data analysis using statistical software packages.

Suggested Readings

1. Foster, J.J., Data Analysis Using SPSS for Windows, Sage Publications Ltd., London, 1998
2. Gaur, Ajai S., et al., Statistical Methods and Practice and Research, Response Books New Delhi, 2006
3. Kelle, V., Computer Aided Qualitative Data Analysis: Theory, Methods and Practice, Sage Publications Ltd., London, 1998
4. Lincoln, Y. S. and N. K. Denzin, Handbook of Qualitative Research, Sage Publications, California, 1994
5. Taxali, R.K., PC Software for Windows Made Simple, Tata McGraw-Hill Publishing Company Ltd New Delhi, 1998
6. User manual of the statistical package used
7. Miles, M.B. and E.A. Weitzman, Computer Literacy in Human Services, The Haworth Press, New York, 1995

SWFW6003: CONCURRENT FIELD WORK II

(4 credits)

The field work practice in the second semester will consist of lab sessions for skills training and placement. The focus will be on the practice of social case work and Group works. The students shall be placed in NGOs, and government service organizations and government agencies working with individuals and families, and in those settings where they can be exposed to issues related to individuals and groups. Normally a student spends fifteen hours over two days per week in field work.

Objectives

The concurrent field work ensures that the student understands the way these institutions and agencies function and practice the skills of working with individuals and different groups.

Activities

The student is expected to complete 5 cases in casework and follow up one group with at least 5 sessions. Besides this, the student shall be involved in the activities of the institution and fulfill the responsibilities that are asked of him/her by the agency supervisor. After each session of field work the students shall write a report of their activities and submit to the concerned field work supervisor. The supervisor shall conduct individual and group field work conferences regularly. At the end of the semester the student shall submit a summary report for the semester and a viva voce examination is conducted.

SWFW6004: CONTINUOUS FIELD WORK I

(3 credits)

SWFW6006: CONTINUOUS FIELD WORK II

(4 credits)

The field work practice in the Third and Fourth Semesters shall focus upon the Area of Concentration chosen by the students. The students shall be placed in the field for twenty five days of consecutive field work. The field work settings shall be communities, NGOs, service organizations, hospitals, clinics and governmental agencies. Those students who are specializing in Community Development will either be placed in an urban or rural community setting that is identified by the Department. Students who are specializing in Medical and Psychiatric Social Work will be exposed to either a Medical or a Psychiatric setting.

The thrust in field placement will be to enable the students to become more proficient in the field and apply relevant skills and techniques in handling real situations. During the placement, the students are expected to implement the following activities and adhere to the guidelines specified below:

1. The students are expected to apply all the methods of social work such as casework, group work, community organization, research and administration, wherever applicable depending upon the organization and their services.
2. The students shall be involved in the activities of the institution and fulfill the responsibilities as requested by the Agency Supervisor.
3. The students shall prepare a daily report of the field work activities implemented and share them through e mail with the concerned Faculty Supervisor at the end of each day. The Supervisor shall provide the necessary feedback and guidance to the students by also making personal visits to the field where they are placed.
4. At the end of the continuous field work placement, the students shall submit a consolidated or summary report highlighting the main activities implemented and the major learning from the field placement. Every student shall also appear for a viva voce examination at the end of the semester.

SWRP6005: RESEARCH PROJECT PHASE I

(2 credits)

Every student shall undertake a research project work which has bearing on his/her AoC under the supervision and guidance of a faculty member. The preliminary work may begin at the end of the second semester. The students are expected to complete the Literature Survey followed by a Synopsis presentation during the Phase I. The dates, 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.

SWRP6007: RESEARCH PROJECT PHASE II

(4 credits)

Every student shall undertake a research project work which has bearing on his/her AoC and present a written thesis on the research work under the supervision and guidance of a faculty member. The preliminary work may begin at the end of the second semester. The students are expected to complete the data collection before the fourth semester. The thesis is to be submitted to the department before the date notified. 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. There shall be a viva voce examination on the research project.

DEPARTMENT OF PSYCHOLOGY AND COUNSELLING

PCLS0002: LIFE SPAN DEVELOPMENT

(4 credits - 60 hours)

Objectives: *This course gives an overview about cognitive, emotional, psycho-sexual, social and moral development during tZAd discussed with a view to enable students to understand the clients in the context of life span perspective.*

Module I: Introduction to Life Span Development (10 hours)

Life Span Perspective: Importance of studying Life-Span Development, Characteristics of life span development, Nature of Development, Scope of Life span development. Theories of Development (Brief mention of all theories), Influence of Socialization and Development

Module II: Biological Bases to explain Human Development and Anatomy of the Nervous system (14 hours)

a) The Evolutionary perspective and Heredity-Environment Correlations, genetic foundation, Conception, effect of Teratogens on Prenatal Development, Neonatal health- Low birth weight, Neonatal Assessment.
b) Neuron: Structure, types and functions. Structure of the nervous system, physiological basis of the action potential (neural response).
c) Structure and function of the brain: forebrain, midbrain, hindbrain, cerebral cortex, temporal, parietal and occipital lobes; prefrontal cortex. The effect of hormones on the nervous system.

Module III: Physical development across life span (12 hours)

Physical growth during childhood, adolescence and old-age, brain development across life span, Bio-Psycho-Social health model, aging, biological theories of aging and death.

Module IV: Cognition (14 hours)

Cognitive Development across during adolescence, growth beyond formal operational stage, Piaget's and Vygotsky's Theories of Cognitive Development, Development of the Self, Self Esteem and Self Concept, Self Regulation. Development of identity and Personality including Erickson's theory. Aging and cognitive skills. Intelligence, creativity, learning and memory across the lifespan. Stages in language development, language development across the lifespan.

Module V: Emotional Development (10 hours)

Development of Emotion, Temperament and Attachment and Love intimacy, Development of identity and Personality including Erickson's theory. Theories of moral development. Changes in moral reasoning(Kohlberg's Theory).

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Understand the meaning of life span; Write about the concept of life span; State the characteristics of lifespan development; Understand the meaning of development; State the meaning of socialization; Find out the effect of teratogens on prenatal development; State the meaning of neurons; Write the functions of the brain parts; State the developmental stages of a child; State the bio-psycho social health model; State the meaning of emotion; Write about the different types of emotions; Name theories of moral development; Write about Kohlberg's theory.

CO2 (COMPREHENSION): Explain the process of life; Differentiate between growth and development; Comprehend the contributions of heredity and environment on the human development; Comprehend about the biological bases of human development; Describe the types and functions of a neuron; Explain the structure of nervous system; Comprehend the physiological basis of neural response; Explain the effect of hormone on the nervous system; Comprehend the characteristics of a child at various stages of childhood; Describe the physical development aspect of a child at the various stages; Explain the period of adolescence; Comprehend the physical development

of an adolescent; Comprehend the concept of aging and death; Comprehend the emotional development of an individual at different stages of development; Comprehend the meaning of temperament, love, intimacy in relation to emotional development; Comprehend the concept of sexuality , self-identity, gender identity in relation with emotional development; Explain the major theories of moral development, cognitive development and personality development; Explain the development of creativity, learning and memory across lifespan.

CO3 (APPLICATION): Illustrate the scope of life span development; Apply the principles of the theories of development in educating our children; Discuss the influence of socialization on development process of an individual; Identify the major developmental periods of an individual; Apply the knowledge in real life situations; Illustrate the structure of a neuron; Illustrate the structure of brain; Identify the problems faced by a child during the physical development; Find out the characteristics of the stage of adolescence; Find out the educational implications of the stages of physical development; Find out the implications of the theories of moral development in an individual's life; Apply Piaget and Vygotsky's theory in daily life.

CO4 (ANALYSIS): Analyze the problems faced in neonatal health; Identify the structure, functions and types of neurons; Compare the functions of different brain areas; Compare physical growth in childhood, adolescence and old age; Compare Piaget's and Vygotsky's theories of moral development; Compare stages in language development.

CO5 (SYNTHESIS): Summarize importance of life span development; Summarize the theories of development; Organize the structure of the nervous systems and neurons; Organize the structure and functions of the brain areas; Summarize the theories of cognitive development; Summarize the theories of emotions and moral development.

CO6 (EVALUATION): Evaluate the need for life span perspective; Critically evaluate theories of physical development; Critically evaluate theories of cognitive development; Critically evaluate theories of emotional development; Critically evaluate theories of moral development.

Suggested Readings

1. Santrock, john W (2007), Life- Span Development, 3rd Edition, New Delhi: Tata McGraw-Hill
2. Hurlock, Elizabeth B. (1981), A Life-Span Approach, 5th Edition, New Delhi: Tata McGraw-Hill Publishing Company Limited
3. Berk, Laura E. (2007), Child Development, 7th Edition, New Delhi: Prentice Hall.
4. Bhaskar, R.(2008), Fundamentals of Child Psychology, Delhi: Swastik Publishers and Distributors
5. Chatterjee, Chopra Suhita, Patnaik, Priyadarshi, Chariar, Vijayaraghavan M. (Eds), (2008), Discourses on Aging and Dying. Los Angeles: Sage.
6. Hurlock, Elizabeth B. (1997), Child Development, 6th Edition, New Delhi: Tata McGraw-Hill Publishing Company Limited.
7. Mallon, Brenda (2008), Dying, Death and Grief, Working with Adult Bereavement, Los Angeles: Sage
8. Mishra, A.K. (2007), Psychology of Aging, Jaipur: Sublime Publications.
9. Santrock, John W. (2007), Child Development, 11th Edition, New Delhi: Tata McGraw-Hill Edition.
10. Sharma, Ram Nath A. Sharma, Rachana (2002), Child Psychology, New Delhi: Atlantic
11. Carlson, N.R. (2004). Physiology of behaviour (8th.ed.). Boston:
12. Allyn and Bacon.Schneider M Alles (1990). An introduction to Physiological Psychology (3rd Edition) USA:Random House.
13. Leukel, F. (1985). Introduction to physiological psychology (3rd.ed.). New Delhi: CPS Publishers
14. Morgan, T.H. and Stellar, A. (1965). Physiological Psychology. New York: McGraw Hill.

PCMH0004: CONCEPTS OF MENTAL HEALTH AND ILLNESS

(4 credits - 60 hours)

Objectives: *In this course students get an overview of the concepts of mental health and illness, forms of diagnosis and learn about the most common groups of disorders. Need for psychological counselling as important part of treatment is discussed but also the limitations counselling has in severe cases.*

Module I: Introduction (10 hours)

Definition, historical review. Changing attitudes and concepts of mental health and illness.Current views. Models for understanding psychopathology. Psychoanalytic, behavioural, interpersonal and humanistic. Need, cultural and social background for and types of classification of mental disorders. DSM and ICD systems of classification.

Module II: Anxiety, Somatoform and Dissociative Disorders (15 hours)

Diagnosis, types, clinical features, social context, medical treatment, possibilities and limits of counseling

Module III: Severe Mental Disorders: Bipolar and Schizophrenic Disorders (10 hours)

Diagnosis, types, clinical features, social context, medical treatment, possibilities and limits of counseling

Module IV: Mental Health Problems in Children and Adolescents (10 hours)

Autism, ADHD, eating disorders - Diagnosis, types, clinical features, social context, medical treatment, possibilities and limits of counselling (behavioural and development)

Module V: Personality Disorder and sexual Disorders (15 hours)

Clinical features , causes, treatment of personality and sexual disorders.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Understanding the meaning of mental disorders, concept of Malad just enter and it's evolution through the ages, perspectives from various theories as well as cultures across the world in viewing mental health as a matter of significance, bio-psycho-socio aspects of mental disorders, characteristics and categorisation of symptoms, clinical scenario, prevalence scenario, treatment and prognosis, recent trends and updates in mental disorders field.

CO2 (COMPREHENSION) : Observe the nature of mental disorders, merits and demerits of clinical settings, treatment plans, social outlook and current trends, developing views on perceiving mental illness under the light of positive psychology, the summarising of changing opinions about mental illness and it's association to people in terms of culture, socioeconomic background, gender and changing social norms.

CO3 (APPLICATION) : Diagnosing, identifying symptoms of different maladjudtments, applying treatment for the progress towards adjustment, operating amongst unawares to spread word on the importance of taking a stand against mental illness, taking and designing preventive measures to avoid mental illness, motivating to initiate change, making people concerned for the future generation right from planning a child's birth.

CO4 (ANALYSIS) : Analyse causal factors, leading factors, maintaining factors and other contributions to increase in mental illness in the recent times, gaps in treatment plans and Role of society, ways to improve the condition of environmental factors causing and maintaining mental illness, developing trends and their influence, the role of counselling practice in preventing and treating the maladjusted and the family.

CO5 (SYNTHESIS) : Summarise the evolution of mental health concern, it's theories, it's role in making people aware of their life choices, diagnosis and treatment plans and further developments, role of politics and economy in promoting mental health.

CO6 (EVALUATION) : Evaluation of the pros and cons of diagnostic manuals, the labelling of mental illness, team work of various fields and their respective mental health professionals, criticise and defend the role of culture and social norms.

Suggested Readings

1. Diagnostic and Statistical Manual of Mental Disorders (DSM- IV TR), 2000 American Psychiatric Association.
2. Robert C.Carson, James N. Butcher, Susan Mineka, Jill M. Hooley, Abnormal Psychology, 13th edition, Pearson
3. Sarason, Irwin G. a. Sarason Barbara R. (2009). Abnormal Psychology. The Problem of Maladaptive Behaviour. 11th Edition. New Delhi: PHI Learning Private Limited.

4. Ahuja, Niraj (2006), A Short Textbook of Psychiatry, 6th Edition, New Delhi: Jaypee.
5. Antony, John D. (2006), Mental disorders, Encountered in Counselling, A Textbook of clinical Psychology Based on DSM IV, Dindigul: Anugraha Publications.
6. Chaube, S.P. (2007), Developmental Psychology, New Delhi: Neelkamal.
7. Gilbert, Paul (2007), Psychotherapy and Counselling for Depression, 3rd Edition. Los Angeles: Sage.
8. Humphrey, Geraldine M. A. Zimpfer David G. (2008). Counselling for Grief and bereavement. 2nd Edition. Los Angeles: Sage.
9. Korchin, Sheldon, J. (1986), Modern Clinical Psychology, Principles of Intervention in the Clinic and Community. New Delhi: CBS Publishers and Distributors.
10. Kumar Updesh and Mandal Manas K. (Eds). (2010), Suicidal Behaviour, Assessment of People-at-Risk. Los Angeles: Sage.
11. Patel, Vikram (2003). Where There is No Psychiatrist. A mental health care manual. Glasgow: Gaskell.
12. Patel, Vikram a. Thara. R. (Eds.) (2003). Meeting The Mental Health Needs of Developing Countries. NGO Innovations in India. New Delhi: Sage.

PCIG0005: PROCESS AND SKILLS OF INDIVIDUAL AND GROUP COUNSELLING I

(3 credits - 45 hours)

Objectives: *This course will introduce to the students the basic theoretical aspects of the counselling process and different skills of counselling, along with their evaluation. In the first part fundamentals of individual counselling are highlighted. Second part of this paper is introducing the basic concepts of group counselling, stages of group development, skills, techniques and strategies to group process.*

Module I: Fundamentals of Individual counselling (10 hours)

Introduction: Definition, Characteristics, advantages of individual counselling, counselling setup indications and contraindications, professional self care- need of safe frame for counselling work, value of supervision as part of professional counselling.

Module II: Eclectic and integrative approaches (12 hours)

Concepts, approaches, skills and techniques, cognitive analytic theory, brief Counselling approaches - solution focused approach and narrative approach.

Module III: Basics of group counselling (15 hours)

Goals, Functions and Definitions of Group guidance, Ethical guidelines for group counselors; Rights of group participants. Uses and misuses of group techniques, psychological risks in group; Group work in multicultural settings and Integrative eclectic perspectives: professional issues and current trends.

Module IV: Skill training – group counselling (10 hours)

Group counselling, Group therapy: Types of groups-structured and psycho educational, theme centered, theory based.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the concept of counseling; State the different settings of the practice of counselling and psychotherapy; Recognize the different skills of counseling; State the basic differences between individual and group therapies in counseling; State the meaning and value of supervision in counselling ; State Cognitive Analytic Therapy; State the brief Counselling approaches - solution focused approach and narrative approach; State about group therapies, family therapy and community based interventions for counseling; Define ethics in counseling; Identify different types of groups and their functions and state uses and misuses of individual and group approaches.

CO2 (COMPREHENSION): Explain the concept of counselling and its types; Illustrate the skills of individual counselling, group counseling; Explain different characteristics essential for professional counseling; Explain solution focused therapy and its techniques; Explain narrative Therapy and its techniques; Differentiate between Integrative and eclectic perspectives in counseling; Elaborate about group therapies and community based interventions for counseling; Explain different types of trauma and

theories of trauma counseling; Explain historical context of counseling; Explain the current trends and practices in the profession of counseling; Explain the different types of techniques used in group therapy and the various settings therein; Illustrate the different stages followed in group therapy.

CO3 (APPLICATION): Apply the individual counselling skills in the professional practice of the same; Follow the ethical guidelines given by ACA in the practice of counseling; Safeguard the members in group counselling from any risks in the group context; Apply the counselling techniques as per the current trends; Apply vigilant about the uses and misuses of group techniques in group counseling; Apply models of group therapy in systematic manner.

CO4 (ANALYSIS): Analyze the differences between individual and group therapy; Analyze the effectiveness of eclectic and integrative approaches in counseling; Analyze the effectiveness of Cognitive Analytic Therapy in counseling; Analyze the effectiveness of Psychoeducational groups; Compare narrative therapy and solution focused therapies; Analyze the practical applicability of ethical perspectives in individual and group counseling.

CO5 (SYNTHESIS): Summarize strengths and weaknesses of Individual and group counseling; Summarize the different types of settings related to the practice of individual and group counseling; Conclude about the contradictions associated with the practice of different approaches in counseling; Summarize the ethical guidelines in individual and group counseling practice.

CO6 (EVALUATION): Evaluate the effectiveness of supervision in the professional practice of counseling; Evaluate the indication and contradictions in the effective use of counselling in various professional settings; Evaluate the effectiveness of Eclectic and Integrative approaches in counseling; Assess the effectiveness of different individual and group therapy approaches; Evaluate the effectiveness of group therapy and its interventions in dealing with different category of clientele in counseling; Evaluate the evident psychological risks that the members in a group could face in group therapy; Evaluate the progress of stages in group therapy.

Suggested Readings

1. Kiruba, Charles and Jyothsna N.G. (2011). Guidance and Counselling. New Delhi: Neelkamal
2. Gladding, S.T (2009), Counselling : A Comprehensive Profession, 6th Edition Pearson
3. Reynolds Welfel, Elizabeth and Patterson, Lewis E. (2005), The Counselling Process, A Multitheoretical Integrative Approach, 6th Edition, New Delhi: Cengage Learning.
4. Koshy, John S (2009/10). Guidance and Counselling. New Delhi: Dominant Publishers and Distributors.
5. Kottler, Jeffrey A. and Shepard, David S. (2008) Counselling, Theories and Practices. New Delhi: Cengage Learning.
6. McLeod, John (2003), An Introduction to Counselling, 3rd Edition, Berkshire: Open University Press.
7. McLead, John (2007), Counselling Skill, Berkshire: Open University Press
8. Nelson-Jones, Richard (1988), Practical Counselling and Helping Skills, Bombay: Better Yourself Books
9. Nelson-Jones, Richard (2008), Basic Counselling Skills, A Helper's Manual, 2nd Edition Los Angeles: Sage.
10. Westbrook, David; Kennerley, Helen A., Kirk J. (2007), An Introduction to Cognitive Behaviour Therapy, Skills and Applications, Los Angeles: Sage.

PCSP0006: INTRODUCTION TO SOCIAL PSYCHOLOGY

(3 credits - 45 hours)

Objectives: *This course helps to understand the social behaviour of individuals in terms of both internal characteristics of the person and external influences. It aims to orient students towards the applications of the concept of social psychology to social problems.*

Module I: Introduction (8 hours)

Social Psychology - Definition, Nature, Origin and Development; Social Psychology in Indian context.

Module II: Social Processes (8 hours)

Social perception or cognition, interpersonal attraction, social motives, social learning, socialisation and social roles, pro-social behaviour and aggressive behaviour.

Module III: Social Influences (8 hours)

Persuasion, attitude, prejudice and stereotypes - nature and differences among them. Factors in the formation of attitudes, measuring attitudes, factors in attitude change.

Module IV: Group Dynamics and Group Influence (13 hours)

Formation of groups, structure and functions, types, group communication, group norms, conformity behaviour, co-operation and competition, social facilitation, leadership, group effectiveness, decision making, problem solving, group conflict and resolution.

Module V: Social Problems and Social Psychology (8 hours)

Understanding social problems in the light of social psychology: concept and approaches, aggression and violence, poverty, discrimination - caste, class, religion, gender.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): knowledge about the definition and nature of Social Psychology; gain familiarity with the origin and development of Social Psychology; acquainted with the underpinnings of the Social Psychology in the Indian Context; expand the fundamental knowledge of interpersonal attraction; define and state the major agents of Socialization; understand the intricacies of pro-social and aggressive behavior; comprehend the nature and differences of prejudice and stereotypes; understand the theoretical basis of the formation and factors of attitude; comprehend the underlying basis of the formation and the types of groups; familiar with the strategies to resolve group conflict; comprehend the social problems like caste, class, religion and gender in the light of social psychology.

CO2 (COMPREHENSION): Able to gain explanation to the students about the definition and nature of Social Psychology; illustrate the origin and development of Social Psychology; point up and categorize the underpinnings of the Social Psychology in the Indian Context; interpret and infer the fundamental knowledge of interpersonal attraction; understand and differentiate among the major agents of Socialization; illustrate and comprehend the intricacies of pro-social and aggressive behavior; gain an in-depth understanding of the nature and differences of prejudice and stereotypes; explain the theoretical basis of the formation and factors of attitude; grasp a detailed knowledge on the social problems like caste, class, religion and gender in the light of social psychology.

CO3 (APPLICATION): Acquainted with the underpinnings of the Social Psychology in the Indian Context with the help of movie reviews or group discussion; provide the students the practical aspect of interpersonal attraction and the related assessments; discuss and display the practicality of the major agents of Socialization; understand the practical nuances of pro-social and aggressive behavior; identify and understand differences of prejudice and stereotypes with the use of daily instances; demonstrate the strategies to resolve group conflict; realistically understand the like caste, class, religion and gender in the light of social psychology.

CO4 (ANALYSIS): Evaluate and illustrate about the definition and nature of Social Psychology; critically analyze the underpinnings of the Social Psychology in the Indian Context; provide the students the fundamental knowledge of interpersonal attraction; relate and analyze with the major agents of Socialization; compare and contrast various pro-social and aggressive behavior; evaluate and identify the nature and differences of prejudice and stereotypes; explore and question the underlying basis of the formation and the types of groups; exemplify the strategies to resolve group conflict; question and analyze the social problems like caste, class, religion and gender in the light of social psychology.

CO5 (SYNTHESIS): Summarize the knowledge about the definition and nature of Social Psychology; organize and evaluate the origin and development of Social Psychology; amalgamate and combine the underpinnings of the Social Psychology in the Indian Context; synthesize the fundamental knowledge of interpersonal attraction; combine and conclude the major agents of Socialization; illustrate and comprehend the intricacies of pro-social and aggressive behavior; organize the

knowledge about the nature and differences of prejudice and stereotypes; compile and collaborate the social problems like caste, class, religion and gender in the light of social psychology.

CO6 (EVALUATION): Evaluate the acquired knowledge about the definition and nature of Social Psychology; question and examine the underpinnings of the Social Psychology in the Indian Context; determine the fundamental knowledge of interpersonal attraction; interpret the major agents of Socialization; understand the intricacies of pro-social and aggressive behavior; scrutinize and observe the nature and differences of prejudice and stereotypes; question the underlying basis of the formation and the types of groups; observe and explore the social problems like caste, class, religion and gender in the light of social psychology.

Suggested Readings

1. Baron, R., A., Byrne, D. (2006), Social Psychology, 10th Edition, New Delhi: Prentice Hall.
2. Mc David and Harai (1968), Social Psychology; Individuals, groups, societies, Harper and Row.
3. Moghaddam, F.M. (1997), Social Psychology: Exploring Universals Across Cultures, Freeman and Company
4. Dalal, Ajit K., A. Misra, Girishwar (Eds). (2001), New Directions in Indian Psychology, Social Psychology, New Delhi: Sage.
5. Eckes, Thomas and Trautner, Hanns M. (Eds.) (2000), The Developmental Social Psychology of Gender, Mahwah: Lawrence Erlbaum Associates, Publishers.
6. Hogg, Michael A. and Cooper, Joel (Eds), (2007), The Sage Handbook of Social Psychology, Concise Student Edition, Los Angeles: Sage.
7. Misra, Girishwar (Ed.) (1990), Applied Social Psychology in India, New Delhi: Sage.
8. Pandey, Janak (Ed.) (2001), Psychology in India Revisited – Developments in the Discipline, Vol. 3: Applied Social and Organisational Psychology, New Delhi: Sage
9. Sharan, A.K. (1999). Social Psychology, New Delhi: Commonwealth Publishers.
10. Linda steg, Abraham p. Buunk, Applied social psychology: Understanding and managing social problems

PCPD0007: PERSONALITY DEVELOPMENT

(3 credits - 45 hours)

Objectives: *In this Course in Personality Development students will learn about personalities. It will go on to look at theories of personality development and the theories of the stages of development. The students will also delve into basic personality traits, including values and beliefs.*

Module I: Understanding Personality (10 hours)

Definition and concepts of personality; Basic Personality Traits and Types, Big Five Personality Dimensions.

Module II: Personality Development (15 hours)

Personality development; theories of personality development: Freudian stages of development, Erik Erickson's stages of development, Maslow's hierarchy of needs, Roger's self theory; applications.

Module III: Techniques of Personality Analysis and Change (20 hours)

Johari Window, SCOT Analysis; Stress Management; Positive attitude; Management of Emotions.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Define the historical concepts surrounding personality; Familiarize with the origin of basic personality traits and types; Acquaint with the theoretical background of the Big Five Personality Dimensions; State major personality theories; Define and state the major tenants of the Freudian stages of Development; State the famous Maslow's hierarchy of needs.

CO2 (COMPREHENSION): Explain about the knowledge of the historical definitions and concepts surrounding personality; Illustrate the origin of basic personality traits and types; Identify and classify the theoretical background of the Big Five Personality Dimensions; Differentiate among the major personality theories; Interpret the fundamentals of the major tenants of the Freudian stages of Development; Explain the intricacies of the famous Maslow's hierarchy of needs; Illustrate and

comprehend the Roger's Self theory in its details and the conceptual background of it; Provide an in depth understanding of the theoretical basis of the applicability of the theories of personality; Interpret and explain the underlying basis of various techniques of Personality Analysis like Johari Window, SCOT Analysis, Stress Management, Positive Attitude and Controlling emotions.

CO3 (APPLICATION): Demonstrate the application orientation of the Big Five Personality Dimensions; Find application bases of the major personality theories in terms of the tools developed on the basis of them; Apply and find out the practical use of the major tenants of the Freudian stages of Development; Find out the practical nuances of the famous Maslow's hierarchy of needs; Demonstrate the usefulness of the Roger's Self theory; Demonstrate the applicability of various techniques of Personality Analysis like Johari Window, SCOT Analysis, Stress Management, Positive Attitude and Controlling emotions as per the need of the hour.

CO4 (ANALYSIS): Critically analyze the basic notions of the Big Five Personality Dimensions; Relate and analyze the major personality theories in terms of their basic constructs; Critically analyze the major tenants of the Freudian stages of Development; Analyze various attributes of the famous Maslow's hierarchy of needs; Compare and contrast the Roger's Self theory with other similar theories; Illustrate and analyze the theoretical basis of the applicability of the theories of personality.

CO5 (SYNTHESIS): Summarize the explanations to the students about the knowledge of the historical definitions and concepts surrounding personality; Organize and evaluate the origin of basic personality traits and types; Generalize and combine the theoretical background of the Big Five Personality Dimensions; Synthesize and organize the major personality theories; Conclude and combine the fundamentals of the major tenants of the Freudian stages of Development; Summarize the intricacies of the famous Maslow's hierarchy of needs; Compile and collaborate the underlying basis of various techniques of Personality Analysis like Johari Window, SCOT Analysis, Stress Management, Positive Attitude and Controlling emotions.

CO6 (EVALUATION): Evaluate the explanations to the students about the knowledge of the historical definitions and concepts surrounding personality; Assess and analyze the origin of basic personality traits and types; Evaluate the theoretical background of the Big Five Personality Dimensions; Question and examine the major personality theories; Determine and assess the fundamentals of the major tenants of the Freudian stages of Development; Scrutinize and observe the famous Maslow's hierarchy of needs; Interpret, decide and judge the Roger's Self theory in its details and the conceptual background of it; Inspect and evaluate the underlying basis of various techniques of Personality Analysis like Johari Window, SCOT Analysis, Stress Management, Positive Attitude and Controlling emotions.

Suggested Readings

1. Atkinson, R. L., Atkinson, R. C., Smith, E. E., Bem, D. J. and Hilgard, E. R. (1990).
2. Introduction to Psychology. New York: H. B. J. Inc.
3. Sternberg, R. J. (2010). Cognitive Psychology. New York: Cengage Learning
4. Passer, M.W. and Smith, R.E. (2010). Psychology: The Science of Mind and Behaviour. New Delhi: Tata McGraw-Hill

PCIG0008: PROCESS AND SKILLS OF INDIVIDUAL AND GROUP COUNSELLING II

(3 credits - 45 hours)

Objectives: *The aim of this course is to impart advanced training to the students in individual and group counselling skills. Developmental model is followed in training the students. On successful completion of the course,the students should have the following competencies:*

- *Knowledge of advanced counselling skills,group counselling theories and skills*
- *Continued enhancement in self-awareness*
- *Development and understanding of using individual and group counselling techniques in applied settings*
- *Development of knowledge,sensitivity and skills in the provision of individual and group counselling to individuals of diverse cultural and environmental backgrounds.*
- *The course will use role plays, observation and individual study methodologies.*

Module I: Counselling with Diverse population (10 hours)

Counselling the aged population, Gender based counselling, Counselling and Sexual Orientation, Counselling and Spirituality, Defining culture and multicultural counselling, History of multicultural counselling, Difficulties and Issues in multicultural Counselling, The culturally skilled counselor.

Module II: Settings for Counselling (11 hours)

Counselors in Educational settings: Training programs for counselors in Educational settings, role and function of counselors in Schools settings, Counselling in Elementary schools, Counselling in Secondary schools, Counselling in institutions of higher education; Counselling in Community and Agency Settings: Training programs for counselors in Community and Agency settings, The Agency team, Counselling in Community setting.

Module III: Group Leadership (12 hours)

Definition of group leader, Group Leadership style, Personal Qualities of effective leaders, skills and functions of group leaders, Impact of leaders' values on the group, Co-leadership, Group leader Training.

Module IV: Stages of group development (12 hours)

Pre –group issues: Formation of the group: Initial stage: Orientation and exploration; Transition stage: dealing with resistance; Working stage: Cohesion and productivity; Final stage: Consolidation and termination; Post group issues: Follow-up and evaluation

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Know advanced counselling skills; Understand the use of individual and group counselling techniques in applied settings; Define and understand the concept of multiculturalism and its importance in the practice of professional counseling; Define the characteristics of a culturally skilled counselor; Understand the practical issues faced in counselling diverse population; Understand the stages involved in group therapy and the skills required in each stage; Understand the rights and privileges of individuals who form the special populations and the legal implications of the same.

CO2 (COMPREHENSION): Explain the skills required in counselling the aged; Illustrate the scope of gender based counseling; Explain the concept of sexual orientation and how is it different from sexual identity; Explain the different types of sexual orientation; Explain the different functions of a culturally skilled counselor; Explain the concept of school counselling and what are its different types at different levels in an educational setting; Explain the concept of community counselling and what are the qualities required for a community counselor; Explain counselling provided in agencies and what the criteria required to provide counselling in agency settings; Explain the qualities and characteristics of a group leader in group counseling.

CO3 (APPLICATION): Apply the advanced skills of individual and group counselling in practice; Follow the legal and ethical guidelines prevailing in the country and as prescribed by ACA in counselling diverse population; Understand the difficulties faced by counselors in dealing with LGBT populations; Design training programmes for school counselors in an educational setting; Design training programmes for community counselors; Imbibe the Personal Qualities of effective leaders in group therapy.

CO4 (ANALYSIS): Analyze the stages of group therapy and the functions involved; Critically analyze the current trends followed in the practice of multicultural counseling; Compare various psychological theories that can be used in providing counselling at different stages of group therapy; Analyze the roles of a leader and co-leader in group therapy; Analyze various community programs and counselling provisions available at the state and national levels.

CO5 (SYNTHESIS): Summarize historical origin of multicultural counseling; Summarize various stages of group therapy; Summarize different group leadership styles and which style is appropriate for different situations; Summarize the influence of the group leader's values and personality on the group members in group therapy; Summarize the ethical and legal guidelines to be followed while counselling individuals with different sexual orientation.

CO6 (EVALUATION): Evaluate the roles and functions of a group counselor; Assess the effectiveness of various leadership styles across different situations; Determine the flaws in the successful implementation of multicultural counseling; Evaluate the effectiveness of various training programs for professionals in community and agency counseling.

Suggested Readings

1. Corey Gerald, Theory and Practice of counselling 8th edition. Canada: Brooks/Cole
2. Corey Gerald, Corey Marianne Schneider, Russell. J. Michael, Group Techniques
3. Drummond Robert J, Jones Karvn Davel, Assessment Procedure for counselor and helping Professional (7th edition)
4. Ehly Stewart, Dustin Richard, Individual and group counselling in schools,(kindle Edition)
5. Gladding, Samuel.T 6th Edition, Group Work:a counselling Speciality, Merrill
6. Gladding, Samuel.T, Counselling: A Comprehensive profession (6th Edition), New Delhi: Dorling Kindersley (Pearson)
7. Vacc. Nicholas. A, DeVaney Susan B, Brendel Johnston.M, Counselling Multicultural and Diverse Populations (2003), New York: Brunner Routledge
8. Dryden's handbook of Individual Therapy, 5th edition, Los Angeles: Sage

PCCY0009: CHILD AND YOUTH COUNSELLING

(4 credits - 60 hours)

***Objective**: This course aims to introduce student to the need for and application of counselling techniques to the educational settings and to improve student mental health. Further, the course attempts to*

- *provide a firm foundation for Educational Counselling and Assessment*
- *develop counselling skills for dealing with behavioural problems of school Children*
- *provide an understanding on career issues*
- *Develop skills for different intervention strategies*

Module I: Introduction (12 hours)

Definitions and goals of counseling for children and youth; Children and Youth- counsellor relationship, attributes of a counsellor , historical background and contemporary ideas about counselling

Module II: Academic Development (12 hours)

a) Learning-styles - VAK Model, Kolb's Experiential Model, MBTI Pattern, Honey and Mumford Model, Hemispheric Dominance Model, Gregorc Model, Gardner's Multiple Intelligence Model.
b) Study skills - reading , writing and note making skills, studying skills and study habits, time management
c) Cognitive issues - causes and factors affecting attention, concentration, remembering, forgetting, experimental evidences and cognitive training

Module III: Major Theories in Counselling Children (14 hours)

Learning, Behavioural, Cognitive Behavioural Modification, Expressive therapy: play, art and drawing, drama, metaphore, story telling

Module IV: Counselling Children with specific problem (12 Hours)

a) Children and trauma, child abuse- physical, sexual, emotional, HIV/ AIDS, specific issues in educational settingS
b) Techniques of assessment: Cumulative record, Anecdotal Record, Case Study, Sociometry

Module V: Career Counselling (10 hours)

Basic aspects: Nature, scope and importance of career counselling; role of counselor in career preparation; career decision making, career exploration techniques, career development theories- (Holland, Ginzberg super), career counselling with diverse population: children, adolescents, college students, women and adults

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Gain knowledge about the meaning and goals of child counseling; gather information about the child-counselor relationship; gain insight into the attributes of a counselor for children; gain familiarity with the historical background of child counseling and the contemporary ideas of counseling children; gain the depth of theoretical background of various important learning styles like VAK Model, Kolb's Experiential Model and MBTI Pattern; gain fundamental knowledge about Study Skills like reading, writing, note making and time management; identify and recognize various cognitive issues in children with experimental evidences from the past; grasp the theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theories; understand the children with trauma, child abuse, HIV/AIDS and other issues; list and recall the various techniques of assessment; state the nature, scope and importance of career counseling and career development theories.

CO2 (COMPREHENSION): Able to grasp the knowledge about the meaning and goals of child counseling; gain command over the child-counselor relationship; understand the clavarious attributes of a counselor for children; conceptualize the historical background of child counseling and the contemporary ideas of counseling children; understand and compare among various important learning styles like VAK Model, Kolb's Experiential Model and MBTI Pattern; interpret and be aware of fundamental knowledge about Study Skills like reading, writing, note making and time management; classify and understand various cognitive issues in children with experimental evidences from the past; illustrate and classify the theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theories; gain a fruitful learning about the children with trauma, child abuse, HIV/AIDS and other issues; classify and grasp the mechanisms of the various techniques of assessment; understand and interpret the nature, scope and importance of career counseling and career development theories.

CO3 (APPLICATION): Perform the skills about the them significance of the child-counselor relationship; play and demonstrate successfully various attributes of a counselor for children; construct the educational implications of the learning styles like VAK Model, Kolb's Experiential Model and MBTI Pattern; apply Study Skills like reading, writing, note making and time management in the practical settings; apply the principles of the major theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theories in the real life situation; administer the various techniques of assessment in the real life situations; illustrate and teach to the students the nature, scope and importance of career counseling and career development theories; identify the appropriate model of career counseling as per the need of the situation

CO4 (ANALYSIS): Illustrate them significance about the child-counselor relationship; analyze various attributes of a counselor for children; help the students compare and criticize the historical background and the contemporary ideas about counseling children; make them able to relate and analyze different theories of learning styles like VAK Model, Kolb's Experiential Model and MBTI Pattern; critically analyze fundamentals of Study Skills like reading, writing, note making and time management.; compare and contrast among the major theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theories; identify the appropriate model of career counseling as per the need of the situation

CO5 (SYNTHESIS): Able to summarize the gained knowledge about the meaning and goals of child counseling; organize and evaluate the information about the child-counselor relationship; help them generalize and combine the historical background and the contemporary ideas about counseling children; help them synthesize and organize the theories learning styles like VAK Model, Kolb's Experiential Model and MBTI Pattern; conclude and combine the information on various cognitive issues in children with experimental evidences; summarize and combine the major theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theories.

CO6 (EVALUATION): Summarize the gained knowledge about the meaning and goals of child counseling; organize and evaluate the information about the child-counselor relationship; help them generalize and combine the historical background and the contemporary ideas about counseling children; help them synthesize and organize the theories learning styles like VAK Model, Kolb's Experiential

Model and MBTI Pattern; conclude and combine the information on various cognitive issues in children with experimental evidences; summarize and combine the major theories in counseling children like Behavioral Therapy, Expressive Therapy and Cognitive theory.

Suggested Readings

1. Asch M (2000) Principles of guidance and counselling (I Ed) New Delhi: Sarup and Sons
2. Bowe Frank G (2000). Birth to Five – early Childhood special education, New York, Delmar Publishers Inc.
3. Butler, G. and Hope, T. (1997). Managing your mind: The mental fitness guide. Oxford University Press.
4. Cohen, L.G., and Spenciner, L.J (2003). Assessment of Children and Youth with Special Needs. Boston: Allyn and Bacon.
5. Mangal S.K (2008) Essentials of Educational Psychology, New Delhi, Prentice Hall of India Pvt ltd
6. Santrock, J.W. (2003). Educational Psychology. Boston: McGraw-Hill.
7. Woolfolk, A. (2007). Educational psychology (10th ed.). Boston, MA: Allyn and Bacon.

PCRM0010: RESEARCH METHODOLOGY AND STATISTICS IN SOCIAL SCIENCE

(4 credits - 60 hours)

Objectives:

- *To understand the significance of research and application of statistics in psychology*
- *To understand the research process and acquire the attitudes and skills essential for psychological research*
- *To develop skills for interpretation, documentation and presentation of results of the research.*
- *To familiarize with statistical methods and techniques needed for psychological research.*
- *To understand the process of report writing and publication.*

Module I: Introduction to Research (10 hours)

Philosophical Foundations of Research.Natural and social science research- characteristics and scientific attitude. Scope of social science research- basic and applied research; Ethical concerns in Counselling research.

Module II: Research designs, approaches and types (12 hours)

a) Research designs: Descriptive, Exploratory and Experimental: meaning, scope, characteristics, application in social work setting.
b) Research Approaches:Qualitative and Quantitative Research: meanings, scope, methods, steps, sampling, data collection, analysis, interpretation and reporting. Strengths and weaknesses.
c) Evaluative research: Programme and projects evaluation: concept, types, steps, reports.
d) Participatory research and action research: concepts, scope, application and steps.

Module III: Steps in Research Process (20 hours)

a) Problem Formulation: Identifying research issue, formulating research topic and problem, review of literature (library work), theoretical framework, formulating objectives, clarifying concepts, variables- conceptual and operational, formulating hypothesis.
b) Population and Sampling: Inclusion and exclusion criteria of population, the logic of sampling size and techniques: probability and non-probability sampling.
c) Tools for data collection: Levels, Types of measurements, reliability and validity of tools. Constructing tools for data collection: questionnaire, interview schedule, scales. Quantification of qualitative data.
d) Sources, Collection and Analysis of Data: Secondary and primary sources. Data collection data editing, coding, master sheet, analysis, report writing. Using computer for data analysis: coding, analysis- graphs and results.
e) Professional report writing

Module IV: Introduction to Statistics (18 hours)

a) Statistics: Definitions, Uses and Limitations. Classification and tabulation of data, univariate and bivariate, diagrammatic and graphic presentations. Measures of central tendencies, Mean, Median and Mode and their uses. Measures of variability range, variance and standard deviation.
b) Correlation: Meaning and computation of coefficient of correlation as product moment, Spearman's Rank Correlations, interpretation of correlations.
c) Test of Hypotheses: Basics, Probability distribution, normal distribution. t-test, Chi-Square test and ANOVA.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the concept of research; Recognize the philosophical foundations of research; Name the different major research designs, research approaches; List the down the steps in conducting a research; Name different sampling techniques; Write different statistical analysis procedure.

CO2 (COMPREHENSION): Explain the various philosophical foundations of research; Differentiate between the natural and social science research; Classify different research designs; Differentiate qualitative and quantitative research approach; Illustrate the different steps in research; Differentiate between probability and non-probability sampling; Differentiate different levels of measurement; Interpret the findings of different statistical analysis.

CO3 (APPLICATION): Apply research designs and approaches appropriately; Carry research designs and approaches appropriately; Demonstrate professional report writing of research; Use computer for data analysis; Compute correlate, t test, chi square and ANOVA; Test hypotheses in research.

CO4 (ANALYSIS): Analyze the scope of natural and social science research; Relate the various ethical concerns in the counseling research; Identify different research designs in research papers; Identity which research approach to be used; Identify steps involved in research; Analyze the collected data in research; Analyze measures of central tendencies; Analysis hypothesis.

CO5 (SYNTHESIS): Summarize the foundations of philosophical research; Organize the advantages and disadvantages of various research deigns; Assemble various reviews in review of Literature; Conclude the findings of research; Conclude the findings of the statistical analysis.

CO6 (EVALUATION): Evaluate the ethical considerations in statistical research; Assess the effectiveness of various research designs; Judge the inclusion and exclusion criteria for research; Determine the sources and process of data collection; Assess the applicability of the statistical procedure; Determine the distribution of data with the normal probability.

Suggested Readings

1. Ahuja, Ram, Research Methods, Rawat, Jaipur, 2001
2. Alston, M. Bocoles, W., Research in Social Workers- An Introduction to the Methods, Rawat, Jaipur, Indian Edition 2003
3. Baker, T.L., Doing Social Research, McGraw Hill, Singapore, 1994
4. Goode, W.J. and Hatt, P.K., Methods in Social Research, McGraw Hill Singapore, 1981
5. Grinell, R. M., (Jr.), Social Work Research and Evaluation, F.E. Peacock Pub. Inc., Illinois, 1988
6. Gupta, C.B., Introduction to Statistical Methods, Vikas Publishing House, 1995
7. Gupta, S.C., Fundamentals of Statistics, Himalaya Publishing House, Delhi, 1997
8. Gupta, S.P., Statistical Methods, Sultan Chand and Sons, New Delhi 1997
9. Jacob, K.K., Methods and Fields of Social Work in India, Asia Publishing, Bombay, 1996
10. Kothari, C.R., Research Methodology: Methods and Techniques, 2nd edition reprint, New Age International New Delhi, 2004
11. Krishnaswamy, O.R., Methodology for Research in Social Science, Himalaya, Bombay, 1993
12. Laldas, D.K., Practice of Social Research, Rawat, Jaipur, 2000
13. Mikkelsen, B., Methods for Development Work and Research-A New Guide for practitioners, Sage, New Delhi, 2005
14. Ramchandran, P., Social Work Research and Statistics, Allied Publishers, Bombay, 1968
15. Rubin, A. and Babbie, E., Research Methods for Social Work, 4th edition, Wadsworth, West, Brooks/Cole and Schirmer, 2001

16. Sarantakos, S., Social Research, Palgrave Macmillan, New York, 2005
17. Sharma, B.A.V., Prasad, R.D. and Satyanarayana, C., Research Methods in Social Sciences, Sterling, New Delhi, 2002
18. Sharma, K.R., Research Methodology, National Publishing House, Jaipur, 2002
19. Wilkinson, T.S. and Bhandarkar, P.L., Methodology and Techniques of Social Research, Himalaya, Bombay, 1984
20. Young, p., Scientific Social Surveys and Research, Asian Students edition, Asia Publishing House, Japan, 1960

PCMF0012: MARRIAGE AND FAMILY COUNSELLING

(4 credits - 60 hours)

Objectives: *This course aims to make the students able to develop an understanding of basic theoretical models related to Family Therapy.They would be able to develop competency in conducting family therapy sessions as demonstrated through Role Play assignments.There would be an understanding of diverse issues amongst couples and the techniques to handle such issues.It would help in the rethinking of behavioural factors,disease prevention and health promotion in the context of holistic philosophy of health in the family.*

Module I: Introduction (10 Hours)

Historical evolution of Family and Marriage therapy; Goals of Family therapy; current trends in Family therapy; Fundamental concepts in Family therapy(Cybernetics and Systems theory, Social Constructivism) Stages of marriage, Divorce and remarriage, Marriage and Divorce: Role of Family Courts.

Module II: Family Across a Lifespan (16 hours)

The family life cycle, stages of family life cycle.Key developmental and emotional issues in different stages: Young adulthood. Newly married, Child bearing, Families with preschool children, Families with school age children. Families with teenage children, Launching stage, Middle aged adult, Retirement

Module III: Classical Schools (12 Hours)

Bowen's Intergenerational Approach; Structural Family Therapy; Strategic Family Therapy; Experiential and Humanistic Family Therapies; Psychoanalytic and Cognitive Behavioural Family therapy.

Module IV: Recent Developments (12 Hours)

Postmodernism, Feminist and contextual work, Solution focused therapy, Narrative therapy, Integrative models. Application and evaluation of Family therapy. Skill development: Genograms. The stages of Family therapy: Planning; Assessment; Disengaging or recontracting.

Module V: Counselling Couples with Special Issues (10 Hours)

Treating sexual abuse and physical abuse issues in family; Counselling of alcoholics and drug-addicts; Counselling the terminally ill and patients with HIV/AIDS.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the fundamental concept of Family and marriage counseling; State the historical evolution of family and marriage therapy; Write the role of family courts in case of marriage and divorce; State the concept of family life cycle; Write the developmental and emotional issues in different family life stages; State Bowen's intergenerational approach; State structural family therapy and strategic family therapy; State experiential and humanistic family therapies; State psychoanalytic and cognitive behavioural family therapy; Explain solution focused therapy, narrative therapy and integrative model approach.

CO2 (COMPREHENSION): Explain the fundamental concept of Family and marriage counseling; Illustrate the historical evolution of family and marriage therapy; Explain the role of family courts in case of marriage and divorce; Explain the concept of family life cycle; Explain the developmental and

emotional issues in different family life stages; Illustrate Bowen's intergenerational approach; Illustrate structural family therapy and strategic family therapy; Explain experiential and humanistic family therapies; Explain psychoanalytic and cognitive behavioural family therapy; Explain about the solution focused therapy, narrative therapy and integrative model approach.

CO3 (APPLICATION): Use the knowledge of the role of family courts in case of marriage and divorce; Apply the knowledge of family therapies such as Bowen's intergenerational approach, structural family therapy, strategic family therapy, experiential and humanistic family therapies, psychoanalytic and cognitive behavioural family therapy, solution focused therapy, narrative therapy and integrative model approach; Use the knowledge of different stages of family therapy; Use the knowledge of treating sexual abuse and physical abuse issues in family; Use the knowledge of counseling of alcoholics and drug addicts; Use the knowledge of counseling the terminally ill and patients with HIV/AIDS.

CO4 (ANALYSIS): Analyze the fundamental concept of Family and marriage counseling; Analyze the historical evolution of family and marriage therapy; Analyze the role of family courts in case of marriage and divorce; Analyze the concept of family life cycle; Analyze the developmental and emotional issues in different family life stages; Analyze Bowen's intergenerational approach; Analyze structural family therapy and strategic family therapy; Analyze experiential and humanistic family therapies; Analyze psychoanalytic and cognitive behavioural family therapy; Analyze about the solution focused therapy, narrative therapy and integrative model approach.

CO5 (SYNTHESIS): Summarize the fundamental concept of Family and marriage counseling; Summarize the historical evolution of family and marriage therapy; Summarize the family therapies such as Bowen's intergenerational approach, structural family therapy, strategic family therapy, experiential and humanistic family therapies, psychoanalytic and cognitive behavioural family therapy, solution focused therapy, narrative therapy and integrative model approach; Summarize about how to treat sexual abuse and physical abuse issues in family; Summarize the counseling of alcoholics and drug addicts and counseling the terminally ill and patients with HIV/AIDS.

CO6 (EVALUATION): Evaluate the fundamental concept of Family and marriage counseling; Evaluate the historical evolution of family and marriage therapy; Evaluate the role of family courts in case of marriage and divorce; Evaluate the concept of family life cycle; Determine the developmental and emotional issues in different family life stages; Assess Bowen's intergenerational approach; Evaluate structural family therapy and strategic family therapy; Evaluate experiential and humanistic family therapies; Evaluate psychoanalytic and cognitive behavioral family therapy; Assess the solution focused therapy, narrative therapy and integrative model approach; Evaluate the treatment of sexual abuse and physical abuse issues in family; Assess the counseling of alcoholics and drug addicts; Assess counseling the terminally ill and patients with HIV/AIDS.

Suggested Readings

1. Nichols, P.M and Schwartz C.R (2006). Family Therapy – concepts and methods,7th edition, Allyn and Bacon, Boston, Pearson education, Inc.Press,Inc
2. Gladding, S.T. Family Therapy: History, Theory, and Practice (4th Edition)
3. Essential Skills in Family Counselling. JoEllen Paterson, et al. New York, New York, Guilford Press. 2009.
4. Gehart,D.R.Mastering Competencies in Family Therapy: A Practical Approach to Theory and Clinical Case Documentation
5. Gottman, J.M.The Marriage Clinic: A Scientifically Based Marital Therapy
6. Satir.V.(2008) Satir Transformational Systemic Therapy. Publisher: Science and Behaviour Books
7. Steve de Shazer.(1982) Patterns of Brief Family Therapy: An Ecosystemic Approach, Guilford Publications
8. Satir.V.(2008) Satir Transformational Systemic Therapy. Publisher: Science and Behaviour Books
9. Napier, A.Y and Whitaker, C. (1988). The Family Crucible: The Intense Experience of Family Therapy
10. Bertrand Piccard, John Family Systems Therapy: Developments in the Milan Systematic Therapies, Ilsa Jones, Elsa Jones

PCEC0013: EASTERN APPROACHES TO PSYCHOLOGY AND COUNSELLING

(3 credits - 45 hours)

Objectives: *The ideas of counselling are mainly connected with western concepts. But Asia and specially India has a rich heritage of skills and techniques to deal with individuals, families and groups in crisis. Concepts of psychology find their own definitions and ways of treatment. In this course traditional forms of Eastern Psychology and Counselling are learned and discussed in relation to western concepts.*

Module I: Introduction (7 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.

Module II: Major Schools of Indian and Eastern Psychology (10 hours)

Indian approaches to Psychology - Upanishads, Sankhya, Dvaitha and Advaitha schools; current areas of research in Indian psychology. Chinese approaches to psychology - Taoism and Confucianism, Japanese approaches to Psychology -Morita and Naikan therapies

Module III: Self and Consciousness (10 hours)

Viewpoints of Upanishads, Bhagavadgita, Buddhism and Jainism and other Eastern schools of thought.

Module IV: Indian and other Eastern Approaches to Health and Wellbeing (9 hours)

Yoga, Ayurveda, goals of life - concept of purusharthas, personality development - concept of Ashramas

Module V: Transpersonal Approaches (9 hours)

Transpersonal phenomenon and consciousness - contribution of Hinduism, Buddhism and Jainism in understanding transpersonal phenomena, transpersonal psychology.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Define the concepts of eastern, Indian and other indigenous perspectives of Psychology; Recognize the elements of Upanishads, Bhagavadgita, Buddhism and Jaininsm; State the tenets of Samkhya, Dvaitha, Advaitha, Chinese, Japanese schools of thought; Outline the basics of the concepts of Yoga, Ayurveda, Purusharthas, Ashramas.

CO2 (COMPREHENSION): Differentiate between the Eastern and Western perspectives of Psychology; Understand the practical aspects of Eastern perspective of Psychology; Explain the need to look into indigenous perspectives of Psychology; Classify the fundamentals of Chinese approaches to Psychology such as Taoism, Confucianism and Japanese approaches to Psychology such as Morita and Naikan therapies; Examine the Viewpoints of Upanishads, Bhagavadgita, Buddhism and Jainism and other Eastern schools of thought; Understand the concepts of Yoga, Ayurveda, Purusharthas, Ashramas.

CO3 (APPLICATION): Apply the knowledge of culture and Psychology in understanding human behavior, Demonstrate how Eastern perspectives of Psychology can be useful in dealing with crisis situations, Apply the teachings of Upanishads, Bhagavadgita, Buddhism and Jaininsm in counselling settings; Use the knowledge of Chinese approaches to Psychology such as Taoism, Confucianism and Japanese approaches to Psychology such as Morita and Naikan therapies to help individuals deal with their difficulties; Use the views of Indian approaches to Psychology such as Upanishads, Sankhya, Dvaitha and Advaitha schools fo ra better understanding of Self and for personal growth; Enhance well-being with the use of their understanding of Yoga, Ayurveda, concept of Purusharthas and Ashramas.

CO4 (ANALYSIS): Critically evaluate the Eastern and Western perspectives of Psychology, Identify the existence of Eastern approaches to Psychology; Differentiate between different Indian approaches to Psychology such as Upanishads, Sankhya, Dvaitha and Advaitha; Analyse the influence of culture in understanding human behavior; Compare the Chinese and Japanese forms of therapies; Compare the viewpoints of Upanishads, Bhagavadgita, Buddhism and Jainism and other Eastern schools of

thought in understanding the Self and Consciousness; Point out the different Ashramas and their importance; Identify the importance of Yoga and Ayurveda in maintaining health and well-being.

CO5 (SYNTHESIS): Summarize the importance of Eastern perspectives of Psychology; Organize the different viewpoints of Eastern perspectives of Psychology; Conclude on the relationship between culture and Psychology; Draw out the teachings of Upanishads, Sankhya, Dvaitha and Advaitha schools of thought; Summarize the Chinese and Japanese approaches to Psychology and therapy; Synthesize the basics of Upanishads, Bhagavadgita, Buddhism and Jainism and other Eastern schools of thought; Assimilate the ideas of Yoga, Ayurveda, Purusharthas and Ashramas.

CO6 (EVALUATE): Examine the different Eastern approaches to Psychology; Assess the impact of culture in understanding human behavior; Determine the implications of different Indian approaches to Psychology such as Upanishads, Sankhya, Dvaitha and Advaitha; Evaluate the current areas of research in Indian psychology; Examine the Chinese and Japanese approaches to Psychology; Assess the traditions of Upanishads, Bhagavadgita, Buddhism and Jainism and other Eastern schools of thought; Evaluate the suggestions of Yoga, Ayurveda, Concepts of Purusharthas and Ashramas.

Suggested Readings

1. Bankart, C. P. (1996). Talking cures: A History of Western and Eastern Psychotherapies. Pacific Grove, CA: Brooks/Cole.
2. Ajaya, S. (1983). Psychotherapy East and West. Honesdale (PA): Himalayan International Institute.
3. Berry, J. W., Poortinga, Ype H. and Pandey, J. (1997). Handbook of cross-cultural psychology, T" Edition, Vol. 1 Theory and method. Boston: Allyn and Bacon. (Chapters 3, 4 and 8 by J.G. Miller, D. Sinha, P.M. Greenfield)
4. Jones-Smith, E. (2012). Theories of counselling and psychotherapy: An integrative approach. Thousand Oaks, CA: Sage.
5. Garg, Pulin K. K. and Parikh, I.J. (1995). Crossroads of culture: a study in the culture of transience, New Delhi: Sage.
6. Kakar. S. (1982). Shamans, mystics and doctors: A psychological enquiry into India and its healing traditions. Bombay: Oxford University Press.
7. Paranjpe, A.C. (1998). Self and identity in modem psychology and Indian thought. New York: Plenum.
8. Dunn, B.R., Hartigan, J.A., and Mikulas, W.L. (1999). Concentration and mindfulness meditations: Unique forms of consciousness? Applied Psychophysiology and Biofeedback, 24 (3), 147-165.
9. Kuyken, W., Byford, S., Taylor, R.S., Watkins, E., Holden, E., White, K., Barrett, B., Byng, R., Evans, A., Mullan, E., and Teasdale, J.D. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent depression. Journal of Consulting and Clinical Psychology, 76(6), 966-978.
10. Segal, Z. (2008). Finding daylight: Mindful recovery from depression. Psychotherapy Networker, (Jan/Feb).

PCAT0014: ADDICTION AND TRAUMA COUNSELING

(3 credits - 45 hours)

Objectives: *This course provides an understanding of the concept of addiction and trauma in the field of counselling. The first two section of the course deals with forms of diagnosis and the classification, treatment of drug abuse and other related issues. The third and fourth sections deal with trauma, assessment and methods of intervention for trauma related issues.*

Module I: Addiction Counselling (8 hours)

Definition, DSM-V diagnostic category - classification of drugs of abuse, stages of addiction

Module II: Treatment Methodology (15 hours)

Psychodynamic approaches, cognitive-behavioural therapies, motivational enhancement therapy. Problem-oriented treatment, solution-focused treatment, group therapy, family therapy and community based interventions.

Module III (12 hours)

a) Introduction to Trauma: Definition, types of trauma, historical context of trauma, theoretical contexts of trauma counselling.
b) Issues of Loss and Grief: trauma experienced in early childhood, adolescence, elder abuse, sexual trauma, treating adult trauma survivors, Contextual issues of community based violence, school violence and trauma, workplace and campus violence, natural disasters

Module IV (10 hours)

a) Assessment in psychological trauma: methods and intervention, models for trauma intervention, strategies and techniques for counselling survivor of trauma
b) Ethical perspective on trauma work, trauma and supervision

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): state the concept addiction counseling; Recognize the DSM 5 diagnostic category; Name the classification of drugs as outlined in DSM 5; To name different psychodynamic approaches; To name different cognitive behaviour therapies; To state Motivational Enhancement Therapy; To write about Problem oriented and Solution Focused therapies; State about group therapies, family therapy and community based interventions for addiction, Define trauma; list various forms of trauma in childhood, adolescence and adulthood; name the assessments in psychological trauma.

CO2 (COMPREHENSION): Explain the diagnostic criteria in substance addiction; Illustrate the stages of addiction; Explain different therapeutic practices available for addiction; explain different psychodynamic approaches and its techniques; explain different Cognitive Behaviour therapies and its techniques; explain Motivational Enhancement Therapy; Differentiate between Problem oriented and Solution Focused therapies; Elaborate about group therapies, family therapy and community based interventions for addiction, Illustrate different types of trauma, Explain historical context of trauma; Explain different theories of trauma counseling; Explain the nature of trauma in childhood, adolescence, community based violence, school violence, workplace violence and in natural disaster; explain methods of assessment and intervention for trauma survivor; Illustrate ethical concerns in trauma counseling.

CO3 (APPLICATION): Apply diagnostic criterias to identify people with substance addiction; Find out the best suitable treatment methodology for a patient with addiction; Assess the effectiveness of different treatment approaches; Demonstrate use of different therapeutic approaches to addiction counseling; Assess the type of trauma a person has undergone; Find out contextual issues in community based, school, workplace and campus violence; Apply psychological interventions and techniques on trauma victims; Apply models of trauma intervention in planning treatment ;Apply ethical guidelines in practice of trauma counseling.

CO4 (ANALYSIS): To analyze classification of drugs of abuse; Analyze the effectiveness of psychodynamic approach in addiction; Analyze the effectiveness of Cognitive Behaviour Therapies in addiction; Analyze the effectiveness of Motivational Enhancement Therapy in addiction, Compare problem focused and solution focused therapies, Identify nature and severity of the trauma victims; Identify assessment and intervention according to the need of the trauma victim, Practical applicability of ethical perspectives in trauma counseling.

CO5 (SYNTHESIS): To summarize DSM 5 criterias of substance addiction; Summarize strengths and weaknesses of different therapeutic approach to addiction counseling; Summarize the different types of trauma and their theoretical contexts; Conclude issues related to trauma and grief; Conclude about the contextual issues in community based violence, school violence, workplace violence and in natural disasters; Summarize the ethical guidelines in Trauma counseling practice.

CO6 (EVALUATION): To evaluate the effectiveness of Psychodynamic approach in dealing with substance addiction; Evaluate the effectiveness of Cognitive Behaviour approach in dealing with substance addiction; Evaluate the effectiveness of Motivational Enhancement Therapy in dealing with substance addiction; evaluate the effectiveness of group therapy and family interventions in dealing with substance addiction; Evaluate the trauma experienced in early childhood, adolescence and sexual abuse; Decide method of assessment and intervention for trauma victims; Examine the ethical guidelines outlined for trauma counseling.

Suggested Readings

1. Rasmussen, S. (2000). Addiction treatment: Theory and Practice. London: Sage.
2. DSM-V (2013)
3. The New Guide to Crisis and Trauma Counselling- H.Norman Wright
4. Trauma counselling - Theories and Interventions,Lopez Levers, Lisa
5. Trauma: A Practitioner's Guide to Counselling, edited by Thom Spiers

PCDR0015: DISABILITY STUDIES AND REHABILITATION PSYCHOLOGY

(3 credits - 45 hours)

Objectives:

- *To Provide an overview of various areas of disability and its rehabilitation*
- *To learn different approaches to rehabilitation.*
- *To understand the importance and application of psychological intervention in the field of rehabilitation*
- *To understand the legal issues in rehabilitation*

Module I: Introduction (10 hours)

Rehabilitation Psychology-meaning, definition, Historical roots, scope of rehabilitation psychology, significance, models of rehabilitation- Psychological and Social- cultural, medical, institutional, Functions of Rehabilitation psychology - General functions and special functions

Module II: Cognitive and Academic disability (15 hours)

a) Intellectual Disability: definition, components of Intellectual Disability, medical, psychological, and educational classification, prevalence of Intellectual Disability in India, functional level of various categories of mentally retarded persons, Prevention and early intervention and rehabilitation.
b) Learning disabilities: Types and causes, methods of assessment, intervention and rehabilitation, planning intervention.
c) Autism spectrum Disorder: Definition,Characteristics, types and causes, intervention and rehabilitation

Module IV: Physical Disability (10 hours)

Nature, causes prevention and rehabilitation of hearing impaired; nature, causes, prevention and rehabilitation of visually impaired; nature, causes, prevention and rehabilitation of orthopedic impaired.

Module V: Legal issues (10 hours)

Rehabilitation policies and services: The Mental health Act, 1987, PWD Act, 1995, RCI Act, 1992, National Trust Act, programs and schemes of assistance, placement and community services; designing training programs for professionals in rehabilitation, implementation of training programs

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the concept rehabilitation; Recognize the models of rehabilitation; Define intellectual disability, learning disability and autism spectrum disorder; Name the methods of assessment for intellectual disability, learning disability and autism spectrum disorder; Name the various interventions for intellectual disability, learning disability and autism spectrum disorder; Name various legal policies related to disabilities; Write about Mental Health Act, PWD act, RCI Act and National Trust act.

CO2 (COMPREHENSION): Explain the Historical roots of rehabilitation psychology; Illustrate the scope of rehabilitation psychology; Explain different models of rehabilitation psychology; Explain the functions of rehabilitation; Illustrate intellectual disability and its classification, its prevalence and intervention; Explain learning disability, its characteristics, assessments and psychological intervention; Explain Autism, its characteristics, assessments and psychological intervention; Explain physical disability in terms of hearing impairment, visual impairment and orthopedic impairment; Explain various legal issues associated with rehabilitation policies and services.

CO3 (APPLICATION): Apply various models of rehabilitation in practice; Ascertain the functional level of children with intellectual disability; Assess the learning disability and apply various assessment tools; Identify the symptoms of autism and assess the level of severity; Assess the causes of hearing impairment, visual impairment and orthopedic impairment in a patient; Perform the guidelines specified in the Mental Health Act, PWD act, RCI Act and National Trust act in the target population; Design training programs for professionals in rehabilitation.

CO4 (ANALYSIS): **A**nalyze the scope of rehabilitation psychology; Identify the functions and general functions of rehabilitation psychology; Identify people with intellectual disability, learning disability and autism spectrum disorder; Compare various psychological tools for assessment of cognitive and academic disability and find out their effectiveness; Compare and analyze the effectiveness of various psychological interventions for cognitive and academic disability and find out their effectiveness; Analyze the rehabilitation process for physical disabilities; Criticize the various acts and government policies designed for people with mental and physical disabilities; Analyze various community programs and training programs for rehabilitation professionals.

CO5 (SYNTHESIS): Summarize historical origin of rehabilitation psychology; Summarize various models of rehabilitation; Summarize intellectual disability and conclude on the prevention and early intervention for people with intellectual disability; Summarize learning disability and conclude on the prevention and early intervention for people with intellectual disability; Summarize Autism spectrum disorder and conclude on the prevention and early intervention for people with intellectual disability; Summarize on nature, causes and prevention of hearing impairment, visual impairment and orthopedic impairment; Conclude about the successful implementation of Mental Health Act, PWD act, RCI Act and National Trust act.

CO6 (EVALUATION): Evaluate the function of rehabilitation psychology; Assess the effectiveness of various psychological interventions for cognitive and academic disability; Judge best psychological intervention of Intellectual disability, learning disability and autism; Determine causes and prevention for physical disability; Determine the flaws in the successful implementation of various Acts related to disability; Evaluate the effectiveness of various training programs for professionals in rehabilitation.

Suggested Readings

1. Tom Meehan Chris Lloyd, Robert King,(2007), Handbook of Psychological Rehabilitation, Blackwell Publisher
2. Sonnenmeier. R, Mirenda. P,(2008)Autism spectrum Disorder and AAC
3. The professional Practice of rehabilitation counselling, Springer Publication company, 2011
4. Jeanne. B. Patterson, (1997),Foundations Of Rehabilitation Counselling with Person who are blind or visually impaired, American foundation for the blind, U.S
5. James K. Luiselli, Dennis C. Russo, Walter P. Christian,(2008), Effective Practice for children with Autism: Educational and Behavioural support Intervention that work
6. KimEtheringon,(2002) rehabilitation counselling in physical and mental health, Jessica Kingsley publication
7. David. R. Cox, Speciality Competencies in Rehabilitation Psychology
8. T. F. Rigger, Handbook of Rehabilitation Psychology.
9. Jules M. Rothstein, Serge H. Roy, Steven L. Wolf,(2005), The rehabilitation specialist's Handbook.
10. Chaturvedi, T.N. (1981). Administration for the Disabled: Policy and Organisational Issues. New Delhi : I.I.P.A.
11. Mani, R.D. (1988). The Physically Handicapped in India Policy and Programme New Delhi: Ashish Publishing.

PCFC0016: FOUNDATIONS OF PROFESSIONAL COUNSELLING

(4 credits - 60 hours)

Objective: *This course aims at introducing the theoretical basis of counselling, needs for counselling, training in Counselling skills, limitation of counselling, counselling in a multi-professional context, counsellors personal and professional issues and growth and ethical and legal issues from a multi-cultural perspective.*

Module I: Introduction (12 hours)

Meaning, Nature, Definition and Scope of Counselling; Historical perspectives; Counselling settings, Counselling psychology in India-development and current status; ethical and legal issues, Confidentiality, Research and Evaluation; Current trends.

Module II: Counselling relationship and Basic Counselling Skills (18 hours)

Qualities of helping relationship.Initial state of building a safe counselling relationship, relations during the counselling process, Microskills approach to Counselling Training, Basic Counselling Skills – Attending Behaviours; Questions; Observation Skills; Paraphrasing and Summarising; Encouraging ; Empathy; Reflection of Content, and Reflection of Feelings.

Module III: Counselling process and Advanced Counselling Skills (18 hours)

Counselling Interview, assessment (standardized and non-standardized measures) setting goals, contracting, conceptualization, Advanced Counselling Skills - Confrontation Skills, Influencing skills, Skill Integration, Termination, and Referrals.

Module IV: Documentation (12 hours)

Case story, documentation of the first session, reports of ongoing sessions, conclusion of a counselling process, verbatim recording and analysis, interpretation, reporting of dangerous situations.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the meaning, nature, definition and scope of counseling; State the historical perspectives of counseling; State the ethical and legal issues in counseling; State the qualities of helping relationship; State microskills approach to Counselling Training; State the basic Counselling Skills; State the initial state of building a safe counseling relationship; State the advanced Counselling skills; State about documentation of the first session and reports of ongoing sessions.

CO2 (COMPREHENSION): Explain the nature and scope of counseling; Explain the historical perspectives of counseling; Illustrate the Counselling Code of ethics and standards of practice; Explain the initial state of building a safe counseling relationship; Explain the relations during the counseling process; Illustrate the Counselling interview; Illustrate the assessment techniques used in counseling; Explain about setting goals, contracting and conceptualization in counseling.

CO3 (APPLICATION): Use the knowledge of ethical and legal issues and confidentiality in counseling practice; Use the knowledge of qualities of helping relationship; Use the knowledge of microskills, basic skills and advanced counseling skills; Use the knowledge of initial state of building a safe counseling relationship; Use the knowledge of relations during the counseling process; Use the knowledge of conclusion of counseling process; Use the knowledge of verbatim recording and analysis, interpretation.

CO4 (ANALYSIS): Analyse the historical perspectives of counseling; Point out the qualities of helping relationship; Analyse the initial state of building a safe counseling relationship; Analyse the counseling stage i.e. relations during the counseling process; Analyse the conclusion of counseling process.

CO5 (SYNTHESIS): Summarize the concept of counseling; Synthesize the development of Counselling Psychology in India and current status of Counselling Psychology; Synthesize qualities of helping relationship; Summarize initial state of building a safe counseling relationship and relations during the counseling process; Summarize the conclusion of counseling process; Summarize about the documentation of counseling session; Summarize about the verbatim recording and analysis.

CO6 (EVALUATION): Assess the meaning, nature, and scope of counseling; Assess the historical perspectives of counselling; Evaluate the development of counselling psychology in India and current status of counselling psychology; Evaluate the ethical and legal issues and confidentiality in counseling practice; Decide the qualities of helping relationship; Assess the initial state of building a safe counseling relationship and relations during the counseling process; Assess the conclusion of counseling process; Evaluate the assessment techniques used in counseling; Evaluate the documentation of counseling session; Evaluate the verbatim recording and analysis.

Suggested Readings

1. Gladding, S.T (2009), Counselling : A Comprehensive Profession, 6th Edition Pearson
2. Ivey, A.E. and Ivey, M.B. (2007), Intentional Interviewing and Counselling, Thomson: Brooks/Cole.
3. Nelson Jones, R. (2008), Basic Counselling Skills: A Helper's Maual, New Delhi: Sage Publications.
4. Evans, D.R., Hearn, M.T., Ulhemann, M.R. and Ivey, A.E.(2008), Essential Interviewing: A Programmed Approach to Effective Communication, Thomson:Brooks/Cole.
5. Kiruba, Charles and Jyothsna N.G. (2011), Guidance and Counselling, New Delhi: Neelkamal
6. Koshy, John S (2009/10), Guidance and Counselling, New Delhi: Dominant Publishers and Distributors.
7. McLeod, John (2003), An Introduction to Counselling, 3rd Edition, Berkshire: Open University Press.
8. McLeod, John (2007), Counselling Skill, Berkshire: Open University Press
9. Palmer, Stephen and Bor, Robert (Ed.) (2008), The Practitioner´s Handbook, Los Angeles: Sage.
10. Russell, Janice and Dexter, Graham (2008), Blank Minds and Sticky Moments in Counselling, Practical Strategies and Provocative Themes, 2nd Edition, Los Angeles: Sage.

PCCP0017: THEORETICAL PERSPECTIVES FOR COUNSELLING PSYCHOLOGY

(4 credits - 60 hours)

Objectives: *This course introduces the students of Psychological Counselling to a few of the contemporary theories of psychology with specific reference to learning, motivation, emotions and personality. The basic concepts and perspective of each theory are discussed and their applications to the field of counselling are highlighted. The empirical studies pertaining to different areas and the applications of the derived principles are examined.*

Module I: Introduction (12 hours)

Nature of a scientific theory, A historical perspective of psychological theories. Definition and Nature of perception, motivation, emotion and personality. Positive Psychology – Basic ideas and concepts.

Module II: Psychodynamic Approach to Counselling (16 hours)

Freudian and Post-Freudian approaches: conscious/unconscious, transference and counter transference, ego-psychology, defence mechanism, self theory. Therapeutic process, Application of Techniques and procedures.Therapy with diverse populations.

Module III: Cognitive-Behavioural Approaches (17 hours)

a) Motivation - Drive and incentive theories (Hull)
b) Emotions - Conditioning experiment (Watson and Rayner), Emotions and social interactions - imitation, empathy, communication and facial expressions, emotional control.
c) Aron Beck's Cognitive Therapy, Albert Ellis Rational Emotive Behaviour Therapy.
d) Donald Meichenbaum's approach to therapy.
e) Behavioural therapeutic process, Application of Techniques and procedures. Therapy with diverse populations.

Module IV: Person-Centered Approaches (15 hours)

History, Basic Theory and Assumptions, View of Psychopathology, Goals and Skills, characteristics of counselling relationship.Existential Therapy.Logo therapy.Application of Techniques and procedures. Therapy with diverse populations.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the nature of scientific theory; Write about the historical perspective of psychological theories; State the Freudian and Post-Freudian approaches; Write the drive and incentive theories (hull) of motivation; State the Aron Beck's cognitive therapy and Albert Ellis Rational Emotive Behavior Therapy; Write the Donald Meichenbaum's approach to therapy; Write the behavioral therapeutic process; State the existential and logo therapy.

CO2 (COMPREHENSION): Explain the concept of scientific theory; Explain about the historical perspective of psychological theories; Explain the Freudian and Post-Freudian approaches; Explain the ego-psychology, and self theory; Explain the drive and incentive theories (hull) of motivation; Explain the conditioning experiment by Watson And Rayner; Explain the Aron Beck's cognitive therapy and Albert Ellis Rational Emotive Behaviour Therapy; Explain Donald Meichenbaum's approach to therapy; Explain the Person-centered approach; Explain the behavioural therapeutic process; Explain the existential and logo therapy.

CO3 (APPLICATION): Use the knowledge of application of psychoanalytical therapeutic techniques and procedure; Use the knowledge of Aron Beck's cognitive therapy and Albert Ellis rational emotive behaviour therapy; Use the knowledge of Donald Meichenbaum's approach to therapy; Use the knowledge of person-centered approach; Apply the knowledge of behavioural therapeutic process; Apply the knowledge of existential and logo therapy.

CO4 (ANALYSIS): Analyze the concept of scientific theory; Analyze the Freudian and Post-Freudian approaches; Analyze ego-psychology, and self theory; Analyze the drive and incentive theories (hull) of motivation; Analyze the conditioning experiment by Watson and Rayner; Analyze Aron Beck's cognitive therapy and Albert Ellis Rational Emotive Behaviour Therapy; Analyze Donald Meichenbaum's approach to therapy. Analyze the person-centered approach; Analyze the behavioural therapeutic process; Analyze the existential and logo therapy.

CO5 (SYNTHESIS): Summarize the concept of scientific theory; Summarize the historical perspective of Psychological theories; Summarize the Freudian and Post-Freudian approaches; Summarize the ego-psychology, and self theory; Summarize the drive and incentive theories (Hull) of motivation; Generalize the Conditioning experiment by Watson and Rayner; Summarize Aron Beck's Cognitive Therapy and Albert Ellis Rational Emotive Behaviour Therapy; Summarize the Donald Meichenbaum's approach to therapy; Summarize the Person-centered approach; Summarize the behavioural therapeutic process; Summarize the Existential and Logo therapy.

CO6 (EVALUATION): Evaluate the concept of scientific theory; Evaluate the Freudian and Post-Freudian approaches and its therapeutic techniques; Evaluate the ego-psychology, and self-theory; Assess the drive and incentive theories (hull) of motivation; Assess the conditioning experiment by Watson and Rayner; Evaluate the Aron Beck's cognitive therapy and Albert Ellis Rational Emotive Behaviour Therapy; Evaluate the Donald Meichenbaum's approach to therapy; Evaluate the person-centered approach; Assess the behavioural therapeutic process; Assess the existential and logo therapy.

Suggested Readings

1. Corey, G.(2008), Theory and Practice of Counselling and Psychotherapy (8th ed), Canada: Brooks/ Cole.
2. Seligman Linda, Lourie W. Reichenberg (2011), Theories of counselling and Psychotherapy (3rd ed), Prentice Hall.
3. Corey, G.(2008), Student Manual for Theory and Practice of Counselling and Psychotherapy (8th ed), Canada:Brooks/Cole.
4. Burl, E.G.and Richard, K.J.(1998), Theories and Strategies in Counselling and Psychotherapy, Singapore:Allyn and Bacon.
5. Borden, William (2009), Contemporary Psychodynamic, Theory and Practice, Chicago: Lyceum Books.
6. Koshy, John S (2009/10), Guidance and Counselling, New Delhi: Dominant Publishers and Distributors.
7. McLeod, John (2003), An Introduction to Counselling, 3rd Edition, Berkshire: Open University Press.
8. Omprakash B. Pal (2011), Encyclopaedia of Guidance and Counselling, Educational and Vocational Guidance and Counselling, Vol I and II, New Delhi: A P H Publishing Corporation.
9. Snyder, C., Lopez, Shane J. (2007), Positive Psychology, The Scientific and Practical Explorations of Human Strengths, New Delhi: Sage.
10. Westbrook, David; Kennerley, Helen and Kirk J. (2007), An Introduction to Cognitive Behaviour Therapy, Skills and Applications, Los Angeles: Sage.

PCPT0018: PSYCHOLOGICAL TESTING

(4 credits - 60 hours)

Objectives:

- *To enhance the understanding of the concepts of psychological testing which is an integral part of psychological research.*
- *To acquaint the students about the techniques of test construction*
- *To familiarise with various assessment techniques – cognitive, personality, achievement and aptitude.*

Module I: Introduction to Psychological Testing (9 hours)

History of Psychological Testing; Definition and Purpose and relevance of Psychological testing, Types of tests, Principles, Applications and Issues,Ethical and Social Considerations in Testing

Module II: Test Construction (15 hours)

Steps in test construction, Item Writing: types of items, General guidelines for item writing, Characteristics of a good psychological test:Objectivity, Standardization, Reliability:Meaning,Types of Reliability and Factor influencing Reliability.

Validity:Meaning,Type of validity and Factors influencing validity. Norms: Norm referenced and criterion referenced tests, Types of Norms and Test Scales.

Module III: Assessment of Cognitive Abilities (13 hours)

Measurement of Intelligence:Types of Intelligence tests, Individual intelligence tests, Other broad range intelligence tests, Group intelligence tests, Psychological issues in intelligence testing Longitudinal studies, Problems in cross cultural testing

Module IV: Assessment of Personality (13 hours)

Measurement of Personality: Meaning and Purpose,Tools of Personality Assessment,

Measurement of Interests, Values and Attitudes,Projective Techniques:Meaning and Types of Projective Techniques, Classification and Evaluation of Projective Techniques

Module V: Assessment of Aptitude and Achievement (10 hours)

Aptitude and Achievement:Distinction between Aptitude and Achievement Tests, Types of Aptitude tests, Types and selection of standardized Achievement Tests, Achievement test batteries.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Acquire knowledge about the historical definitions and concepts psychological testing; gain familiarity with definition and purpose of Psychological Testing; acquainted with the theoretical background principles of Psychological testing; gain the fundamental knowledge of the ethical and social considerations in Psychological testing; define and state the major steps in test construction and the principles behind them; understand the intricacies of the standardization of psychological tests; comprehend the basic principles of Reliability, Validity and Norms; understand the theoretical basis of the applicability of the theories of personality; comprehend the underlying basis of the formation and application of intellectual assessment; understand the theoretical background of the construction of the personality assessment tools; analyze the assessment of other behavior faculties like aptitude, achievement, values and interests.

CO2 (COMPREHENSION): Gain explanations about the historical definitions and concepts psychological testing; illustrate and gain familiarity with definition and purpose of Psychological Testing; identify and categorise with the theoretical background principles of Psychological testing; understand and list the fundamental knowledge of the ethical and social considerations in Psychological testing; interpret and comprehend the major steps in test construction and the principles behind them; be aware of and understand the intricacies of the standardization of psychological tests; comprehend the basic principles of Reliability, Validity and Norms; interpret and explain the theoretical basis of the applicability of the theories of personality.

CO3 (APPLICATION): Find out and apply various types of Psychological testing; demonstrate about the main ethical and social considerations in Psychological testing with the help of practicals; exhibit

and demonstrate the major steps in test construction and the principles behind them; try the intricacies of the standardization of psychological tests with group activities and construction of tests; construct and find out the basic principles of Reliability, Validity and Norms.

CO4 (ANALYSIS): Able to evaluate and illustrate the historical definitions and concepts psychological testing; critically analyze the various types of Psychological Testing; relate and analyze the theoretical background principles of Psychological testing; critically analyse the fundamental knowledge of the ethical and social considerations in Psychological testing; compare and analyse the major steps in test construction and the principles behind them; identify and organize the intricacies of the standardization of psychological tests; evaluate, explore and question the basic principles of Reliability, Validity and Norms.

CO5 (SYNTHESIS): Summarize the explanations about the historical definitions and concepts psychological testing; able to organize and amalgamate the various types of Psychological Testing; generalize and combine with the theoretical background principles of Psychological testing; synthesize and fuse the fundamental knowledge of the ethical and social considerations in Psychological testing; conclude and combine the major steps in test construction and the principles behind them; merge and blend the intricacies of the standardization of psychological tests; amalgamate and compile the basic principles of Reliability, Validity and Norms .

CO6 (EVALUATION): Evaluate and question the explanations about the historical definitions and concepts psychological testing; assess and analyze the definition and purpose of Psychological Testing; determine and list the fundamental knowledge of the ethical and social considerations in Psychological testing; interpret and comprehend the major steps in test construction and the principles behind them; scrutinize and observe the intricacies of the standardization of psychological tests; interpret, decide and judge the basic principles of Reliability, Validity and Norms

Suggested Readings

1. Anastasi, A. and Urbina, S. (1997).Psychological testing. N.D.: Pearson Education.
2. Kaplan, R.M. and Saccuzzo, D.P. (2007).Psychological Testing: Principles, Applications, and Issues. Australia: Thomson Wadsworth.
3. Gregory, R.J. (2005).Psychological testing: History, principles and applications. New Delhi: Pearson Education.
4. Singh, A.K. (2006).Tests, Measurements and Research Methods in Behavioural Sciences.Patna: Bharati Aiken, L.R., and Groth Marnat, G.(2006). Psychological Testing and Assessment (12th ed.). Boston, MA: Pearson.

PCBP0101: BASIC PSYCHOLOGICAL PROCESSES

(4 credits - 60 hours)

Objectives: *To introduce and initiate the student into the world of Psychology with a brief historical sketch of the science of psychology and a glimpse into the methods used in the study of human behavior; To understand the fundamental processes underlying human behavior such as biological foundations of behaviour, processes underlying sensation, perception, cognition, memory, learning, motivation, emotion, individual differences, intelligence, personality and states of consciousness.*

Module I: The Science of Psychology (14 hours)

Definition and goals of psychology; modern perspectives and Indian perspective of psychology; fields of psychology; types of psychological research: descriptive research (observation, survey and interviews, standardized tests, case studies); correlational research (positive and negative); experimental research (independent and dependent variables, experimental and control groups, doubleblind experiments).

Module II: Intelligence (14 hours)

Definition; measuring intelligence; criteria of good intelligence tests, types of intelligence tests (Binet tests, Wechsler scales, Group Tests of Intelligence); theories of intelligence - multiple intelligences, Gardners Eight Intelligences, Sternbergs Triarchic intelligence; influences on intelligence - genetic and environmental only; extremes in intelligence - mental retardation, giftedness; emotional intelligence.

Module III: Learning (12 hours)

Definition, types of learning; biological factors in learning, classical conditioning: (Pavlovs studies, acquisition, generalization and discrimination, extinction and spontaneous recovery); applications of classical conditioning; operant conditioning: Thorndikes Law of Effect; Skinners approach to operant conditioning, shaping, principles of reinforcement (positive and negative reinforcement, primary and secondary reinforcement); observational learning, insight learning.

Module IV: Memory (12 hours)

Nature of memory (Encoding, storage and retrieval): Memory encoding - attention, levels of processing, elaboration, imagery; Memory storage sensory memory, short-term memory, chunking and rehearsal, working memory, long-term memory, explicit memory, implicit memory; Memory retrieval retrieval cues and retrieval tasks; Forgetting encoding failure; retrieval failure; memory and study strategies in encoding, storage and retrieval.

Module V: Motivation (8 hours)

Nature; Approaches instinct approaches, drive reduction approaches, arousal approaches, incentive approaches, humanistic approaches, self-determination theory.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Define psychology; Name the modern and Indian perspective of psychology; Name the types of psychological research; Define intelligence; State the theories of intelligence; Define mental retardation; Define learning; State classical conditioning and operant conditioning; Name the principles of learning; Define memory; List down the types of memory; Name different approaches to motivation

CO2 (COMPREHENSION): Explain the various modern and Indian perspectives of psychology; Explain the types of research designs in psychology; Explain the theories of intelligence; Classify principles of classical, operant, observational and insight learning; Explain the causes of forgetting; Classify the stages of memory; Classify approaches to motivation

CO3 (APPLICATION): Apply research designs and approaches appropriately; Find out the applicability of intelligence tests; Apply principles of learning to understand from real life examples; Apply strategies for memory retrieval; Approaches of motivation into practice

CO4 (ANALYSIS): Analyze the strengths and weaknesses of research designs; Identify the variables in research; Identify a good intelligence test; Analyze the applicability of classical conditioning and operant conditioning; Analyze the principles of reinforcement; Analyze the applicability of theories of memory

CO5 (SYNTHESIS): Summarize the criteria of a good intelligence test; Organize the advantages and disadvantages of various research deigns; Summarize the theories of intelligence, learning and memory; Conclude the findings from intelligence tests; Summarize the theories of motivation

CO6 (EVALUATION): Evaluate the modern and Indian perspectives on intelligence; Evaluate the research designs; Determine the level of mental retardation; Assess the strengths and weaknesses of theories of intelligence; Assess the strengths and weaknesses of theories of learning; Assess the strengths and weaknesses of theories of memory; Determine causes of memory failure

Suggested Readings

1. John W Santrock, Psychology Essentials 2, II Edition (Updated) 2006, Tata McGraw Hill Publication.
2. Saundra K Ciccarelli and Glenn E Meyer, Psychology, South Asian Edition, Dorling Kindersley (India) Pvt. Ltd.
3. Feldman RS Understanding Psychology, IV Edition, 2006, Tata McGraw Hill Publication.
4. Robert A Baron, Psychology, III Edition, Prentice Hall Publications.
5. Srivasthava, Indian Psychology
6. Anand Paranjpay, Indian Psychology

PCDP0102: DEVELOPMENTAL PSYCHOLOGY

(4 credits - 60 hours)

Objectives: *This course in Developmental Psychology will enable students to*
Understand basic concepts, issues and debates in the field of developmental psychology. Appreciate principal theories of life-span development. Comprehend human development as progressing through different stages. Discuss development from the perspective of different domains such as physical, motor, cognitive, and psychosocial.

Module I: Introduction to Developmental Psychology (12 hours)

Life span perspective: importance of lifespan development; principles lifespan approach, theoretical approaches to human development; domains of human development - physical, cognitive, psycho-social development; influences on human development - heredity, environment, maturation, family, socioeconomic status and neighbors, culture.

Module II: Biological Beginnings (16 hours)

Birth process - stages of child birth; evolutionary perspective and heredity - genetic code, sex determination, patterns of genetic transmission -dominant and recessive inheritance: genotypes, phenotypes, multifactorial transmission, effects of teratogens on prenatal, perinatal and postnatal development.

Module III: Stages of Life Span (16 hours)

Infancy, childhood, puberty, adolescence, adulthood and old age- characteristics, developmental tasks, adjustment process personal and social hazards across lifespan

Module IV: Cognition and Emotional Development (16 hours)

Cognitive development throughout life span, theories of cognitive development; development of emotional, temperament and attachment and love intimacy, theories of moral development.

COURSE/LEARNING OUTCOMES

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

01 (KNOWLEDGE): State the concept of life span perspective; Write the different theoretical approaches to human development; State the effects of teratogens on prenatal, perinatal and postnatal development; State the developmental tasks, adjustment process personal and social hazards across lifespan (infancy, childhood**,** puberty, adolescence, adulthood and old age); Write the theories of cognitive development; Write theories of moral development

02 (COMPREHENSION): Explain the life span perspective; Illustrate the different theoretical approaches to human development; Explain the birth process and stages of child birth; Explain the evolutionary perspective and heredity i.e. genetic code, sex determination, patterns of genetic transmission; Explain theories cognitive development and theories of moral development

03 (APPLICATION): Use the knowledge of different theoretical approaches to human development; Use the knowledge of the birth process and stages of child birth; Use the knowledge of developmental tasks, personal and social hazards across lifespan; Hypothesize about the emotional development, cognitive development and moral development

04 (ANALYSIS): Analyze the concept of life span perspective and principles of life span development; Analyze the different theoretical approaches to human development; Analyze the different domains of human development i.e. physical, cognitive, psycho-social development; Analyze evolutionary perspective and heredity-genetic code, sex determination, patterns of genetic transmission

05 (SYNTHESIS): Summarize the life span perspective; Synthesize the evolutionary perspective and heredity; Generalize the effects of teratogens on prenatal, perinatal and postnatal development; Generalize the theories of cognitive development and theories of moral development

06 (EVALUATION): Evaluate the life span perspective; Determine the influences of heredity, environment, maturation, family, socio-economic status and neighbors, cultures on human development; Assess the birth process; Determine the patterns of genetic transmission; Assess the effects of teratogens on prenatal, perinatal and postnatal development

Suggested Readings

1. Santrock, John W (2007), Life Span Development, 3rd Edition, New Delhi: Tata MacGraw- Hill
2. Diane E Papalia, Sally Wendkos Olds, Ruth Duskin Feldman, Human development, 9th edition, Tata McGraw Hill Publication

PCCP0103: COUNSELLING PSYCHOLOGY

(4 credits - 60 hours)

Objective: *This course introduces a few of the contemporary theories of counselling, the need for counselling, training in counselling skills, motivations, emotions and personality.*

Module I: Introduction (13 hours)

Definition of counselling, goals of counselling, scope of counselling, difference between counselling, guidance and psychotherapy; historical background of counselling; current trends.

Module II: Theoretical Approaches to Counselling (20 hours)

Nature of a scientific theory, psychoanalytic, behavioural, cognitive, humanistic and Gestalt therapy.

Module III: Process of Counselling (13 hours)

Clientcounsellor relationship establishment, stages of counselling, working in a counselling relationship, types of counselling - individual and group, micro and macro skills of counselling

Module IV: Personal Aspects Of Counselling Skills (14 hours)

Counselling skills: communication skills: nonverbal and verbal communication skills; variables affecting the counselling processes: counsellor variables - age, experience, sex, interest, perceptual sensitivity, personal adjustment, personal security, genuineness, counsellors attitude and beliefs, rapport, empathy; portrait of an effective counsellor; counsellee factors.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): define counseling; State the goals of counseling; Write about the historical perspective of psychological theories; State the nature of scientific theory; state the basic principles of Psychoanalytic, behavioural, cognitive, humanistic and gestalt therapy, define the stages in counseling, define the micro and macro skills; state the counselor and counselee factors

CO2 (COMPREHENSION): Explain the concept of scientific theory; Explain about the historical perspective of psychological theories; Explain the basic principles of Psychoanalytic, behavioural, cognitive, humanistic and gestalt therapy, explain the importance of client counselor relationship, explaining micro and macro skills, explain the importance of verbal and non verbal skills, explain the portrait of an effective counselor .

CO3 (APPLICATION): Use the knowledge of application of psychoanalytic, behavioural, cognitive, humanistic and gestalt therapy therapeutic techniques and procedure; Use the knowledge of counseling in understanding the current trends, apply stages of counseling in role plays, applying individual and group counseling skills, applying knowledge of practice in understanding professional aspects of counseling

CO4 (ANALYSIS): Analyze the goals of counseling, analyze the scope of counseling, critically analyze psychoanalytic,behavioural. Cognitive, humanistic and Gestalt therapy, analyze the effectiveness of client counselor relationship, analyze the factors in establishing various counseling, analyze the professional aspects of counseling skills

CO5 (SYNTHESIS): Summarize the major goals of counseling, understanding the difference between counseling, guidance and psychotherapy, analyze the concept of scientific theory; Summarize the historical perspective of Psychological theories; summarize the stages of counseling, summarize the process of working in a counseling relationship, summarize the similarities and differences in theoretical approaches to counseling, summarize the various personal perspectives of counseling..

CO6 (EVALUATION): Evaluate the concept of counseling; Evaluate the applicability of guidance, counseling and psychotherapy, evaluate the effectiveness of different theoretical approaches, evaluate individual and group counseling skills, analyze the various micro and macro skills of counseling, analyze the effectiveness of non verbal and verbal communication skills, evaluate the effectiveness of a professional counselor.

Suggested Readings

1. Samuel T. Glading,(6th Edition), Counselling, A Comprehensive Profession. Dorling Kindersley India Limited, Pearson.
2. Robert.LGibson,Marianne H, Mitchell, Introduction to Counselling and Guidance. 7thEdition, Prentice Hall India Private Limited.
3. S Narayana Rao, Counselling and Guidance.Tata McGraw Hill Publication Co. Ltd. New Delhi.
4. E.R. Welfel, LevisE. Patterson. The Counselling Process A multi-theoretical Integrative Approach

PCEX0105: EXPERIMENTAL PSYCHOLOGY

(3 credits - 45 hours)

Objectives: *This course aims to acquaint students with the basic concepts of experimental psychology provide students a perspective of experimental psychology equip the students with the basic information and knowledge about test-administration and scoring, and interpretation of the obtained results.*

Module I: Introduction (10 hours)

Meaning, nature, scope and value; types of experiment, steps involved in conducting an experiment, meaning and types of variable, forms of behaviour, advantages and limitations of experimental method. Pioneers of experimental method - Wilhelm Wundt, Herman Von Helmholtz, J. McKeen Cattel

Module II: Psychophysics and Psychophysical experiments (13 hours)

Psychophysics: Introduction to psychophysics, threshold and absolute threshold, differential threshold, point of subjective equality, point of error and movement error. Webers law, Fechners Law

Psychophysical Method and Experiments: Method of limits, method of constant stimuli, method of average error.

Module III: Learning Memory (12 hours)

Meaning and types of learning (verbal learning, motor learning and thinking and problem solving), transfer of training, types of measurement of learning and experiments in learning. (serial learning: non-sense syllables, meaningful words; free learning; Bolt Head Maze, Tapping test)

Introduction to memory, basic distinctions about memory, short term memory, long term memory, Models of memory - The Atikinson and Shiffrin Model; Tulvings Model: Episodic, Semantic and Procedural; The levels of Processing Approach; The Parallel Distributed Processing Approach

Retention: Retention as a function of level of learning, test of retention. Experiments in memory. The effect of mnemonic strategies on memory

Module IV: Thinking and Problem Solving (10 hours)

Thinking: nature, definition and kinds; theories of thinking: Central Theory and Peripheral-central Theory; problem solving: nature of problem, types of problems, understanding the problem, approaches in problem solving, factors influencing problem solving; Reasoning: Formal logic and Limitations; Decision Making: Stages and heuristics; experiments of thinking/ problem solving.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE) Understand the basic concepts in experiments, significance of experimental psychology, experimental failures and successes in the history of experimental psychology, types of experiments, psychophysics and it's related terms, phenomenon of memory, learning, sensation, perception and attention.

CO3 (COMPREHENSION) : To be able to similarise and differentiate between laboratory and field experiments, stating the advantages and limitations of laboratory and field experiments, identifying variables in experiments and ways to manipulate them, techniques in psychophysics, types of learning and memory, relation between learning memory, perceptual laws and the interplay of sensation and perception.

CO4 (APPLICATION) : Designing and conducting experiments under supervision, observing interrelated phenomena and other noble associations, applying findings of earlier researchers in understanding

individuals, applying dynamics of sensation and perception in the field of counselling, upgrading the field of Psychology through research contributions.

CO5 (SYNTHESIS) : Development of self awareness and decision making, finding better patterns of thinking, divergent perspectives, exploration of options to answer problems, insight on probable cause and effect relations to be tested, identifying fruitful strategies for learn and memory in the context of learner, instructor and materials.

CO6 (EVALUATION) : Critically analyse objectivity of Psychological experiments and ways to improve it, observations based on behaviors under experiments, struggling with subject variables and their control in experiments.

Suggested Readings

1. Hussain Akbar. (2014): Experiments in Psychology, PHI Learning Private Limited. New Delhi
2. M.Rajamanickam. (1925) Experimental Psychology with Advanced Experiment (Vol.2) Concept Publishing Company
3. Borton Andrews. Experimental Psychology Wiley Eastern Pvt. Ltd., New Delhi.
4. Morgan and King. Introduction to Psychology (4th ed.) McGraw Hill Book Co. New York.
5. DAmato, M.R. (2009). Experimental psychology: Methodology, psychophysics and learning. N.D.: Tata McGraw-Hill.
6. Myers, A. and Hansen, C. (2002). Experimental Psychology. U.S.: Thomson Wadsworth.
7. Postman, L. & Egan, J.P. (1949), reprint 2009. Experimental psychology: An introduction. ND: Kalyani Publication.
8. Solso, R.L., MacLin, M.K. (2008). Experimental psychology: A case approach. N.D.: Dorling Kindersley Pvt. Ltd.
9. Woodworth, R.S. & Schlosberg, H. (reprint 2008, 6th ed.), Experimental Psychology. ND: Oxford & IBH Publishing Co. Pvt. Ltd.

PCBP0106: BASIC PSYCHOLOGICAL THEORIES

(3 credits 45 hours)

Objectives: *To familiarize students with the different perspectives prevalent in the discipline of Psychology; To understand the basic theories in Psychology to be able to describe and explain human thought and behaviour in a systematic way.*

Module I: Introduction (10 hours)

Theories and hypotheses, functions of psychological theories; mind-body problem, determinism, free will, empiricism, rationality, introspection and phenomenology; physiological influences in the development of psychology

Module II: Psychodynamic theories (15 hours)

Historical background and fundamental ideas of psychoanalysis, neo Freudians: C. G. Jung, A. Adler, K. Horney, and E. Erikson; therapeutic processes; critics of psychoanalytic theories.

Module III: Behavioural and Cognitive theories (10 hours)

Historical background and fundamental ideas: I. Pavlov, B. F. Skinner, J. B. Watson, A. Beck, A. Ellis; therapeutic processes; critics of behavioural and cognitive theories.

Module IV: Humanistic and Existential theories (10 hours)

Historical background and fundamental ideas: C. Rogers, A. Maslow, V. Frankl, R. May; therapeutic processes; critics of humanistic theories.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Define science and scientific method; Define a scientific theory; State the differences between a general theory and a scientific theory; Define a hypothesis; Determine the fundamental differences between determinism and free will; State the different psychosexual stages of development in Freudian theory; State the differences between the psychosexual stages and psychosocial stages of development; State the different behavioral theories; State the differences between overt and covert behavior; Name the different proponents in the humanistic paradigm.

CO2 (COMPREHENSION):Explain the different steps involved in formulating a scientific hypothesis; Explain the different stages involved in formulating a scientific theory; Explain different aspects of the mind-body debate in psychology; Explain different psychodynamic approaches and its techniques; Explain different Cognitive behavior therapies and its techniques; Explain the historical background of the different scientific theories in psychology; Differentiate between Freudian and Post-Freudian approaches

CO3 (APPLICATION): Formulate Hypothesis following the steps of a scientific method; Demonstrate the use of psychological theories in counseling; Introspect self and others and gain greater degree of self-awareness; Apply the principles of different theories in real life contexts an evaluate its effectiveness

CO4 (ANALYSIS): Analyze the issues involved in the mind-point debate and the psychological stance involved therein; Analyze the effectiveness of psychodynamic approach in therapy; Analyze the effectiveness of Cognitive Behaviour Therapies in therapy; Analyze the effectiveness of Humanistic and Existential approaches in therapy; Compare Behavioral and the Cognitive Behavioral therapies; Identify the drawbacks in the existing theories and understand the areas of making improvement

CO5 (SYNTHESIS): Summarize the steps involved in the formulation of a scientific theory; Summarize strengths and weaknesses of the empirical techniques in psychology; Summarize the techniques involved in all the theoretical paradigms in psychology; Conclude issues related to the mind-body debate; Conclude about different theories under the umbrella of the humanistic paradigm and differences across them

CO6 (EVALUATION): Evaluate the steps and techniques involved in the development of a scientific psychological theory; Evaluate the effectiveness of Cognitive Behavior approach, Psychodynamic approach and Humanistic approaches in counseling; Evaluate the effectiveness of different Behavioral therapy techniques used in dealing with phobia

Suggested Readings

1. Hall, G. C., Lindzey, G., & Campbell, J. C. (1998). Theories of Personality . NY: Wiley.
2. Leahey, T.H. (2005). A History of Psychology: Main currents in psychological thought. Singapore: Pearson Education.
3. Paranjpe, A.C. (1984). Theoretical Psychology: The Meeting of East and West. New York: Plenum Press.
4. Viney, W. & King, D.B. (2003). A History of Psychology: Ideas and Context. Boston: Allyn & Bacon.
5. Wolman, B.B. (1979). Contemporary Theories and Systems in Psychology. Delhi: Freeman Book Company.
6. Higdon, J. (2011). Psychodynamic Theory for Therapeutic Practice. NY: Palgrave Macmillan.
7. Frankl, V. E. (1985). Man's Search for Meaning: An Introduction to Logotherapy. NY: Simon and Schuster.
8. Todd, J. T., & Morris, E. K. (1995). Modern Perspectives on BF Skinner and Contemporary Behaviorism. London: Greenwood Press.
9. Ellis, A. (2004). Rational Emotive Behavior Therapy: It works for me-it can work for you. NY: Prometheus Books.
10. Maslow, A. H. (1943). A theory of human motivation. Psychological Review, 50(4), 370-396.

PCPG0107: PERSONAL GROWTH

(3 credits 45 hours)

***Objectives**: To focus on the discovery of self and the authentic search for meaning in ones own life; To familiarize students with aspects related to interpersonal relationships, socio-cultural challenges encountered, human development and effective coping mechanisms; To advance in a multi-faceted approach to personal development combining theory, personal experience, and self-reflection.*

Module I: Understanding the self (10 hours)

Self esteem, self concept, self efficacy, self-reflection, self in a social world; Enhancing individuals potential: Self-determination theory; Self-regulation and self enhancement; Fostering creativity; Facilitating self-awareness through reflective exercises, self-awareness questionnaires/inventories.

Module II: Stress, Health and Coping (18 hours)

Nature and sources of stress; effects of stress on physical and mental health; the mind-body connection; wellness and life choices , coping with stress, depression, anger and anxiety ; managing stress: methods - yoga, meditation, relaxation techniques, problem focused and emotion focused approaches.

Module III: The Challenge of Human Relationships (12 hours)

Effective interpersonal communication, interpersonal conflicts: causes and management; Perceiving others and Interpersonal attraction; self-disclosure in close relationships; loneliness and social support

Module IV: Emotional Competence (5 hours)

Recognizing emotions in oneself; the universality of emotional expression; perceiving emotions accurately in others; managing difficult emotions; applying emotional intelligence

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Able to gain knowledge about the self and its components in the real world , gain familiarity with self regulation and self enhancement, be acquainted with the concept self awareness with the help of the questionnaires and inventories, acquire the fundamental knowledge of the nature and sources of stress and other related issues, define and state the major strategies to cope with stress, anger and anxiety, understand the intricacies of the effective interpersonal communication, comprehend the interpersonal conflicts in its details and the conceptual background of it.

CO2 (COMPREHENSION): Able to gain explanations about the self and its components like self esteem and self concept in the real world, to illustrate the origin of self regulation and self enhancement, to identify and classify various components of the concept of self awareness with the help of the questionnaires and inventories, to understand and categorize among the fundamental knowledge of the nature and sources of stress and other related issues, to interpret and explore the major strategies to cope with stress, anger and anxiety, to exemplify the intricacies of the effective interpersonal communication, to comprehend and illustrate the interpersonal conflicts in its details and the conceptual background of it, to acquire the in depth understanding of the theoretical basis of the loneliness and social support, to interpret and explain the underlying basis of emotions, management of difficult emotions and emotional intelligence

CO3 (APPLICATION): Able to learn the practical means of improving self regulation and self enhancement in one's daily lives, to demonstrate the application orientation of various components of the concept of self awareness with the help of the questionnaires and inventories, to learn from group activities and experiential tasks to understand the nature and sources of stress and other related issues, to understand the applicability of the major strategies to cope with stress, anger and anxiety, to demonstrate the intricacies of the effective interpersonal communication, to understand the interpersonal conflicts in its details and with real life situations and to have practical understanding and assignment of the underlying basis of emotions, management of difficult emotions and emotional intelligence

CO4 (ANALYSIS): Able to analyze the origin of self regulation and self enhancement with a critical lens, to identify and relate with various components of the concept of self awareness with the help of the questionnaires and inventories, to explore and question the fundamental knowledge of the nature and sources of stress and other related issues, to interpret and explore the major strategies to cope with stress, anger and anxiety, to identify and evaluate the intricacies of the effective interpersonal communication, to assess and identify the interpersonal conflicts in its details and the conceptual background of it, to evaluate and identify them the in depth understanding of the theoretical basis of the loneliness and social support, to explore and search about the underlying basis of emotions, management of difficult emotions and emotional intelligence.

CO5 (SYNTHESIS): Able to summarize and form an overall understanding the explanations about the self and its components like self esteem and self concept in the real world, to organize and evaluate the origin of self regulation and self enhancement, to synthesize and organize various components of

the concept of self awareness with the help of the questionnaires and inventories, to conclude and combine the fundamental knowledge of the nature and sources of stress and other related issues, to summarize and list the major strategies to cope with stress, anger and anxiety, to compile and collaborate the intricacies of the effective interpersonal communication, to merge and unite the interpersonal conflicts in its details and the conceptual background of it, to amalgamate the in depth understanding of the theoretical basis of the loneliness and social support.

CO6 (EVALUATION): to evaluate and judge the explanations about the self and its components like self esteem and self concept in the real world, to analyze the origin of self regulation and self enhancement, to question and examine various components of the concept of self awareness with the help of the questionnaires and inventories, to determine and assess the fundamental knowledge of the nature and sources of stress and other related issues, to scrutinize and observe the list the major strategies to cope with stress, anger and anxiety, to interpret, judge and decide upon the intricacies of the effective interpersonal communication, to determine and inspect the interpersonal conflicts in its details and the conceptual background

Suggested Readings

1. Baron, R.A., Byrne, D. & Bhardwaj, G.Social Psychology . New Delhi: Pearson.
2. Carr, A. Positive Psychology: The science of happiness and human strength.UK: Routledge.
3. Neiten, W. & Lloyd, M.A . Psychology applied to Modern life. Thomson Detmar Learning.
4. Schraw, G. Promoting general metacognitive awareness. Instructional Science, 26,113-125.
5. Robbins, S.P. & Hunsaker, P. L.Training in interpersonal skills: Tips for managing people at work. New Delhi: PHI Learning

PCPA0108: PSYCHOLOGY OF PERSONAL ADJUSTMENT

(3 credits 45 hours)

Objective: *The objective of this course is to provide insights into the area of personal adjustment so as to ease the process of adjustment in various life contexts. It also aims to increase self-knowledge considering the role of personality, environment and social factors.*

Module I: Introduction (10 hours)

The process of adjustment. Adjustment to college work: motivation for study, improving basic study habits.

Module II: Personal factors in adjustment (15 hours)

Understanding oneself: goals, conflicts, conflict management. Personal efficiency: managing time, money and creating an efficient environment. Development of personal strengths: Concentration, learning, thinking, self-confidence, attitude and attitude change.

Module III: Personality development (10 hours)

Personality development across the lifespan: childhood, adolescence, and adulthood. The adjusted personality. Career planning and vocational choice.

Module IV: Social adjustment (10 hours)

Friendships, familial roles, interpersonal attraction, social influence (conformity, compliance, obedience), social groups, intergroup relations, social proficiency, leadership.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): State the concept of adjustment; Recognize ones own self; State about conflict management and time management; Name different techniques to develop personal strengths; State the process of personality development; Write different processes related to social adjustment; State concepts like social conformity and leadership

CO2 (COMPREHENSION): Explain the process of adjustment; Illustrate the challenges in adjustment to college work; Understand about the concept of motivation to studies; Interpret oneself: ones goals and conflicts; Explain ways to improve personal efficiency; Illustrate different phases in personality development; Differentiate between career planning and vocational choice; Differentiate among

conformity, compliance and obedience; Interpret concepts like familial roles, interpersonal attraction

CO3 (APPLICATION): Apply the process of adjustment in the context of their lives; Apply their understanding in improving motivation and basic study habits; Demonstrate ways of increasing self-awareness; Use their understanding to increase personal efficiency; Apply the theories of personality development in their own lifespan; Apply these trainings in their own vocational choice and career planning; Apply concepts of social adjustment in real life situations.

CO4 (ANALYSIS): Analyze the process of adjustment; Analyze most effective ways of improving motivation to study; Analyze ones own goals and conflicts; Identify ways of managing time and creating an efficient environment; Analyze ones own strengths; Analyze attitude and attitude change; Identify the changes in personality across lifespan; Analyze concepts related to social adjustment in everyday scenario; Identify the impact of social influence on us.

CO5 (SYNTHESIS): Summarize the process of personal adjustment; Summarize the challenges faced in adjustment to college life; Organize ones own understanding of one self; Gather effective measures for the development of personal strengths; Summarize process of personality development across lifespan; Organize concepts related to adjusted self; Summarize understanding of concepts like friendships, familial roles, interpersonal attraction, social proficiency; Summarize characteristics of a good leader; Organize the positive and negative impacts of social influence

CO6 (EVALUATION): Evaluate the applicability of process of adjustment; Determine ways to overcome challenges in adjustment to college work; Assess the effectiveness of conflict management and time management strategies; Determine the applicability of personality development theory across lifespan; Evaluate the importance of adequate vocational training and career planning; Evaluate the role of social influence on human behavior; Assess the leadership qualities in oneself; Determine ways to inculcate leadership qualities within self.

Suggested Readings

1. Wade, C. and Tavris, C. (2007). Psychology. Pearson Education.
2. Sternberg, R.J. (2007). Cognitive Psychology. Australia: Thomson Wadsworth.
3. Isaacson, L.E. and Brown, D. (1993). Career information, career counselling and career development. New York: Allyn & Bacon.
4. Wolman, B.B. (1979). Contemporary Theories and Systems in Psychology. Delhi: Freeman Book Company.
5. Baron, R. A., & Branscombe, N. R. (2016). Social Psychology. Boston, MA: Pearson/Allyn and Bacon
6. Crawford, L. A., & Novak, K. B. (2013). Individual and Society: Sociological Social Psychology. New York: Routledge
7. Frankl, V. E. (1985). Man's Search for Meaning: An Introduction to Logotherapy. NY: Simon and Schuster.
8. Williamson, E. G. (1942). Psychology of personal adjustment. Psychological Bulletin, 39(3), 187-188.
9. Claes, M. E. (1992). Friendship and personal adjustment during adolescence. Journal of adolescence, 15(1), 39-55.

PCBP0110: BIO- PSYCHOLOGY

(3 Credits - 45 Hours)

Objectives: *To understand the key concepts in biology and their evolutions; To be able to make a connection between the psychological aspects of humans and their behavioral basis; To understand the biological aspects of psychological disorders*

Module I: Introduction (10 hours)

Bio-Psychology: Meaning, evolution and scope, major characteristics and principles, and critical evaluation.

Major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin. Nature versus Nurture controversy

Module II: Genetic Bases of Behavior (12 hours)

Genes: Structure of a gene, DNA and Chromosomes, Types and Functions of genes, Genotype and Phenotype

Mendelian genetics, Chromosomal abnormalities: Down Syndrome, Klinefelter Syndrome, Turner Syndrome.

Module III: Nervous System (14 hours)

Neuron: Structure and Function, Communication within a Neuron, Types of Neurons, Synapse and Synaptic Transmission, Neurotransmitters: types and functions.

The Brain: Basic Features of Nervous System, Central Nervous System, Peripheral Nervous System, Role of Nervous Systems in Controlling Behavior, Spinal Cord: Structure and Functions

Module IV: Behavioral Basis of the endocrine system (9 hours)

Endocrine System: Structure and Functions, Major endocrine glands,

Hormones: Types and Functions, Influence of hormones on human behavior

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE): Define the meaning of Bio-Psychology, its principle and characteristics; write about Major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin; understand the meaning of Genes; write about the Structure of a gene; understand about DNA and Chromosomes; state about Mendelian genetics and Chromosomal abnormalities; understand about neuron, nervous system; Definition of hormones, endocrine systems.

CO2 (COMPREHENSION): Comprehend the about major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin; comprehend about Down Syndrome, Klinefelter Syndrome, Turner Syndrome; comprehend the role of Nervous Systems in Controlling Behavior; explain the types and functions of spinal cord; comprehend about the Influence of hormones on human behavior.

CO3 (APPLICATION): Apply the knowledge of major theoretical perspectives while practicing in clinic in future; Apply the knowledge of Chromosomal abnormalities: Down Syndrome, Klinefelter Syndrome, Turner Syndrome into practical field; illustrate about the Nature versus Nurture controversy; illustrate the structure of neuron and endocrine system; find out the basic Features of Nervous System, Central Nervous System and Peripheral Nervous System; apply the knowledge about Influence of hormones on human behavior while dealing with mentally ill patients in future.

CO4 (ANALYSIS): Analyze the evolution, scope and major characteristics of Bio-Psychology; critically evaluate about Bio-Psychology; compare between Genotype and Phenotype; analyze about Mendelian genetics; analyze about the Synapse, Synaptic Transmission and Neurotransmitters; identify the major endocrine glands.

CO5 (SYNTHESIS): Summarize the fundamental concept of Bio-Psychology; summarize the major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin; summarize about genes and chromosomal abnormalities; summarize about neuron, central nervous system, endocrine glands and hormones.

CO6 (EVALUATION): Evaluate the fundamental concept of Bio-Psychology; assess the major theoretical perspectives: Rene Descarte, Phinaes Gage, Charles Darwin; evaluate the chromosomal abnormalities: Down Syndrome, Klinefelter Syndrome, Turner Syndrome; assess the role of Nervous Systems in Controlling Behavior; assess the Influence of hormones on human behavior.

Suggested Readings

1. Bateson, W. (1902). Mendels principles of heredity. Cambridge, UK: Cambridge, University Press.
2. Carlson N.R. (1998) Physiology of Behaviour, 6th edition, Allyn & Bacon: Boston
3. Glimcher, P. W. (2005). Indeterminacy in brain and behavior. Annual Review of Psychology, 56,25-56.
4. Kandel E.R., Schwartz J.H. and Jessell T.M. (2000) Principles of Neural Science, 4th edition, McGraw-Hill Inc.
5. Pinel,J., Biopsychology (2009), Pearson Education Limited.
6. Wickens. A., Introduction to BioPsychology (2009), Pearson Education Limited.

PCPP0111: PEACE PSYCHOLOGY

(3Credits-45 hours))

Objectives: *Understand the psychological connections between violence and peace; To comprehend the meaning and relevance of Peace Psychology and dynamics of violence; Apply current theories in peace psychology to personal, interpersonal, community, national, and international contexts; Discuss peace psychologys contributions to peacemaking and peace building Module 1: Introduction to Peace Psychology*

Module I: Introduction to Peace Psychology (10 Hours)

Peace - Meaning and definition, Paradigms of peace (Negative Peace, Positive Peace and Sustainable Peace), Peace Psychology and its notions.

Module II: Understanding Violence and its Psychological effects (13 Hours)

Understanding Violence: Typologies of Violence: Direct Violence, Indirect Violence, Structural Violence, Cultural Violence and Psychological Violence and other dimension of Violence, Mental health consequences of Violence: PTSD, Depression, Suicide etc.

Module III: Psychological Violence and its dynamics (11 Hours)

The Psychology behind Violence: Gender Discrimination, Harassment and its types, Rape, Abuse and its types, Psychological violence in Children, Elder abuse, Racial Abuse, Domestic Violence etc.

Module IV: Peace Building and Prevention of violence (11 Hours)

Conflict Resolution, Peace Building, Intrapersonal Peace Resolution, Interpersonal Peace Resolution, Cross- Cultural Peace Building etc.

COURSE/LEARNING OUTCOMES

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

CO1 (KNOWLEDGE) : To understand the meaning, dynamics, causes, consequences and strategies involved in peace and violence, the different types of peace and violence, relations or Co functioning of peace and violence.

CO2 (COMPREHENSION) : To get a concept of the occurrence of violence and sustainability of peace, the idea of peace across culture, it's evolution through the ages from 500 B. C. to present, theoretical perspectives of peace.

CO3 (APPLICATION) : Application in the form of educational and vocational intervention, strategies of peace sustainance and conflict resolution, identify psychological affects of peace and their prevention and intervention, spreading awareness, community counselling, research,, understanding cognition of individual and group.

CO4 (ANALYSIS) : The changing trends in peace psychology and probable future changes, the scenario of society with and without awareness on peace and violence, the emotions of people under violence, the pros and cons of present peace sustaining strategies, intervention of consequences of violence, cross cultural dynamics of violence, cross cultural essence and attempts to peace.

CO5 (SYNTHESIS) : Improvement and critics for the current trends in peace and violence scenario, identifying faulty interpretation of peace, identifying faulty comprehension of conflicts, base and ceiling of peace and violence.

CO6 (EVALUATION) : Analyse the significance of peace psychology and Role towards communities, ways to incorporate peace teaching and awareness to public at large, shortcomings in working organisations to reach people, existing barriers to attain peace, criticise and defend aspects of peace theories and violence theories.

Suggested Readings

1. Christie, D. J., Wagner, R. V., & Winter, D. (2001). Introduction to peace psychology.
2. Sanson, A., & Bretherton, D. (2001). Conflict resolution: Theoretical and practical concerns.
3. Wessells, M. Schwebel, M., & Anderson, A. (2001). Psychologists making a difference in the public arena: Building cultures of peace.
4. Steger, M. B. (2001). Peacebuilding and nonviolence: Gandhi's perspective on power.

PCBA0112: BASIC ABNORMAL PSYCHOLOGY

(4 credits - 60 hours)

Objectives: *To have knowledge of different aspects of abnormal behavior; To know the historical development of the study of abnormal behaviour, criteria and perspectives in abnormal behaviour, common classification systems, and range of disorders including anxiety disorders, mood disorders, schizophrenia, disorders generally observed at childhood and adolescence, and personality disorders; Understand various behavioural dysfunctions and use the same in day-to-day life.*

Module I: Introduction to Abnormal Psychology (10 hours)

Definition of abnormal behaviour, historical and contemporary views of abnormal behaviour; history of psychiatry in India; myths and misconceptions of abnormal behaviour; classification of abnormal behaviour,

Module II: Understanding causes of Abnormal Behaviour (15 hours)

Necessary, sufficient, contributory causes and diathesis- stress model, psychodynamic, behavioural, cognitive- behavioural, humanistic theory, socio- cultural factors.

Module III: Psychological Disorders (25 hours)

Anxiety disorders, somatoform disorders, dissociative disorder, mood disorder, schizophrenia, personality disorder, disorders of childhood

Module IV: Psychological Treatment (10 hours)

Psychodynamic treatment, behavioural therapies, cognitive treatment, client-centred therapy, experiential therapies, family therapy

Suggested Readings

1. American Psychiatric Association (2013). Diagnostic and Statistical Manual of Mental Disorders, DSM -5th, Fifth Edition.
2. Ahuja N. (2011). A Short Textbook of Psychiatry (7th Ed). New Delhi: Jaypee
3. Barlow D.H. and Durand V.M. (2005). Abnormal Psychology: An Integrated Approach (4th Ed.).Wadsworth: New York.
4. Carson R.C., Butcher J.N., Mineka, S., & Hooley J.M. (2007). Abnormal Psychology (13th Ed.).ND: Pearson Education.
5. Davison, G. C., Neal, J. M.,& Kring. A. M. (2004) Abnormal Psychology. (9th Ed) New York; Wiley.
6. Lauren B Alloy, John.H.Riskind, Margaret J Manah, Abnormal Psychology Current perspective- 9th edition.
7. Kring,A.M.,Johnson,S.L., Davison G.C. & Neale J.M. (2010). Abnormal Psychology (11th Ed.).NY: John Wiley.

PCCA0113: CHILD AND ADOLESCENT DEVELOPMENTAL PSYCHOLOGY

(3 Credits- 45 Hours)

Objectives*: To equip the learner with an understanding of the concept and process of child and adolescent growth and development across the lifespan. To gives an overview about physical, cognitive and language development, personality and social development. Various theories of child and adolescent development are discussed with a view to enable the students to understand child and adolescent clients in the context of their developmental milestones.*

Module I: Introduction (10 hours)

Definition of human development, principles of development, periods of development, developmental task; purpose, hazards of developmental task. Different theories of development, influences of factors on human development, nature vs. nurture issue.

Module II: Physical development (12 hours)

Physical growth during childhood, Milestones: Gross motor development in early and middle childhood. Puberty: Physical transition to adulthood, growth spurt, puberty and adolescents health, Bio-psycho-social health model.

Module III: Cognitive and language development (13 hours)

Cognitive development across childhood and adolescence, information-processing perspective, Piagets and Vygotskys theories of cognitive development, language development across childhood and adolescence, theories of language development.

Module IV: Personality and Social development (10 hours)

Psychosexual and psychosocial theories of personality development; Emotional development: Functions of emotion, development of emotional expressions, temperament, development of attachment, understanding of self. Moral development: theories of moral development

Suggested Readings

1. Berk E. Laura,(7th ed). Child Development. Prentice-Hall of India Private Limited
2. P. E. Diane, O. W. Sally & F. D. Ruth. Human Development. Tata Mc Graw Hill.
3. Hurlock, B. E. Developmental Psychology.Tata McGraw Hill.
4. Hurlock, B. E. Child DEvelopment.Tata McGraw Hill.

PCCM0114: COMMUNITY PSYCHOLOGY

(3 Credits-45 Hours)

Objectives: To learn the link between individuals and communities; Deal with social issues more effectively with peoples participation; Understand the importance of community mental health and to deal with the different issues prevailing in the communities.

Module I: Introduction (12 hours)

Definition of community psychology; social and historical contexts of community psychology; principles of community psychology; the ecological model in psychology; types of communities; models;

Module II: Core values (10 hours)

Individual and family wellness; sense of community; respect for human diversity; social justice; empowerment and citizen participation; collaboration and community strengths.

Module III: Community mental health (10 hours)

Evolution and nature of community mental health; process of community organization for health promotion, importance. Community program for: child and maternal health, Mental Health as a complex Community Function

Module IV: Interventions (13 hours)

Community development and empowerment; Mental Health Education; Necessary conditions, techniques and status of crisis intervention. Community Intervention in India-Present Status and Future Scope; case studies in Indian context.

Suggested Readings

1. Shanmugham, T.E. (1987) Community Psychology. Madras: Utsav Shanmugham.
2. Korchin, S.J., (2004) Modern Clincal Psychology: Principles of Intervention in the Clinic and Community. New Delhi:CBS Publishers
3. Rappaport, J & Seidman,E (2000) Handbook of Community Psychology. NewYork: Plenum Publishers
4. Kloos B. Hill, J Thomas, Wandersman A, Elias M.J. & Dalton J.H. (2012). Community Psychology: Linking Individuals and Communities, Wadsworth Cengage Learning.
5. McKenzie, J. F. Pinger, R. R. & Kotecki, J. E. (2005). An introduction to community health. United States: Jones and Bartlett Publishers.

PCIG6001: INDIVIDUAL AND GROUP COUNSELLING PRACTICUM
(2 credits)

Objectives: *This practicum course is meant to be a first practical experience for the students of Psychological Counselling in the area of individual and group counselling skills.*

Students are expected to explore the following skills:

Individual Counselling Skills

- Social perception
- Observation
- Intake assessment skills
- Documentation of case history
- Mental status examination
- Establishing Counselling goals

Group Counselling Skills

- Group effectiveness: verbal, non-verbal cum non-verbal
- Communication: Verbal and Non-verbal
- Leadership
- Decision making process
- Group Problem solving
- Conflict management

PCPG6002: PERSONAL GROWTH I (P/NP)
PCPG6005: PERSONAL GROWTH II (P/NP)

Objectives: *Counselling uses the personality of the counsellor as the main instrument. It is a basic need in a training program for the students to learn to understand their own perceptions, emotions, motivations. Therefore this session is a guided form to bring the students close to their own strengths and weaknesses. They learn to be aware about their own perceptions and feelings, understand basics of transference and counter transference as part of their own social life, and experience how to deal with it in personal and professional life. This part of the training is based on personal experience and exploration of students. During the sessions of personal growth workshops which spread across two semesters the future counsellor explores the following areas of his/her person:*

Self-Awareness

- Johari Window
- SCOT Analysis
- Transactional Analysis

Emotional Development

- E.Q. Assessment
- Self Management
- Positive Emotion

Suggested Reading

Goud Nelson H. (2009). Psychology and Personal Growth. 8th Edition. Boston: Pearson.

PCCY6003: CHILD AND YOUTH COUNSELLING PRACTICUM
(2 credits)

In this course which is meant to be the second practical experience, students will develop their skills in the areas of individual and group counselling skills further:

Individual Counselling Skills

- Perception during the counselling process
- Interviewing skills
- Documentation of case history, process documentation
- Establishing Counselling goals and follow up
- Problem solving
- Skills of listening

Group Counselling Skills

- Understanding Group processes
- Roles inside a group
- Psycho-dynamic background of a group situation
- Systemic approach
- Using group skills like psychodrama, systemic approach
- Conflict management

PCFW6004: FIELD WORK
(2 credits)

Field work is an essential part of the preparation to become a counsellor. It is designed to give opportunity to integrate academic knowledge into real life situations. The field work practice in the second semester shall focus upon the area of concentration chosen by the students. The students will be placed in the field for a minimum of eight days. The fieldwork setting shall be NGO's, hospitals, clinics, schools. During the placement the students are expected to implement the follow activities and adhere to the guideline specified below:

1. The students are expected to apply all the skills and techniques of counselling whenever applicable depending upon the organization and their services
2. The students should be involved in the activities of the institution and fulfill the responsibilities as requested by the agency supervisor.
3. Students shall prepare a daily report 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.
4. At the end of the semester the students shall submit a summary report of the cases taken and activities done during their placement. The students shall also appear for the viva voce examination at the end of the semester.

PCMC6006: MARRIAGE AND FAMILY COUNSELLING PRACTICUM
(2 credits)

The practicum for this course will deal with counselling in the areas of

1. Family environment
2. Anxiety, stress and depression in the family
3. Emotional adjustment and its management in the family

PCCS6007: CASE STUDY AND DOCUMENTATION
(4 credits)

Objectives: *Students should be able now to make good documentation about individual and group counselling. Hence this course in case study and documentation.*

One detailed case study 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.Findings from the case study are to be presented to the staff and students of the department. The presentation will be followed by a viva voce examination. Details of the components of evaluation and weightages attached to them are to be determined by the department and informed to the students at the beginning of the semester.

PCRP6008: RESEARCH PROJECT PHASE I
(2 credits)

PCRP6011: RESEARCH PROJECT PHASE II
(8 credits)

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 before the fourth semester. Phase II of the research project should ideally be undertaken in the organisation where the student is placed for internship. The thesis 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 attached to them shall be published by the Department at the beginning of the semester. There shall be a viva voce examination on the research project.

PCSI6009: SUMMER INTERNSHIP
(P/NP)

Students are required to undergo a summer internship of two weeks' during the semester break between the second and third semesters. It is a P/NP course and shall be recorded in the third semester. The Summer Internship gives students an opportunity to apply the theories and principles that they have learnt in class room courses to the "real world" of social service agencies, medical institutions, the criminal justice system, business, and industry. During the internship, students can explore career interests, develop professional skills, learn how community organizations work and expand their clinical and interpersonal skills. The summer internship enriches the students' academic experience while making a valuable contribution to the community and utilizing the vacation optimally.

PCSI6010: SUPERVISED INTERNSHIP
(8 credits)

Objectives: *On basis of the theory, skills and practical experience acquired by the students so far, they will now be able to start counselling work at an individual, family and group level. It is expected that this be done in the form of an Internship in an organisation which offers counselling help to clients. Supervision has to be provided for by the university in collaboration with the organisation where the student performs the internship.The process has to be documented, reflected and the insights of supervisor have to be recorded.Students should feel competent to do their own counselling using supervision as part of the counselling setting.*

1. **Introduction**
   Analysing the situation: need of counselling, space for counselling, information to clients, documentation, organizing supervision.

2. **Internship**
   Taking in clients: first interview, documentation of the case, definition of counselling goals, building the counselling relationship, process of counselling, using skills of counselling, concluding counselling, documentation of the whole counselling process, evaluation; working in a team – role of counselling, resources and challenges, role in the team, case management: discussion, supervision.

Evaluation of the internship will be based on the documentation, reports from the organisation, report of the supervisor and the presentation and the viva voce examination of the student at the end of the period of Internship.

Every student is required to undertake a research project work and present a written thesis on the research work under the supervision and guidance of a faculty member. The research project should ideally be undertaken in the organisation where the student is placed for internship.

The thesis is to be submitted to the department before the date notified. 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. There shall be a viva voce examination on the research project.

PCST6012: STUDY TOUR
P/NP

During the programme the students shall undertake a study tour, along with the faculty members, to a place approved by the department. The places are to be so chosen as to be of educational benefit to students. During the tour, the focus shall be to visit and interact with NGOs, hospitals, state/national/international organisations involved in psychological counselling. A report of the learning outcomes shall be submitted to the department at the end of the tour. The Study Tour shall be a Pass/No Pass course.

DEPARTMENT OF EDUCATION

EDLR0007: LEADERSHIP AND SOCIAL RESPONSIBILITY

(3 credits – 45 hours)

***Objective**: This course in Leadership and Social Responsibility, offers the students a landscape to reconnoitre and construct a foundation of leadership through fundamental theories of leadership by understanding the dynamic nature of human behaviour, advancement in Information and Communication Technology, change in values, cultures and relationships, and blurring of international borders. Students will be challenged to develop skills required to build immediate, extended and virtual communities that support a sustainable equitable world. A special emphasis is given to leadership as relationships between and among people and systems.*

Module I: Leadership and Management (13 hours)

Understanding Leadership, its need and function, Styles and Theories of Leadership, changing roles of Leadership; Concept of Management, functions of Management, Leadership and Management issues, The Daily Disciplines of Leadership, Leadership-A bridge to improved practice, How to improve Staff Achievement; Staff motivation, Performance and Personal Organization

Module II: Social Responsibility (10 hours)

Concept of Social Responsibility, Types of Social Responsibility, Its need, Changing role; Social Engagement; Individual Social Responsibility and Corporate Social Responsibility, Social Responsibility of the Educators.

Module III: Leadership and Decision Making (12 hours)

Decision Making process; Types of Decision Making, Key steps in Decision Making, techniques of effective Decision Making; What inhibits and misleads Decision Makers Tactics for improving Managerial Decision Making; Importance of Decision Making in Educational Institution, Organisational Behaviour, Leadership and Decision Making.

Module IV: Leadership Implementation and Implantation (10 hours)

Leadership and implantation; Formulating policy; Complexity of joint actions; Economic theory and program implementation; Implantation as exploration; Volunteerism; social entrepreneurship

COURSE/LEARNING OUTCOMES

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

Module-I: State the meaning of leadership (K); Understand the qualities of a true leader (U); State the meaning of social responsibility (K); Write the characteristics of leadership (K); Identify a true leader (Ap); Analyze the role of a leader in the present context (An); Understand the different leadership styles existing (U); Explain the theories of leadership (U); Understand the historical background of leadership theories (U); Find out the implications of the theories of leadership on education system (Ap); Define the term management (K); Describe the nature of management (U); Explain the functions of management (U); Define the term individual social responsibility (K); Understand the implications of leadership in the field of individual social responsibility (U); Analyze the role of individual social responsibility in our day to day life (An); State the meaning of corporate social responsibility (K); Describe the historical background of CSR (U); Understand the relationship of leadership and CSR (U); Illustrate the CSR activities taking place in our country (U)

Module II: Identify the issues related to management and leadership (Ap); Analyze the role of leaders in improving practice in an institution (An); Understand the changing roles played by leaders in a society (U); State the meaning of social engagement (K); Describe the role of leader in social engagement (U); Understand the daily disciplines of a true leader (U); Find out the impact of leadership in motivating staff and achieving performance (Ap); Give a brief overview of the role of leaders in personal organizations (U)

Module III: Write about the concept of decision making (K); Identify the role of leadership in the decision making process (Ap); State the meaning of organizational behaviour (K); Explain the decision making process (U); Find out the tactics for improving the decision making process (Ap); Identify the problems of the decision making process (U); Understand the key steps in decision making process (U); Find out the techniques that improves decision making process (Ap)

Module IV: Understand the relationship between leadership and policy implementation (U); Find out the effect of leadership in formulating policy (Ap); Analyze the complexity of joint actions (An); Understand how leadership influences economic theory and program implementation.(Ap); Define volunteerism (K); Explain the role of leadership in the field of volunteerism (U); State the meaning of social entrepreneurship (K); Understand the meaning of social entrepreneurship (U); Find out the effect of leadership in social entrepreneurship (Ap)

Suggested Readings

1. Bass, B. M. (1998). Transformational leadership: Industry, military, and educational impact, Mahwah, NJ: Erlbaum.
2. David, B. (2009). Leadership in Organizations There Is a Difference between Leaders and Managers. New York: University Press Of America
3. Friedman, A. A. (2004). Beyond mediocrity: transformational leadership within a transactional framework. International Journal of Leadership in Education, 7(3), 203-224. doi:10.1080/1360312042000213877
4. Fullan, M. (2005). Leadership and sustainability. New Delhi: Sage publication Ltd.
5. Kouzes, J.M., & Posner, B.Z. (2002). The leadership challenge. San Francisco, CA: Jossey- Bass.
6. Lee G. & Bolman,T. (2008). Deal Reframing Organizations Artistry, Choice, and Leadership. San Francisco: Jossey- Bass.
7. Rogers, C. (2012). Transition, self-regulation, independent learning and goal theory. Psychology Of Education Review, 36(2), 26-31.
8. Starratt, R. (2004). Ethical Leadership. San Francisco: Jossey- Bass
9. Williams, M. (2006) Leadership for leaders. New Delhi: Vinod Vasishtha

EDFE0011: PHILOSOPHICAL FOUNDATIONS OF EDUCATION
(4 credits - 60 Hours)

Objective: *In this course on Philosophy of Education, students will explore Eastern and Western philosophies of human flourishing, dilemmas in contemporary education, and certain specific Indian philosophical thoughts. Students will encounter the philosophical underpinnings that help educators navigate through the truly difficult historical situation of 21st century education.*

Module I: Nature and Scope of Education

Education as a science and Education as a social process; Nature of Knowledge and theories of knowledge; Role of Philosophy in Education; Aims of education – individual, social, vocational and democratic; Formal, informal, and non-formal agencies of education; Relation between school and society.

Module II: Indian Schools of Thought

Astika and Nastika; Sankhya, yoga, Nyaya, Visheshika, Mimamsa, and Vedanta; Buddhism, Jainism, Carvaka – with special reference to theories of knowledge.

Module III: Western Philosophical Thought

Some major schools; Naturalism, Idealism, Rationalism, Pragmatism, Realism, Logical positivism, Empiricism, Existentialism, Marxism and Post modernism - Their educational implications with special reference to epistemology, axiology and the process of education.

Module IV: Modern Indian Thinkers

Vivekananda, Tagore, Gandhi, Aurobindo, J. Krishnamurty, Radhakrishnan; Nature of Knowledge and theories of knowledge; Social Philosophy of Education – Freedom, Equality, Democracy and Responsibility; Indigenous philosophy with special reference to northeast India

Module V: Functions of education

Individual development; Transmission of cultural heritage; Acquisition of skills; Acquisition and generation of human values; Social cohesion; A practical approach to philosophy of education.

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'education' (K); Explain education as a science (U); Explain education as a process (U); Define 'knowledge' (K); State the methods of obtaining knowledge (K); State the theories of knowledge (K); Explain the theories of knowledge (U); Anlayse the theories of knowledge (An); Demonstrate the use of the theories of knowledge (Ap); Explain the concept of philosophy (U); Use the philosophical basis for determining the educational aims and objectives (Ap); Define and state the individual ,social, vocational and democratic aims of education (K); Differentiate between the informal and non- formal agencies of education (U); Explain the relationship between school and society (K)

Module II: State the basic concept of Indian philosophy (K); Explain the Indian philosophical concepts-Astika and Nastika (U); Differentiate between the Astik person and Nastik person (U); Hypothesise the actions of Astik and Nastik persons (Ap); Define the concepts Sankhya, Yoga (K); Define the concepts Sankhya,Yoga,Visheshika,Mimansa and Vedanta (K); Explain the concepts like – SankhyaYoga,Visheshika,Mimansa and Vedanta (U); Explain the philosophies of Buddhism,Jainism and Carvaka (U); Apply these ideals of different philosophies in life (Ap); Establish the relationship of philosophies and education (Ap); Determine the quality of life with the concepts of different philosophies (Ap)

Module III: State the major Western philosophies of education (K); Explain the concept of Naturalism in relation to aims and objectives of education ,curriculum, method of teaching, role of teacher, discipline (U); Use the philosophy of Naturalism in making and teaching the curriculum (Ap); State the functions of Idealism, Pragmatism, Empericism, Existentialism, Marxism and Post modernism (K); Distinguish among the different philosophies of education (U); Prepare the curriculum for taking the ideas of different philosophies (An); Analyze the different philosophies of education (AN); Evaluate the different philosophies of education from their implications point of view (E)

Module IV: State the life sketches of Tagore,M.K.Gandhi,Aurobindo,J.Krishnamurthy and Radhakrishnan (K); Analyze and find out the contributions of modern Indian thinkers in the field of education (AP); State the nature of knowledge and theories of knowledge advocated by modern Indian thinkers (K); Explain the concept of social philosophy of education in relation to freedom, equality, democracynad responsibility (U); Find out the indeginous knowledge of different ethnic groups of NE India (Ap); Find out the relevance of Indian and western philosophies of education in NE India (Ap); Find out the difference in educational philosophies of NE India and India as a whole (Ap)

Module V: State the functions of education (K); Define the functions of education towards an individual (K); Explain the integral growth of an individual (U); Illustrate education as a preparation for adult life (U); Define the function of education towards society (K); State the role of education in maintaining continuity of life (K); Find out the process of continuity of life and education in society (Ap); Use the process of education in conservation of culture (Ap); Find out the impact of education on the culture and civilization (Ap); Explain the process of education and transmission of culture (U); Define function of education towards nation (K); Explain the different aspects of nation which need to be cured through education(U); Explain the concepts of emotional integration and national integration (U); Inculcate life skills through education (Ap); State human values (K); Acquire and practice human values (Ap); Find out the impact of different philosophies on human life (Ap)

Suggested Readings

1. Bailin, S., and Siegel, H. (2003). Critical thinking. The Blackwell guide to the philosophy of education, 181-193.
2. Barrow, Robin. (1988). Chapter 1: the concept of education. Ch 2: knowledge and curriculum. An introduction to Philosophy of Education, London: Routledge.

3. Biesta, G. (2010). 'This is My Truth, Tell Me Yours'. Deconstructive pragmatism as a philosophy for education. Educational Philosophy and Theory, 42(7), 710-727. doi:10.1111/j.1469-5812.2008.00422.x
4. Bredo, E. (2010). Mead's Philosophy of Education. Curriculum Inquiry, 40(2), 317-334. doi:10.1111/j.1467-873X.2010.00484.x
5. Brown, L.M. (1970). Aims of Education, New York: Teachers College Press.
6. Brubacher, John. (1970). Modern Philosophies of Education, New Delhi: TATA McGraw-Hill publishing company Ltd.
7. Carr. Brian and Mahalingam. Indira. (1998). Part II and III, Companion Encyclopedia of Asian Philosophy. London and New York: Routeldge.
8. Cohen, B. (1983).Means and Ends in Education, London: George Allen and Unwin.
9. Dewey, J. (1966). Democracy and Education and Introduction into Philosophy of Education, New York: The Free Press
10. Freire, P. (1971). Pedagogy of the oppressed. New York: Herder And Herder.
11. Hamm C. M. (1989). Chapter 3, An Analysis of the Concept of Education. 31-40. RoutledgeFalmer London and New York.
12. Hamm, C.M. (1989). Philosophical issues in education: An introduction, Chapter 1, The nature of philosophical inquiry into educational discourse. 1-14.
13. Kamii, Constance. (1984). Autonomy: the aim of education as envisioned by Piaget. The Phi Delta Kappan, Vol. 65, No. 6, 410-415
14. Kazepides, T. (1979). Human nature in its educational dimensions. Journal of philosophy of Education, Vol.13, 55-63.
15. Lal. B.K. (1973). Contemporary Indian Philosophy. Delhi: Motital Banarasidass
16. Lipman, M. (2003). Thinking in education. Cambridge University Press
17. Morris, V. (1966). Existentialism in Education, New York: Harper and Row.
18. Peters, R. S. (Ed.). (2010). The concept of education (international library of the philosophy of education volume 17). Routledge.
19. Radhakrishnan. S. (2008). Indian Philosophy. Vol. 1. 2nd edn. USA: Oxford University Press.
20. Radhakrishnan. S. (2008). Indian Philosophy. Vol. 2. 2nd edn. USA: Oxford University Press.
21. Saksena. Kishore. (1970). Essays in Indian Philosophy. Honolulu: Universities of Hawaii Press.
22. Sidorkin, A. M. (2011). On the Essence of Education. Studies In Philosophy and Education, 30(5), 521-527. doi:10.1007/s11217-011-9258-3
23. Smith, Philip. (1965). Philosophy of Education, New York: Haper and Row.
24. White, J. (2010). Elusive rivalry? Conceptions of the philosophy of education. Ethics and Education, 5(2), 135-145. doi:10.1080/17449642.2010.516134
25. Winch, C., and Gingell, J. (1999). Key concepts in the philosophy of education. Psychology Press.

EDEP0012: FUNDAMENTALS OF EDUCATIONAL PSYCHOLOGY

(4 credits - 60 Hours)

Objective: *This course provides an overview of contemporary theories of learning, cognitive development, and memory. Besides these the study will include significant aspects of human development from conception through adolescence, emotional growth, personality, intellectual capacity and the acquisition, and development of language.*

Module I : Foundations of Psychology (12 hours)

Definitions of psychology, Historical antecedents of psychology and trends in 21st Century; Psychology: Its meaning, nature, methods and scope; Educational Psychology: concept concerns and scope, and functions of educational psychology

Module II: Human growth and Development (14 hours)

Human Development and growth: Concept, principle; factors influencing development and their relative role; general characteristics and problems of each stage. Stages of human development; stage specific characteristics and developmental tasks; Adolescence in Indian context – characteristics and problems of adolescents; their needs; Theories of growth and development; Piaget, and Bruner, Erickson and Kohlberg –and their educational implications.

Module III: Learning and Memory (12 hours)

Learning: Concept, kinds, levels of learning, laws of learning and various view points on learning; Theories of Learning:; trial and error, classical conditioning, operant conditioning Gagne's theory of learning, Carl Roger's theory of learning and field theory of learning; cognitive view point and information processing; Educational implications of the view points on learning; Memory: Encoding and remembering, different forms of memory, theories of forgetting.

Module IV: Thinking and Problem Solving

Definitions of thinking and problem solving; Piaget's theory of cognitive; Group Dynamics: Group process, Interpersonal relations, Sociometric grouping; Social emotional climate of the classroom and its influence of teacher characteristics; Adolescence – Psychological characteristics and problem of adolescents; role of education in solving their problems.

Module V: Motivation and Personality

Individual Difference: Concept of intra and inter differences: Intelligence and cognitive abilities, identification fostering; Creativity – Nature, Process, Identification, fostering and Guiding creative children; Motivation Cycles; Interests, attitude and values; Adjustment of teaching – learning process to suit individual differences – learning styles and teaching strategies; Atkinson's Theory of Achievement Motivation; Maslow's Self-actualization Theory; Tolman's Sign Gestalt Theory; Gagne's Hierarchical Theory of Learning

COURSE/LEARNING OUTCOMES

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

Module I: Defined psychology (K); Recount the historical antecedents of psychology (K); Explain the importance and significance of educational psychology in the teaching learning process (U); List down the stages of human development (K); Apply the knowledge of the stages of human development in understanding their own growth and development pattern (Ap); Point out their current stage of growth and development (U); Summaries the different specific stage developmental tasks that human beings undergoes during their life time (S); Assess the unique contributions of psychology in the field of education (E)

Module II: Differentiate between growth and development (K); Apply the concepts of growth and development in the context of human being and nature (Ap); List down the principles of human growth and development (K); Identify factors affecting human growth and development (An); Recall the different theories of growth and development (K); Explain the Cognitive development theory of Piaget (U); Identify the different stages of cognitive theory of Piaget (An); Critique on the cognitive development theory of Piaget (E); Explain Moral Development theory of Kohlberg (U); List down the different stages of moral development (K); Find out the current stage of their moral development (Ap); Compare the moral development during childhood stage and that of Adolescent (An); Generalize the moral development pattern of human beings (S); Compare the different theories of personality (An); Assess their own personality based on the theory of Carl Jung (E)

Module III: To list down the different theories of learning (K); Identify the different laws of learning (An); Apply the laws of learning in their our learning (Ap); Write down the different levels of learning (K); Illustrate the different levels of learning (U); Analyse the different levels of learning (An); Apply the knowledge of theory of classical conditioning in their own learning (Ap); Evaluate their own learning style (E); Generalize the different factors that enhance remembering/memory (S); Identify different factors associated with forgetting (An); Point out the different forms of memory (U); Illustrate the cognitive view point and information processing in learning (U); Explain the Gagne theory of learning (K); Contrast Social learning theory with operant conditioning. (E)

Module IV: Define thinking (K); Classify the different tools of thinking (U); Analyze the types of thinking (An); Define adolescence (K); Identify the three main stages of adolescence (An); Assess the growth and development of an adolescent (E); Summarize the different needs and problems of adolescence (S); Assess their own problems they faced as an adolescents (E); Evaluate the significance of group dynamic in group works (E); Point out the different features of group dynamic (U); Identify the different type of

Group formation (An); Differentiate a formal group from informal group (U); Predict the process of group formation (Ap); Generalize the principles of group dynamic (S); State the concept of social emotional climate of the classroom (K); Illustrate the significance of socio-emotional climate of the classroom in the teaching-learning process (U) ; Synthesize the roles of the teacher in promoting a conducive socio-emotional climate in the teaching-learning process (S); Explain the concept of sociometric grouping (K); Identify the individual and group phenomena influencing formation of group in the society (An); Assess the various factors influencing group formation in the classroom environment (E)

Module V: Define the concept of adjustment (K); Identify the factors influencing adjustment (An); Compare the individual and situational factors influencing adjustment (An); Synthesis the adjustment mechanism of people (S); Decide about the type of adjustment mechanism that individuals use in their daily life (E); Identify the symptoms of maladjustment (An); Define intelligence (K); Synthesize the concept of intelligence as given by different thinkers (S); Explain the nature of intelligence (U); State the different functions of intelligence (K); Explain Spearman's two factor theory of intelligence (U); Determine the significance of g factor in the intellectual activity of the organism (E); Compare the Guilford's structure of intellect and Spear's two factor theory as theoretical perspectives of intelligence (E); Explain the mental process or intelligence as a composition of operations, contents and products (K); Assess their own intellectual activities in terms of operations, contents and products (E); Define motivation (K); Identify the different types of motivations (An); Explain Maslow's Human Needs theory as a theory of motivation (U); State Maslow's hierarchy of needs (K); Understand Henry Murray's theory of motivation (U); Identify the viscerogenic and psychogenic needs as the factors of motivation (An); Compare the similarity of Maslow's Theory of motivation with Henry Murray's theory of motivation (E)

Suggested Readings

1. Atkinson, J.W. and Feather, N.T. (1960). A Theory of Achievement Motivation, New York: Wiley Publishers.
2. Bhatnagar, S. (2002). Advanced Educational Psychology, Agra: Bhargava Book House.
3. Chand, T. (2002). Educational Psychology, Agra: Bhargava Book House.
4. Crow, R.B. and Crow, A. (1964). Educational Psychology, New Delhi: Eurasia Publishing House.
5. Dececee, .J.P. (1970). The Psychology of Learning and Instruction, New Delhi: Prentice Hall.
6. Dhir, R.N. (2002). Educational Psychology, Chandigarh: Abhishek Publication.
7. Ewen R. B. (2010). An Introduction to the theories of personality, 7th Edition. New York: Psychology press.
8. Forsyth, D. R. (2006). Group Dynamics. Fifth Edition. USA: Wadsworth, Cengage Learning.
9. Gagne, R.M. (1976). The Conditions of Learning (2nd edition), New York: Rinehart and Winston.
10. Guilford, J.P. (1967). The Nature of Human Intelligence, New York: McGraw Hill.
11. Hulac, D. M., and Benson, N. (2011). Getting Students to Work Smarter and Harder: Decreasing Off-Task Behavior Through Interpersonal Techniques. School Psychology Forum,5(1), 29-36.
12. Judd, C.H. (2002). Educational Psychology, Guwahati: Nivedita DK Distributions.
13. Kuppuswamy, B. (1963). Advanced Educational Psychology, Jalandhar: Jalandhar University Publications.
14. McLaren, C., Edwards, G., Ruddick, S., Zabjek, K., and McKeever, P. (2011). Kindergarten kids in motion: Rethinking inclusive classrooms for optimal learning. Educational and Child Psychology, 28(1), 100-113.
15. Mukunda, K. V. (2009). What did you ask at school today? A handbook of child learning. Noida, UP: HarperCollins, 371
16. Putwain, D. W., and Symes, W. (2011). Teachers' use of fear appeals in the Mathematics classroom: Worrying or motivating students? British Journal of Educational Psychology, 81(3), 456-474. doi:10.1348/2044-8279.002005
17. Rao, K.R., Parajpe, A.C. and Dalal, A.K. (Ed). (2008). Handbook of Indian Psychology, New Delhi: Cambridge University Press India.
18. Reynolds, W. M and Miller, G. E. (2003). Current perspectives in Educational Psychology. In Handbook of Psychology Vol. VII (ed.) Irving B. Weiner. Canada: John Wiley and Sons, Inc.
19. Rogers, C. (2012). Transition, self-regulation, independent learning and goal theory. Psychology Of Education Review, 36(2), 26-31.

20. Sahoo, F.M. (2002). Psychology in Indian Context, Agra: Bhargava Book House.
21. Sharma, R.N. (2002). Educational Psychology, Guwahati: DVS Publication.
22. Sternberg, R.J (2003). Contemporary Theories of Intelligence. In Handbook of Psychology Vol. VII (ed.) Irving B. Weiner. Canada: John Wiley and Sons, Inc.
23. Swiderski, S. M. (2011). Transforming Principles into Practice: Using Cognitive Active Learning Strategies in the High School Classroom. Clearing House, 84(6), 239-243. doi:10.1080/00098655.2011.590549
24. Weinstein, C., Acee, T. W., and JaeHak, J. (2011). Self-regulation and learning strategies. New Directions For Teaching and Learning, 2011(126), 45-53. doi:10.1002/tl.443

EDTE0013: EMERGING TRENDS IN EDUCATION

(3 Credits - 45 Hours)

Objectives:

- *To impart in students the knowledge of the contemporary issues in education.*
- *To acquaint students with the information related to recent techniques in Education.*
- *To make students aware of the various challenges and hurdles faced by the Educational Institutions.*

Module I: Recent Pedagogical and Delivery Techniques (10 Hours)

Distance Education – Purposes, functions, organization and management of Distance Education Programme; e-learning – Nature, Characteristics Styles, Arrangement for e-learning in an educational institution; Virtual Classrooms – Modus operandi, Advantages and Limitations. Teleconferencing and Videoconferencing – Meaning, types, Educational Advantages.

Module II: Recent Techniques in Education (10 Hours)

Language laboratory - Need, Types, Functioning, Uses and Applications. Team Teaching-Meaning, Definition, Objectives, Principles, Types, Organization, Procedure and steps, Advantages and Limitations. Co-operative learning and collaborative learning-Key elements-Implementing the elements

Module III: Autonomy, Accountability and Accreditation (8 Hours)

Autonomy-Meaning, Need, Academic, Administrative and Financial Autonomy, Objectives, Salient Features, Advantages of Autonomous colleges. Accountability and Accreditation; Accreditation process, Assessment and Accreditation –NAAC, NBA-ISO, Accreditation and Certification

Module IV: Challenges in School Education (10 Hours)

Current student related Challenges: Parental Involvement, Drugs and Violence, School safety. Current Teacher related challenges: Diverse learning needs, Quality and expectations, Pupil-Teacher ratio. Teacher mentee /mentor programs. Current School related challenges- Technology issues, Bullying, harassment and ragging.

Module V: Learning Environment in Educational Institutions (7 Hours)

The concept of Institutional environment, The classroom learning environment- Disciplinary problems, The effects of the Institutional environment on Academic performance, Punishment and its effects. Creating Trustworthy school environments. Guidance and Counselling.

COURSE/LEARNING OUTCOMES

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

Module I: State the concept, purpose and functions of distance education (K); Explain the functions and management of distance education (U); Establish the distance education center and running it effectively (Ap); Write the meaning, features, models ,styles and arrangement for e-learning (K); Explain the concept and features of e-learning (U); Use e-learning for the purpose of performance in any field of learning (Ap); Define virtual classroom (K); Explain the concept of virtual classroom (U); Use virtual classroom for effective learning (Ap); State the merits and demerits of virtual classroom (K); Explain the concepts of

teleconferencing and video conferencing as the modes of learning (U); Define teaching (K); Distinguish between teaching and instruction (U); Explain the levels and phases of teaching (U); Define a model of teaching (K); Explain the elements of the model of teaching (U); Prepare the instructional materials and using a model of teaching in the classroom (Ap); Apply micro teaching for the inculcation of teaching skills among the pupil teachers (Ap); Explain the concept of FIACS (U); Use the FIACS for observing the behavior of a teacher in the classroom (Ap)

Module II: Write about language laboratory, its need, types and functions (K); Explain the utility of language laboratory for effective teaching (U); Define team teaching (K); Explain the steps of team teaching (U); Apply team teaching in the classroom (Ap); Evaluate the effect of team teaching in terms of learning of students (E); State the objectives and principles of team teaching (K); Define collaborative learning (K); Explain the steps of collaborative learning (U); Analyze the elements of collaborative learning (An); Use the collaborative learning for creating maximum learning among the students (Ap); Evaluate the process of collaborative learning in terms of the performance of students (E); Summarize the features of micro teaching , team teaching and collaborative learning (S)

Module III: Write the meaning, need and objectives of autonomy (K); Explain the academic, administrative and financial autonomy (U); Use the concept of autonomy in educational institution (Ap); Analyze administrative, financial and academic autonomy of an educational institution (An); Define accountability (K); Explain the features by educational accountability (U); Explain the implication of accountability (U); State the meaning of accreditation (K); Explain the parameters of assessment and accreditation of an educational institution (U); Assess and accredit the educational institution (E); Explain the functions of NAAC,NBA and ISO in the context of accreditation and certification (U)

Module IV: State the challenges relating to students (K); Analyze the challenges relating to the students of an educational institution (An); Solve the problems of students (Ap); Explain the role of parents in solving the problems of students (U); Use the involvement of parents in making the smooth and effective functioning of the school (Ap); Identify and analyze the teacher related problems (Ap); Find out the diversified needs of the learnings (Ap); Meet up the needs of the learners by adopting some effective measures (Ap)

Module V: Define the term environment (K); Write the meaning of institutional environment (K); State the elements of institutional environment (K); Explain the institutions and classroom learning environment (U); Find out the effects of institutional environment on the academic performance of students (AP); Define the concept of trustworthy environment (K); Create trust worth environment in the institution (AP); Identify the causes of indiscipline in institutions and solving the problems of indiscipline (AP); Organize the guidance and counselling services (AP)

Suggested Readings

1. Associates, A. F. (2000). Leading Academic Change: Essential Roles for Departmental Chairs. San Francisco: Jossey -Bass Publishers.
2. Associates, H. D. (2000). Higher Education in the Era of Digital Competition – Choice and Challenges. Modison: WI Atwood Publishing.
3. Association of Indian Universities. Privatization of Higher Education. 2003
4. Association of Indian Universities: Accountability and Autonomy in Higher Education. 1998
5. Association of Indian Universities: Excellence in Achieving Social Relevance in Higher Education. 1993
6. Chauhan, S.S (2004) Innovations in Teaching Learning Process. New Delhi, Vikas Publication
7. Gandhi, M.M (2013). Autonomy and Accountability in Higher Education- An Indian Perspective. IOSR Journal of Research and Method in Education. Vol. 3, Issue 5 (Nov-December) pp. 33-37. Retrieved from http://www.iosrjournals.org/iosr-jrme/papers/Vol-3%20Issue-5/F0353337.pdf?id=7370
8. Govindasamy, T. (2001). Successful implementation of e-learning: Pedagogical considerations. The internet and higher education, 4(3), 287-299.
9. Haynes, N. M. (1996). Creating safe and caring school communities: Comer school development program schools. Journal of Negro Education, 308-314.

10. Hernes, G and Martin, M. (eds) (2008). Accreditation and the global Higher education market. UNESCO: International Institute for Educational Planning. Retrieved from http://unesdoc. unesco.org /images/0016/001635/163514e.pdf. Accessed on 19 July, 2016.
11. Holmberg, B. (2005). Theory and Practice of Distance Education. 2nd Edition. Routledge.
12. Mangal, S.K (2005) Essentials of Educational Technology. Ludhiana, Tandon Publications.
13. McIsaac, M. S. and Gunawardena, C. N. (2005). Distance Education. Retrieved from http:// www.aect.org / edtech /ed1/pdf/13.pdf. Accessed on 19 July, 2016.
14. Mehta, R. (2004). Crisis in Higher Education. Delhi : Kalpaz Publications.
15. Ministry of Human Resource Development Department of Secondary and Higher Education (2005).Report of the Government of India Central Advisory Board of Education (CABE) Committee On Autonomy of Higher Education Institutions. Retrieved from http://mhrd.gov. in/sites/upload_files /mhrd/files/document-reports/Autonomy HEI.pdf. Accessed on 19 July, 2016.
16. Narkhede, S. (2001). Challenges of higher Education in India. New Delhi: Sarup and Sons.
17. Pollack, I., and Sundermann, C. (2001). Creating safe schools: A comprehensive approach. Juvenile Justice, 8(1), 13-20.
18. Purushotham, H.R (2009). Team Teaching: An Alternative to Lecture Fatigue. Edutracks, 9(1), 5-7
19. Singh, A. and G.D.Sharma. (1989). Higher Education in India: The Institutional Context (ed.), New Delhi: Konarch

EDDE0014: HISTORY AND DEVELOPMENT OF EDUCATION IN INDIA

(3 Credits - 45 Hours)

Objectives:

- *To develop in the students an understanding of the progress of education in ancient India- Vedic and Buddhist Education*
- *To develop in the students an understanding of the progress of education in medieval India- Islamic education*
- *To impart knowledge about the various committees and commissions formed for the progress of education during the pre- and post-Independent India.*
- *To impart knowledge about the various Government policies related to Education*

Module I: Ancient Indian Education (8 Hours)

Fundamentals of Ancient Indian Education, Salient features, purpose of studying Vedas, Relevance of Ancient Indian education in the 21st Century. Chief Characteristics of Vedic Educational System; Education in post Vedic (Buddhist) period – features. Female education; *Swardhyaya* (Self-Learning), Duties of teachers and students in Vedic and post Vedic period, Introduction to Islamic Education, State patronage and Growth of education, Primary Education (*Maktabs*), Higher Education (*Madarsas*), Female Education, Student and Teacher relationship.

Module II: Education during Pre Independent India (13 Hours)

Anglicization of Education 1836-1855- Exponents of Oriental Education, The Anglicists, Macaulay's Minutes and its effect, Wood's Despatch – 1854, India Education Commission regarding Primary, Secondary and University Education, The University Commission (1902), The Hartog Committee (1928-29), The Filtration Theory of Education. Important Development in Education during 1921-1931- Inter University Board, Establishment of new Universities, Teachers Training, Technical Education.

Module III: Education during Post Independent India (14 Hours)

Various Commission and policies in Education - Secondary Education Commission 1953, Education Commission 1964-66, National Policy on Education 1986, Ramamurthy Review Committee 1990, National Commission on Teacher 1999, National house Committee 2004; problems of Indian Education- Wastage and Stagnation, Examination Reform, Inclusive Education and Education of the Marginalized.

Module IV: Current Government Policies (10 Hours)

Unni Krishnan commission, DPEP, National policy on ICT,National Commission Report, Panchayat Raj Act, Rashtriya Madhyamik Shiksha Abhiyan, Rashtriya Uchchatar Shiksha Abhiyan ,SSA, RTE, Right to Information Act, Total Literacy Campaign,NAEP,National Knowledge Commission, Education for all,NAS,SPQEM etc.

COURSE/LEARNING OUTCOMES

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

Module I: State the fundamentals of Ancient Indian Education (K); Explain the fundamentals of Ancient Indian Education (U); Illustrate the feature and purposes of studying Vedas (U); Find out the relevance of Ancient Indian Education in 21st century (Ap); Write the basic features of Vedic education system (K); Analyze the Vedic education in post Vedic period in terms of duties of teachers and students (An); State the Islamic education (K); Analyze the different aspects of Islamic education (An); Find out the implications of Islamic education on the quality of life (Ap); Explain the growth of Islamic education (U); Explain the female education and relationship between students and teachers in Islamic Education (U)

Module II: State the educational development from 1836 to 1855 in India (K); Analyze the educational development in India before independence (U); Explain the exponents of oriental education (U); State Macaulay minute and its effects (K); Write about Wood's Despatch-1854 (K); Find out the effect of Wood's Despatch on the learning of students (Ap); Explain the university education (1902), Hartog committee (1928-29) (AP); Explain the filtration theory of education. (Ap); Find out the effect of filtration theory of education (Ap); State the educational development during 1921-1931 in India (K)

Module III: State policies and programmes of education in India after independence (K); Explain the features of Secondary Education Commission (1953), and Education Commission (1964-1966) (U); Identify the impact of different commissions and committees on the quality of education in India (Ap); State the basic features of NPE 1986 (K); Analyze the different components of NPE 1986 (An); Find out the effects of NPE -1986 on the qualitative improvement in education (Ap); Explain the features and changes inducted in POA-1992 (U); Explain the concept of teachers education and basic features of Teacher Education Commission-1999 (U); Identify the problems of Indian Education and suggest some solutions of these problems (Ap); Conduction research or action research on some problems and giving the solutions of those problems (Ap)

Module IV: State the features of Unni Krishnan Commission (K); Explain the objectives and structure of DPEP (U); Find out the effect of DPEP (Ap); Analyze the problems of DPEP (An); Solve the identified problems of DPEP (Ap); State the National Policy on ICT (K); Explain the role of Panchayat in educational development (U); Explain the features of SSA and RMSA (U); Find out the effects of SSA and RMSA on the quality of Education (Ap); Explain the features of RTE Act 2009 (U); Evaluate the TLC,NAEP and find out the effectiveness of these programmes (Ap); Explain the structure of NKC, EFA, NAS, SPQEM (U)

Suggested Readings

1. Acharya, P. (1978). Indigenous vernacular education in pre-British era: Traditions and problems. Economic and political weekly, 1981-1988.
2. Dash, M. (2000), Education in India: Problems and Perspectives, Eastern Book Corporation
3. Ghosh, S. C. (2007), History of Education in India, Eastern Book Corporation.
4. Govt. of India, report of the University Education Commission,(1949) Vol -I, Simla.
5. Jain, M. (2003), History in the New NCERT Textbooks Fallacies in the IIIC Report, Delhi NCERT.
6. Lall, M. (2005), The Challenges for India's Education System, Chatham House: London
7. M.H.R.D, Report of the University Education Commission (1948), Ministry of Education, New Delhi, Govt. of India.
8. M.H.R.D. Challenges of Education (1985). A policy perspective, Ministry of Education, New Delhi, Govt. of India.
9. M.H.R.D. Report of the Secondary Education Commission (1952). Ministry of Education, New Delhi, Govt. of India.
10. Mookerji, R. K. (1990), Ancient Indian Education: Brahmanical and Buddhist, Delhi, Motilal Banasidass Publishers.

11. Niak J.P. (1963) The role of govt. of India, Ministry of Education.
12. Nurullah S., Naik J.P. and Oad L.K. (1970). A student history of education in India, Mumbai: McMillan and Co.
13. Ramchandra, P. and Ramkumar V. (2005), Education in India. Eastern Book Corporation.
14. Rawat, P. L. (1956), History of Indian Education: Ancient to Modern, Delhi Bharat Publication.
15. http://mhrd.gov.in/sites/upload_files/mhrd/files/document-reports/NPE86-mod92.pdf
16. http://www.teindia.nic.in/Files/Reports/CCR/Yash%20Pal_committe_report_lwb.pdf
17. http://ncte-india.org/ncte_new/pdf/NCFTE_2010.pdf
18. http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf

EDET0015: EDUCATIONAL TECHNOLOGY

(3 Credits - 45 Hours)

Objectives: *The aims of this course on Educational Technology are*

- *To impart to the students an understanding of the Concept, Scope and Significance of Educational Technology in the Education System.*
- *To describe the Teaching Models and explain the concept of instructional design*
- *To describe the application of programmed instruction in the teaching-learning process.*
- *To impart the knowledge and understanding of the methods of ICT integration and other advanced techniques of instruction in education.*
- *To develop an insight into the multimedia applications in teaching learning.*

Module I: Educational and Behavioural Technology (13 Hours)

Meaning, nature and scope; Historical perspective of Educational Technology; approaches- Software, hardware and system; Utility and problems of Educational technology in Formal and non-formal education; Behavioural Technology: teacher behaviour and teaching behaviour, teaching skills, Micro Teaching SSST and FIACS

Module II: Designing Instructional System (12 Hours)

Teaching learning process, variables, levels, functions taxonomies of instructional objective, instructional startegies, PI, PSI, MI, CAI, BMLS

Module III: Process of Communication and ICT (10 Hours)

Concept and process of communication, Barriers to communication, principles of communication, Mass Media and multi media; concept and need of ICT

Module IV: Emerging trends in Educational Technology (10 Hours)

Distance Education; Open learning system; New technologies- Videotapes, Radio, Teleconferencing, CCTV, INSAT, EDUSAT, Internet, Broadband; Resource centres for Educational Technology: CIET, UGC, IGNOU, NIOS; 3D printing, mobile learning, Gamification, Flipped, blended learning/classrooms, Cloud computing, Massive open online course (MOOCs), Flashnotes, Virtual Reality, Wearables, etc

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'educational technology' (K); Analyze the different definitions of educational technology (An); Explain the nature of educational technology (U); Write the historical background of educational technology (K); State the approaches of educational technology (K); Explain the hardware ,software and systems approach (U); Use the hardware and software approaches in the classroom for effective teaching (Ap); Apply systems approach for the improvement of learning outcomes (Ap); Explain the concept of ICT (U); Write process of communication (K); Analyze the process of communication (An); Synthesize the basic features of educational technology (S); Write the principles involved in the process of communication (K); Evaluate the process of communication (E); State the scope of educational technology (K); Define instructional technology (K); Explain the concept of instructional technology (U); Use the new approaches of teaching in the class room for effective teaching (Ap); Explain the verbal and non- verbal interaction in the classroom which the teacher and students process (U); Define mass media (K); Explain the concept of multimedia approach in the process of mass communication (U)

Module II: Define instructional objectives (K); Formulate instructional objectives (Ap); Analyze the task of teaching (An); State the different instructional strategies (K); Eexplain the methods like- lecture, team teaching,discussion,seminar,tutorialetc (U); Differentiate between a method and approach of teaching (U); Apply the different methods of teaching in a classroom (Ap); Write the meaning of programmed instruction (K); State the origin and types of programme instructional styles (K); Develop the programmes instructional material (AP); Explain the concepts of CAI and multimedia presentation (U); Apply CAI or multimedia presentation in classroom (Ap); Synthesize the plus points of programmed instruction and CAI in the context of classroom teaching(S); Analyze the features of PI and CAI (An)

Module III: State the meaning of distance education (K); Explain the significance and features of distance education (U); Explain the concept of open learning system (U); Differentiate between distance education and open learning system (U); Use new technologies in the teaching-learning process (Ap); Analyze the roles of resource centers of Educational technology (An); Prepare the software's for various hardware's and using in the classroom (An); State the roles of CIET,UGC,IGNOU and NIOS in the field of educational technology (K)

Module IV: State the meaning of 3D printing (K); Illustrate the concept of 3D printing (U); Write about the concept of mobile learning (K); Explain the merits of 3D printing and mobile learning (U); State the meaning of gamification (K); Analyze the components of gamification (An); Use 3D,mobile and gamification in the process of learning (Ap); Describe the nature of flipped and blended learning (K); Illustrate the utility of flipped and blended learning (U); Define cloud computing, MOOCs, flashnotes, virtual and wearability etc.(K); Apply cloud computing in the management of library (Ap); Use flashnotes, virtual classrooms for teaching and learning (Ap); Explain the nature and scope of MOOCs in the present context (U)

Suggested Readings

1. Ahalt, S. (2015). Ten Emerging Educational Technology. *Renci White paper Series*, Vol. 3, No. 1 pp. 1-18.
2. Barle David (1960), The Process of Communication, Holt andRinerhart New York.
3. Bhatia, R.L. and Ahuja, B.N. Educational Technology. New Delhi: Surjeet Publications.
4. Bhatta B.D. and Sharma, S.R. (1992). Educational Technology- Concept and Techniques, Kanishka Pub. House New Delhi.
5. Dale Edgar (1961) Audio Visual Methods in Teaching, Holt Rinehart and Einston, New York.
6. Das R.C. (1993) Educational Technology-A basic Text, Sterling, New Delhi.
7. Dhand,H., Techniques of Teaching, APH Publishing Corporation.
8. Hooft, M. V. (2008). Mobile, Wireless, connected information clouds and learning. *Emerging technologies for learning*. Vol. 3.pp. 30-46.
9. Jangira N.K. and Ajit Singh (1982), Core Teaching Skills: The Micro Teaching Approach, NCERT, New Delhi.
10. Joyce, and B Weil, Models of Teaching, Prentice Hall, New Jersey.
11. Mangal S.K. Foundations of Educational Technology, Prakash Brothers Ludhiana.
12. McIsaac, M. S. and Gunawardena, C. N. (2005). Distance Education. Retrieved from http://www.aect.org /edtech/ed1/pdf/13.pdf. Accessed on 19 July, 2016.
13. Nayak, A.K. Classroom Teaching Methods and Practices: APH, Publishing Corporation.
14. Passi, B.K (1976) Becoming Better Teacher, Micro Teaching Approach, Sahita Mudranalya, Ahmedabad.
15. Sechdeva, M.S. A New Approach to Educational Technology, Vinod Publications.
16. Sharma R.A. Technological Foundations of Educational Publications Meerut.
17. Sharma, R.A. (1983) Technology of Teaching: International Publishing House.
18. Venkataiah: Educational Technology, APH Publishing Corporation New Delhi.
19. Walia. J.S. Essentials of Instructional Technology; Paul Publishers Punjab.

EDPC0016: PEACE EDUCATION AND CONFLICT MANAGEMENT

(3 credits - 45 Hours)

Objectives: *To enable students*

- *To understand the importance and relevance of peace education*
- *To comprehend the concept of peace as held by different thinkers and other religious beliefs*
- *To bring awareness of the modes and methods for conflict management*
- *To familiarize with global issues and peace movements*

Module I: Understanding peace as a dynamic social reality (10 hours)

Peace – meaning, nature; theories of peace – democratic peace and active peace; religious beliefs and peace – Buddhism, Islam, Hinduism and Christianity

Module II: Philosophy of peace and peace education (10 hours)

Montessori, Freire, the Dalai Lama, Gandhi, Krishna murthy, Aurobindo and Tagore; Concept and scope of peace education; peace teacher, peace method and other enabling practices for a culture of peace in an educational setting

Module III: Conflict management and its methods and modes (9 hours)

Meaning, types, levels and reasons for conflict; approaches to the study of conflict; methods and modes of conflict resolution - mediation, negotiation, diplomacy, coercive methods; creative peace building, cross cultural methods

Module IV: Global issues and peace movements (8 hours)

Human rights, preservation of ecology, population control, economic exploitation, deprivation, equitable economic world order; non-alignment movement, campaign for nuclear disarmament and role of world organizations in promoting peace

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'peace' (K); Explain the nature and theories of peace (U); Use the theory of peace in an educational institution (Ap); Analyze the theories of peace (An); Evaluate the theories of peace (E); Explain the roles of different religions in creating peace (U); Find out the effectiveness of religions in generating peace in the society (Ap)

Module II: Describe the contributions of Montessori, Friere and Dalai Lama in creating peace in the world (K); Explain the contributions of Gandhi,Krishnamurty, Aurobindo and Tagore in creating peace (U); Compare the roles of Montessori,Friere , Gnadhi,Aurobindo and Tagore (AP); Apply the philosophies of great personalities of the world in classroom teaching (AP); Explain the role of teachers in generating peace in the society (U); State the practices for a culture of peace (K); Apply different practices in life for enhancing peace in society (Ap)

Module III: State the concepts of conflict and conflict management (K); Explain the process conflict management (U); Analyze the factors affecting conflict management (An); Use the process of conflict management in practice (Ap); Name the approaches /methods to resolve conflicts (K); Explain the approaches to conflict resolution (U); Explain the meaning of mediation, negotiation, coercive method and cross cultural methods (U); Use diplomacy in resolving the conflict (Ap)

Module IV: State the human rights (K); Explain the significance of human rights (U); Define the term 'ecology' (K); Explain the practices of preservation of ecology (U); Write the meaning of population control (K); Name the methods and approaches of population control (K); Explain the approaches of population control (U); Explain the concept of economic exploitation (U); Identify the causes of economic exploitation and eliminate the exploitation (Ap); Explain the non- alignment movement (U); Explain the nuclear disarmament and the role of UNO in promoting peace in the world. (U)

Suggested Readings

1. Dalai Lama (1998). The joy of living and dying in peace. (ed.) Donald S. Lopez. Jr. Dharamsala: Tibetan and Archives.
2. Diwahar, R. R.,and Agarwal, M. (Ed). (1984). Peace education. New Delhi: Gandhi Marg.
3. Doyle, M. W. (2012). Liberal peace: Selected essays. London and New York: Routledge.
4. Duckworth, C. (2006). Teaching peace: a dialogue on the Montessori method. Journal of Peace Education, 3(1), 39-53.
5. Fountain, S. (1999). Peace education in UNICEF. New York: UNICEF.
6. Gat, A. (2005). The Democratic peace theory reframed: The impact of modernity. World Politics, 58, pp. 73-100.
7. Girard, K. (1995). Preparing teachers for conflict resolution in the schools. Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education
8. Heopper, B (2002). Peace education and years 1to 10 studies of society and environment key learning Area. Queensland: Queensland School Curriculum Council.
9. Johan, G. (1996). Peace by peaceful means. New Delhi: Sage Publication.
10. Krishnamurti, J. (n.y). Education and Significance of life. Retrieved from http://www.jkrishnamurti.org/krishnamurti-teachings/view-text.php?tid=51&chid=66876.
11. Layne, C. (1994). Kant or Cant: The Myth of the Democratic Peace. International Security, Vol. 19. Issue 2, pp. 5-49.
12. Montessori, M. (1943). Peace and Education. India: The Theosophical Publishing House.
13. Morrison, M. L. (2003). Peace Education. Australia: McFarland
14. Nair, G. (1997). Peace education and conflict Resolution in school. Health Administrator Vol. XVII, Number 1:38-42.
15. Pant, D. and Gulati, S (2014). Ways to peace: a resource book for teachers. New Delhi: National Council of Educational Research and Training.
16. Salomon, G., & Nevo, B. (2002). Peace Education: The Concept, Principles, and Practices around the World. London: Lawrence Erlbaum Associates
17. Sheean, V. (1955). Mahatma Gandhi, a great life in brief. New Delhi: Random House.
18. UNESCO. (2005). Peace Education: Framework for Teacher Education. New Delhi: UNESCO

EDSF0017: SOCIOLOGICAL FOUNDATIONS OF EDUCATION

(4 Credits - 60 hours)

Objective: *This course in sociological foundation of education probes into educational systems of past and present, to comprehend the relationship between education and social change. Education is inseparable from society. Emerging theories, methodologies and policies of society play a vital role in forming an understanding of contemporary education and determining its future. Besides teaching and learning, educational institutions are crucial for shaping the broader society. To understand this it is important to consider the relationships within and outside the educational institutions and between various stakeholders. The sociological perspective will enable students to have a better grasp of the larger social reality that affect educational institutions and their mission.*

Module l: Concept and Approaches (10 Hours)

Education from a sociological point of view – functionalism, structuralism, system approaches to education and a critical evaluation of these approaches; transition from pre-capitalist to capitalist social formations and its impact on educational structure and function; education and social groups, education in a multi-cultural context.

Module ll: Theoretical Perspective of Educational Sociology (15 Hours)

Theoretical approaches to educational sociology and their relevance in present day scenario - stand point theory, theory of social learning by Bandura, social realism, critical theory, rational choice theory, human capital theory, conflict theory.

Module lll: School as a Social Institution (15 Hours)

School as a social institution, school as an organization; hierarchy of authority and their functions in school, unpacking schools` social contexts - contexts and factors shaping differences in schooling and

schooling outcomes, schools as sites for social development, school choice, social mobility by means of education; organisational climate types, classroom climate and its impact.

Module IV: Cross-National Perspectives on the Sociology of Education (10 Hours)

a) Culture - conceptual understanding of culture, developing intercultural competency through education, culture and personality, education for cross-national understanding;
b) Education beyond geographical barriers - distance education, online certification courses, student and faculty exchange programmes, curriculum goals for creating globally competent students.

Module V: Schooling in the Context of Globalization and National Policies (10 Hours)

Central policies of education, privatization of education, sanskritisation and westernization of society and role of education, conceptualizing modernization from educational point of view, present education system and sociological issues - primary level, secondary level, higher educational level.

COURSE/LEARNING OUTCOMES

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

Module I: State the meaning of sociology (K); Explain the relationship between sociology and education (U); State the meaning of sociology of education (K); Explain the scope of sociology of education (U); Differentiate educational sociology from sociology of education (An); Summarize the function of education from a sociological point of view (S); Conclude the need of studying sociology of education (S); Understand the different theoretical approaches to Sociology of Education (U); Identify the major theories that have contributed towards the field of sociology of education (An); Explain the concept of society from the functionalism view points (U); List down the functions of Functionalism (K); Critique the viewpoints of functionalism on society (E)

Module II: Explain the perspective of conflict theorists on society (U); Contrast the perspective of conflict theorist on society from that of functionalists (E); Summarize the contributions of different perspectives on better understanding of society (S); Describe the basic principles and tenets of symbolic interactionism in understanding society (K); State and explain the different theories associated with Symbolic interactionism (K); Interpret and apply symbolic Interactionists perspectives in school (U); Relate the rational choice theory in explaining the actions of individual in society (Ap); Critique rational choice theory in explain the complex social phenomena (E); Give a historical account of the evolution of feminism (U); List down the specific foci of feminist standpoint theory (K); Explain social realism in the understanding of social life (U); Explain the social theory in understanding and critiquing the changing society (U)

Module III: Explain the concept of classroom climate (U); Assess the impact of classroom climate on students' learning (E); Identify the factors that influence climate classroom (An); Define classroom climate (K); Summarise the dimensions of classroom climate (S); Illustrate the factors promoting positive classroom climate (U); Explain school as a center of community service (U); Justify the concept of school as community center (An); Demonstrate the connection between school and home (Ap); List down the educational function of the family (K); Analyse the need of parent-teacher cooperation in the teaching-learning process (An); Pinpoint the difficulties in securing home-school cooperation in the teaching-learning process (An); Propose method for securing healthy cooperation between the home and the school in the teaching-learning process (Ap); Explain the relationship between school and society (U); Predict the impact of society on education and vice-versa (Ap); Generalize the duties of school towards education (S)

Module IV: List down the agencies of education (K); Explain the concept of community (U); Infer the importance of community in the education of the child (An); List down the educational functions of the community on child (K); Suggest ways and means to make community an effective agency of education (Ap); Illustrate the role of family as an agency of education (U); Explain the meaning of socialization (U); Explain socialization as a process of acculturation (U); List down function of educational institution in socialization (K); Differentiate between state management and state control of education (U); Summarise the educational functions of state (S); Identify the merits and demerits of state control on education (An)

Module V: Define and explain the meaning of culture (K); List down different types of culture (K), Differentiate between material and non-material culture (U); Explain the concept cultural lag (U); Summarise the role of education in promoting and conserving culture (S); Identify the influence of culture on education (An); Explain the broad concept of Democracy (U); Apply the ideas of democracy in the context of education (Ap); Incorporate democratic ideas in formulation of curriculum (Ap); Explain the meaning of International understanding (U); Justify the need of international understanding in the present scenario (E); Propose the various principles of international understanding (Ap); Explain the concept of nationalism (U); Differentiate between nationalism and patriotism (U); Summarize the role of education in promoting the spirit of nationalism (S); Explain the meaning of national integration (U); List down the obstacle of national integration (K); Suggest educational programme for national integration (Ap); State the demerit of education for national integration (K); State the meaning of Sanskritization (K); Differentiate between Sanskritization and Brahmainisation (U); Analyse the process of Sanskitization (An); Explain the concept social mobility (U); Differentiate between horizontal and vertical mobility (U); Apply the concept of vertical mobility in society (Ap); State the different dimensions of social mobility (K); List down causes of social mobility (K); Summarise the factors affecting social mobility (S); Apply the concept of social mobility in the classroom context (Ap); Explain the concept of social stratification (U); Summarize the process of stratification (S); Explain the concept of equality of educational opportunity (U); Explain the concept of westernization (K); State the concept of modernization (K); Differentiate westernization from modernization (U)

Suggested Readings

1. Below, S. V., Powell, J. J., & Roberts, L. W. (2013). Educational Systems and Rising Inequality: Eastern Germany after Unification. Sociology of Education, 86(4), 362-375.
2. Bills (2013). 2013. Sociology of Education reviewer awards. Sociology of Education, 86(4).
3. Binder, A. J. (2013). Sociology of Education's Cultural, Organizational, and Societal Turn. Sociology of Education, 86(4), 282-283.
4. Bose, S. (2012). A Contextual Analysis of Gender Disparity in Education in India: Women's Status and Community. Sociological Perspectives, 55(1), 67-91.
5. Brown, F.J. Educational Sociology, Prentice Hall of India, New Delhi.
6. Clinard, M. B., & Elder, J. W. (1965). Sociology in India: A Study in the Sociology of Knowledge. American Sociological Review, 30(4), 581-587.
7. Damle, Y. B. (1974). Sociology in India: its teaching and status. International Social Science Journal, 26(2), 343-348.
8. Goel, S. K. (1990). Education, Training, and Rehabilitation of the Handicapped in India. Retrospect and Prospect. Education & Society, 8(1), 21-29.
9. Harding, 0. J. (2011). Rethinking the Cultural Context of Schooling Decisionism Disadvantaged Neighborhoods: From Deviant Subculture to Cultural Heterogeneity. Sociology of Education, 84(4), 322-339.
10. Hodkinson, A., & Devarakonda, C. (2009). Conceptions of inclusion and inclusive education: A critical examination of the perspectives and practices of teachers in India, Research in Education, (82), 85-99.
11. MacIver and Page- Society: An Introductory Analysis, Macmillan.
12. Nakamura, T. (2013). Sociologization, Pedagogization, and Resociologization: Has the Post-war Japanese Sociology of Education Suffered from the Galapagos Syndrome? International Journal of Japanese Sociology, 22(1), 64-79.
13. Sharma, C. L. (1990). Crisis of Character in India: The Need for Moral Education. Education & Society, 8(1), 64-73.
14. Smith R. Eliot et al, (2000). Social Psychology. U.S.A.: Taylor and Francis.
15. Von Below, Powell, J. W., & Roberts, L. W. (2013). Educational Systems and Rising Inequality: Eastern Germany after Unification. Sociology of Education, 86(4), 362-375.
16. Wright, R. (2014). The Fourth Sociology and Music Education: Towards Sociology of Integration. Action, Criticism, and Theory for Music Education, 13(1), 12-39.

EDTK0018: THEORY OF KNOWLEDGE

(3 Credits - 45 Hours)

Objective:*The course aims at developing educational practitioners who can facilitate the process of knowledge construction, organisation of the curriculum and make a significant contribution in learner's experiences towards 'learning to learn'. The modules highlight not only the concepts to be discussed but also the abilities to be nurtured. Learners will be able to*

- *Appreciate the different 'forms of understanding'.*
- *Derive key principles for teaching-learning experiences in each of the discipline.*
- *Analyse the classroom interactions through the lens of 'critical pedagogy'.*
- *Critically review the textbooks with the lens of 'knowledge' and 'power'.*

Throughout the course dialogic method of teaching will be used so that students can experience constructivist way of teaching and learning. Students will be required to present and initiate dialogue.

Module I: Introduction to knowledge and Forms of Understanding (12 Hours)

Difference in Belief, assumptions, information, and Knowledge. Knowledge as true justified belief. Sources of knowledge, types of knowledge, forms of understanding/ different kinds of knowledge and their validation processes, role of learner (knower) in knowledge construction.

Reviewing how students learnt subjects in school and college and critically analyse the processes through the lens of 'knowledge'.

Module II: Facilitating knowledge construction (12 Hours)

Nature, process of construction, pedagogy (andragogy) and assessment of: Mathematical knowledge, Knowledge of science; Knowledge of humanities and social sciences; Aesthetics

Dialogue on 'knowledge claims' and 'validation' of the claims in each of the disciplines.

Module III: Understanding Curriculum (10 Hours)

Curriculum framework, curriculum and syllabus. Process of/approaches to curriculum organisation and development; principles for selection of content and processes.

With reference to school, college and university curricula - Study of NCF 2005, NCERT syllabi for school education, curricular documents of degree courses.

Module IV: Knowledge and power (11 Hours)

Knowledge and power-Dominance, inclusion and exclusion of knowledge in curriculum and text books. Academic knowledge and everyday knowledge; Knowledge of the marginalised, indigenous knowledge.

COURSE/LEARNING OUTCOMES

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

Module I: Write the conceptual framework of knowledge (K); Differentiate the concept of knowledge and belief, assumptions ,information's (U); Define 'knowledge' (K); Explain the sources of knowledge (U); Name the types of knowledge (K); Categorize the knowledge (Ap); Explain the process of validation of knowledge (U); Validate the knowledge (Ap); Construct the knowledge (Ap); Analyze the knowledge (An); Summarize and come out with theory of principal (S)

Module II: Write the nature of construction of knowledge (K); State the process of knowledge construction (K); Analyze the process of construction (An); Synthesize the elements of the process of knowledge construction (S); Construct the knowledge (Ap); Explain the term pedagogy (U); Classify the knowledge of Mahematics,Science,Humanities and Social sciences (Ap); Use the constructed knowledge. (Ap)

Module III: Define curriculum (K); Analyze the elements of curriculum (An); Explain the concept of curriculum (U); Execute the curriculum (Ap); Design the curriculum (AP); Evaluate the curriculum (E); Name the co-curricular and extra-curricular activities (K); Explain the approaches to organize curriculum (U); Write principles and bases of curriculum (K)

Module IV: State knowledge as power (K); Classify knowledge (Ap); State the criteria for inclusion and exclusion of knowledge in curriculum (K); Explain the process of inclusion and exclusion of knowledge

in curriculum (U); Update the curriculum (Ap); Analyze the knowledge (An); Synthesize the knowledge (S); Define text-book (K); Explain the different parameters of a good text-book (U); Design and develop a good text-book (Ap); Differentiate between the academic (specific) knowledge and general knowledge (U); Define indigenous knowledge (K); Explain the knowledge marginalized communities (U); Eplain the utility of indigenous knowledge (U); Identify the indigenous knowledge and to classify it (Ap); Analyze the text-book (An); Evaluate the text-book (E)

Critical study of text books – NCERT, state board text books, text books for colleges.

Suggested Readings

1. Dhankar, Rohit. Aims of Education to classroom – mapping the field of curriculum.
2. Hirst, P.H., Realms of meaning and forms of knowledge in 'Knowledge and Curriculum' A collection of philosophical papers, Routledge and Kegan Paul, 1974
3. Kumar, Krishna. (1992). What is worth teaching? Orient Blackswan.
4. Nambissan, Geetha. B. (2000). 'Identity, Exclusion and the Education of Tribal Communities'. In Rekha Wazir (Ed.) The Gender Gap in Basic Education: NGOs as Change Agents. New Delhi: Sage
5. NCERT (2006). Position papers on Science, Language, Social Science, Mathematics, Assessment. NCERT, New Delhi
6. Noah, Lemos. (2007). An Introduction to the Theory of Knowledge.Cambridge.
7. Sarangpani, Padma. Constructing school knowledge.
8. Saxena, Sadhana (2007). 'Education of the Masses in India: A Critical Enquiry'. In Krishna Kumar and Joachim Oesterheld (Eds.) Education and Social Change in South Asia. New Delhi: Orient Longman.
9. Batra, P. (2010). The Contested Terrain of School Social Science.Learning Curve. Bangalore: Azim Premji Foundation.
10. Carr, D. 'Knowledge and curriculum: four dogmas of child-centred education', Journal of Philosophy of Education, vol. 22, 1988, pp. 151–62.
11. Carr, D., 'The logic of knowing how and ability', Mind, vol. 88, 1979, pp. 394–409.
12. Gettier, E.L. (1967). Is justified true belief knowledge? in A. Phillips-Griffiths (ed.), Knowledge and Belief, Oxford, Oxford University Press.
13. Lawton, D. (1975). Class, Culture and the Curriculum, London, Routledge.
14. Mehlinger, H. D. (ed). (1981). UNESCO Handbook of Social Studies. France: UNESCO Publications
15. Mukherjee, A. (2010). The Nature of mathematics and its relation to school education. Learning Curve XIV, pp. 16-22.
16. Mukherjee, A. (2005). Methods of enquiry in science, Proceedings of the International Seminar on Science Education. VidyaBhawan Education Resource Centre, Udaipur.
17. Winch, P., The Idea of a Social Science and Its Relation to Philosophy, London, Routledge and Kegan Paul, 1958.
18. Young, M.F.D. (ed.), Knowledge and Control, London, Collier-MacMillan, 1971.

EDEL0019: DEVELOPING EDUCATIONAL LEADERSHIP

(3 Credits - 45 Hours)

Objectives: *This course aims at developing the concepts and skills required to understand, appreciate and make informed choices required for leading educational endeavours. The modules highlight not only the concepts to be discussed but also the abilities to be nurtured. The objectives of the course are to enable students to:*

- *Understand specific nature and attributes of educational processes, institutions and system.*
- *craft the vision, goals and strategy for the educational institution in the light of democratic values, larger societal aims and context.*
- *anlayse the various roles and responsibilities of an educational leader.*

It is recommended that dialogic pedagogy be used and students are required to bring in their personal experiences, initiate dialogue and build theories. Teachers would problematize, provide space for dialogue, provide resources and help the students understand finer nuances.

Module I: Education system and institutions (15 Hours)

a) Education as an ideal (What is education? Aims of education). Education as a system. School as a social institution.

b) Decentralisation of Education: Education- a concurrent subject in the Constitution. Structure of the educational system in India. Study of the structure at the state level. Linkages within the system.

c) Roles and responsibilities of the personnel involved: Teacher as an academic leader, Head teacher as a school leader, CRC, BEO, DEO, DIET Principal, SCERT Director, NCERT Director, Panchayati Raj Institutions.

Reflecting on one's own experiences of schooling to understand school as a social institution, nature of relationships among the various stakeholders in the school and overarching values as stated by the school.

Module II: Stakeholder collaboration (10 Hours)

a) Parent, learners, community, teachers as stakeholders: their expectations and roles. Ensuring their participation.

Analysis of research on impact of stakeholder participation, challenges and principles for successful collaboration.

Module III: Leadership for Inclusion (10 Hours)

a) School Culture: Meaning and components. Hidden curriculum.

b) Zones of exclusion. Analysing curriculum-content and pedagogy - to critically examine school processes. Identifying school processes that cause exclusion.

Synthesizing principles of inclusive institutional culture.

Module IV: Constructing 'Educational Leadership' (15 Hours)

a) Leadership for quality education, equity and inclusion, continuous professional development of teachers, creation of learning communities, ensuring autonomy of learners, teachers and other staff, contextualisation of the curriculum.

b) Crafting vision and mission for an educational institution. Critical review of the vision based on the parameters of educational aims, ideals of administration and values of democratic society.

Assess an educational issue to arrive at a strategic principles, action plans, resource management to address the issue.

COURSE/LEARNING OUTCOMES

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

Module I: Define the term education (K); Understand the concept of education (K); Explain the importance of Education (U); Illustrate the aims of education (U); Find out the relevance of aims of education in the present context (Ap); Write the basic types of aims of education (K); Analyze education as a system (An); Understand school as an social institution (U); State the meaning of decentralization of Education (K); Explain the decentralization system in India with regard to education (U); State the meaning of concurrent list (K); Understand education as a concurrent list subject (U); Analyze the structure of education system in India (An); Find out the structure of education at the state level (Ap); Find out the role of a teacher as a academic leader (Ap); Find out the role of the Head teacher as a school leader (Ap); Understand the role and responsibilities of CRC, BEO, DIET Principal, SCERT Director and NCERT Director (U); Describe the *Panchayati Raj* Institution in India (U); Understand the roles and responsibilities of *Panchayati Raj* Institutions in India (U)

Module II: Write about the meaning of stakeholder's (K); Explain the role of leadership played by a teacher, parent and community (U); Understand the role of parent, learner , community, teachers as a stakeholder (U); Find out the expectations of parents, learners, community and teachers as stakeholders (Ap)

Module III: Understand the concept of inclusion (U); State the meaning of school culture (K); State the basic of school (K); Explain the meaning of hidden curriculum (U); State the meaning of exclusion----; Critically analyze the curriculum content and pedagogy existing in schools (AN); Examine the school processes existing in schools (Ap); Identify the school processes causing exclusion (Ap); Identify the role of a leader for bringing inclusive institutional culture (Ap)

Module IV: Understand the need of quality education (U); Explain the importance of leadership for quality education (U); State the meaning of equity (K); Explain the problems related to equity, quality and inclusion (U); Explain the role of leadership in bringing equity and inclusion (U); Understand the continuous professional development of teachers (U); Find out the importance of creating learning communities (Ap); Understand the nature of learners, teachers and other staff (U); Analyze the factors responsible for ensuring autonomy to teachers, learners and staff (An); Understand the role of leader in crafting a vision and mission for educational institutions (U); Citically analyze the vision and mission of any educational institution based on the parameters of educational aim, ideals and values of our society (An)

Suggested Readings

1. Apple, M. W., & Beane, J. A. (1995). Democratic schools. Association for Supervision and Curriculum Development, 1250 North Pitt Street, Alexandria, VA 22314 (Stock No. 1-95052; $14.95)..
2. Batra, S. (2003).From School Inspection to School Support. In Sood, N. (ed). Management of School Education in India. NIEPA: New Delhi. 2. Early, P., and Weindling, D. (2004).
3. Cheney, G. R., Ruzzi, B. B., & Muralidharan, K. (2005).A profile of the Indian education system. Prepared for the New Commission on the Skills of the American Workforce.
4. Dewey, J. (1916). Democracy and Education. New York: Macmillan.
5. Fullan, M. (1993). Why Teachers Must Become Change Agents. In Educational Leadership, 50 (6).
6. Govinda, R. (2001). Capacity Building for Educational Governance at Local Levels. Paper presented at the International Consultation on Educational Governance at Local Levels. Held at UNESCO, Paris 27-28 February 2001.
7. NCERT.(2006). position paper on aims of education. New Delhi: NCERT Preamble to the Constitution of India concerning values for teachers
8. School as a social institution, Andre Baitelle.
9. Sheshagiri K.M. Decentralisation of Education in India: Reflections from Kerala and Rajasthan.
10. Wren, D. J. (1999). School culture: Exploring the hidden curriculum. Adolescence, 34(135), 593.
11. A Changing Discourse: From Management to Leadership. In Early, P. and Weindling, D. (ed). Understanding School Leadership. Paul Chapman Publications: UK.
12. Senge, P. M. (1990). Organizations as learning communities.
13. Pollard, A. (2002). Reflective Teaching. Continuum: London. Chapters – 1,8,9. 39
14. Hargreaves, A. (2000).Teachers and Teaching: History and Practice, Vol. 6, No. 2, 2000 Four Ages of Professionalism and Professional Learning

EDDL0020: HUMAN DEVELOPMENT AND LEARNING

(3 credits - 45 hours)

Objectives: *The purpose of the course is to give a comprehensive idea of the developmental, socio-cultural and environmental influences on the child's overall personality formation. It also provides students an idea on the process of adjustment and specific disabilities encountered by children at various stages. The overall learning is to enable students:*

- *To understand the various developmental aspects of children.*
- *To understand the stages of growth, maturation and development and it's certain specific theories.*
- *To develop an understanding about the factors to enable effective learning.*
- *To understand adjustment as a process and the mechanism involved in effective adjustment.*
- *To understand the differently abled children and the various kinds of learning difficulties.*

Module I: Understanding Child and Childhood (10 hours)

Importance of understanding child and childhood, capabilities of children belonging to different socio-economic and cultural backgrounds, idea of multiple childhood, nature-nurture debate, language development, learning and acquisition, promoting autonomy in children, development of case studies of children belonging to different backgrounds

Module II: Development and Learning (10 hours)

Stages of development, growth and maturation, Adolescence: why it is a sensitive period, the importance of recognizing issues related to adolescence. Erikson's stages of psycho-social development, Vygotsky's theory on social constructivism, concept of tools, zone of proximal development, Piaget and Vygotsky debate.

Developing a personal narrative of experiences of adolescence

Module III: Enabling learning (10 hours)

Bronfenbrenner's ecological systems, theory of development, social context of learning, enabling school environment, promoting independence of thought and action, parenting at different stages of development: Students analyze views of parents on parenting and child care practices. Quality frameworks.

Module IV: Psychology of Adjustment and Adjustment Mechanisms (6 hours)

Adjustment as a process; a theory of cognitive adaptation. frustration and conflict; causes of maladjustment; contribution of Freud, Adler, Jung and Neo-Freudians to understand maladjustment, adjustment mechanisms. conflicts and defence mechanism, mental hygiene.

Module V: Differently-abled persons and learning (9 hours)

Understanding differently abled persons; educational implications: ADHD, autism, dyslexia. juvenile delinquency.

Develop a detailed discussion paper on various kinds of learning difficulties.

COURSE/LEARNING OUTCOMES

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

Module I: Write about the child and childhood (K); State the significance of childhood study (K); Explain the features of childhood (K); Find out the capabilities of children belonging to different socio-economic and cultural background (Ap); Differentiate the children on the basis of their SES and low SES (Ap); State the features of the children belonging to high SES and low SES (K); Explain the concept of multiple childhood (U); Explain the nature and nurture of the child (U); State the process of language development among the children (K); Create the sense autonomy among the children (Ap); Conduct studies on the children of different backgrounds (Ap)

Module II: State the stages of development (K); Explain the concepts of growth and maturation (U); State the principles of development (K); Define adolescence (K); Explain the features of adolescence period (U); Find out the problems of adolescents (Ap); State the Erickson's stages of psycho-social development (K); Analyze the psycho-social stages of development (An); Write the meaning of social constructivism (K); Apply the theory of Vygotsky's social constructivism (Ap); Explain the zone of proximal development (U); Differentiate between the theory of Piaget and the theory of Vygotsky (U)

Module III: Analyze Bronfenbrenner's ecological system (An); Explain the features of ecological system given by Bronfenbrenner (U); Explain the theory of development (U); Explain the concept of learning in social context (U); Define school environment (An); Find out the impact of school environment on the development of the students (Ap); Evaluate the school environment (E); Explain the role of parents in the development of children (U); Explore the views of students on parenting and child care practices (Ap); Find out the impact of parenting on the quality of the child development (Ap)

Module IV: State the adjustment as a process (K); Explain the theory of cognitive adaptation (U); Define frustration and conflict (K); State the causes of maladjustment (K); Explain the contributions of Freud,Adler,Jung and Neo-Freudians in the process of maladjustment (K); Find out the adjustment mechanism in specific situation of a student (Ap); Define defence mechanism (K); Use defence mechanism to protect himself/herself (Ap); Explain the nature and scope of mental hygiene (U)

Module V: Explain the concept of differently abled persons (U); Find out ADHD, Autism, Dyslexia, Juvenile delinquency among students (Ap); Define delinquent (K); Explain the causes of delinquency (U); State the preventions and treatments for avoiding delinquency (K); Develop a special package for the delinquents and educate them effectively (Ap); Find out the learning disabilities among the students (Ap)

Suggested Readings

1. Arkoff & Abe. (1968). ' Adjustment and Mental Health' .New York, McGraw- Hill
2. Bjorklund, D. (2010). 'Child and Adolescence Development-an integrated approach'. Blasi Wadsworth Cengage Learning Publications.
3. Bronfenbrenner,Urie. (1979). 'The ecology of human development' .Harvard University Press Cambridge.
4. Crow & Crow. (1956). 'Understanding Our Behavior' .N.Y.Alfred A Knoff Publications.
5. Erickson ,H.Erik. (1993). 'Childhood and Society'. W.W.Norton Publication.
6. Erickson ,H.Erik. (2005) . 'Stages of Psycho social Development'. Green Verlag, Gmbtt
7. Freud,S. (1938). 'Psychopathology of Everyday Life-The Basic Writings of Sigmund Freud'.New York, Modern Library.
8. Kostelnik, J.M.,Gregory,M.K.,Soderman. K.A., & Whiren, P.A. (2012).'Guiding children's social development and learning'. Wadsworth Cengage Learning Publications
9. Kozulin A.,Gindis,B.,Ageyev.,S.V & Miller,M.S(2003): 'Vygotsky's Educational Theory in Cultural context'. Cambridge University Press.
10. Lahner, George. (1964). 'The Dynamics of Personal Adjustment' .New Jersey: Prentice –Hall.
11. Lerner, J. (1985). 'Learning Disabilities-Diagnosis and Teaching Strategies' .Boston Honghton Miffin.
12. Lock, A & Strong, T. (2010). 'Social Constructionism – Sources and Stirrings in Theory and Practice'. Cambridge University Press
13. Mangal, S.K. (2010). 'Educating Exceptional Children-An Introduction to Special Education' .PHI Learning Private Limited,Delhi
14. Mangal, S.K. (1987). 'Abnormal Psychology' N.D-Sterling Publications (revised edition)
15. Mangal, S.K. (2002). 'Advanced Educational Psychology'. PHI Learning Private Limited,Delhi,
16. McLounghlin, J.A and Netick, A. (1983). 'Defining Learning Disabilities- A new and co-operative direction '.Journal of Learning disabilities.
17. Newman,M.B & Newman,R.P. (2006). 'Development through Life-A psycho-social approach'.12th edition, Cengage Learning Stamford.
18. Sinha, AKP, Singh, R.P. (1971). 'Manual for Adjustment, Inventory for College Students'. Agra, National Psychology Corporation.
19. Telford, C.W & Sawrey,J.M. (1967): 'The Exceptional Individuals' .New Jersey,Prentice-Hall.

EDCI0021: CURRICULUM DEVELOPMENT AND INSTRUCTION

(3 credits - 45 hours)

Objective: *This course will explore the various types of curriculum and the relevance of its study. It will help to understand how curriculum takes a shape, how curricular decisions impact students in particular and the society in general. The objectives of the course are to enable students to understand how the pattern of education changes with time influenced by thinkers, to identify the various resources that can make impact in curriculum design, how different ideas are embodied in the existing curriculum and how different agendas are permeated through curriculum and to discern how to look for change and develop a curriculum of their own to meet educational and organizational goals.*

Module I: Understanding curriculum (6 hours)

Contemporary definition of curriculum; curriculum criteria, curriculum goals and values, basic principles of curriculum and instruction

Brainstorming session on the issues and trends of school/college curriculum

Module II: Philosophical underpinnings of curriculum (15 hours)

Curriculum types and Models of teaching: Social, Information Processing, Personalist, and Behavioral, Child-Centered, Society-Centered, Knowledge-Centered, or Eclectic; Goals and Philosophies of Education across changing education paradigms - Idealism, Realism, Perennialism, Essentialism, Experimentalism, Existentialism, Constructivism and Reconstructivism

Analysis of the philosophical underpinnings of the present day curriculum

Module III: Approaches to curriculum development (10 hours)

Tagore, Gandhi, Krishnamurthy, Plato, Dewey, Montessori, Don Bosco, Freire,

Detailed discussion on the pedagogical approach of one of the above thinkers

Module IV: Curriculum development frameworks in 21st Century (6 hours)

NCTE Framework for 21st Century Curriculum and Assessment; UNESCO - A Futures Perspective in the Curriculum, Learning Environment, Skills, Assessment, Professional Development; Curriculum and Future - Concepts from Social Sciences

A review of the NCTE framework for 21st century Curriculum and Assessment

Module V: Curriculum development and assessment (8 hours)

Developing a curriculum document: Approach and organization, stages of curriculum development, guidelines of statutory bodies with regard to curriculum development – UGC, NCTE, NCF; Curriculum integration: disciplines, media and technology; evaluating and assessing a curriculum; Models of curriculum; Curriculum implementation - Factors influencing curriculum implementation

COURSE/LEARNING OUTCOMES

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

Module I: State the concept of curriculum (K); Different curriculum from course of studies and syllabus (U); Summarize the characteristics of curriculum (S); Differentiate the traditional concept of curriculum from the new/modern concept of curriculum (U); Explain curriculum as a process (U); Identify the different sources of curriculum criteria (An); State the goals and values in curriculum planning (K); List down the general goals of curriculum planning (K); Identify the philosophical positions that influence curriculum planners and teachers (An); Use the basic elements of curriculum development in constructing new curriculum (Ap); Conclude the various factors influencing curriculum development (S); State the relationship between curriculum and instruction (K); Use the knowledge of curriculum development for designing appropriate learning activities (Ap); Short listed the basic principles of curriculum and instruction (K); Listist the principles of curriculum construction (K)

Module II: Explain the core ideas of constructivism (U); Assess the role of teachers in the curriculum implementation according to constructivism (E); Find out the constructivist's method of teaching in present day (Ap); Summarize the constructivist approach in the classroom teaching (S); Pinpoint the unique contribution of constructivist's approach to the teaching-learning environment (An); Explain the philosophy of existentialism (U); Apply the philosophy of existentialism in education (Ap); Relate some of the educational practices that are related to philosophy of Perennialism (Ap); Generalize the principles of Perennialism (S) Explain the basic tenets of Essentialism (U); Interpret and identify the educational practices that are associated with the philosophy of essentialism (An); State the curriculum proposed by essentialism (K); Explain the philosophy of progressivism(U); Explain the philosophical foundations of a student-centred curriculum (U); Recount the historical background of Reconstructionism (K); Apply the ideology of Reconstructionism in education (Ap); Critique the philosophy of Reconstructionism in general and its application in education in particular (E); List down the different types of curriculum (K); Assess the significance and pitfalls of integrated curriculum (E); Apply Tyler's model of curriculum in the construction of curriculum (Ap); Identify the basic steps of curriculum construction proposed by Tyler (An); Apply the five major steps in curriculum design proposed by Taba (Ap)

Module III: Explain the educational philosophy of Don Bosco (U); Judge the philosophy of Education of Don Bosco in the present era (E); Summarize the methods of education promulgated by Don Bosco (S); Assert the relevance of the philosophy of education of Gandhiji (E); Follow the teaching methods of Gandhiji (Ap); Critique the philosophy of education of Gandhiji (E); Explain the aim of education according to John Dewey (U); Recollect the educational methods of John Dewey (K); Contrast the philosophy of Education of Gandhiji and John Dewey (An); Summarize the philosophy of education of Krishnamurthy (S); Identify the roles of an educator in the teaching-learning process (An); Apply the principles of Montessori Method (Ap); Explain the curriculum proposed by Montessori (K); Critique the educational philosophy of Maria Montessori (E); Explain the Banking concept of education of Freire. (U); Assess the Freire's philosophy of liberative education (E); Use the pedagogical methods of Freire (Ap); Assess the applicability of Freire's philosophy of education in the Indian context (E); Explain the Plato's philosophical foundations of education (U); Illustrate the qualities of good teachers proposed by Plato (U)

Module IV: Interpret the Indian National Curriculum Framework 2005 in the current scenario (U); Identify the shift of focus in the teaching-learning process (An); Redefine methods and focus of curriculum in the teaching-learning process (Ap); Synthesis the significance of school and classroom environment in the teaching-learning process (S); List down the various reforms proposed by the documents (K); Name a wide range of abilities and competencies that the 21st century literacies demand (K); Assess the significance of the knowledge of social science and humanities in planning, decision-making and problem-solving process (E); Explain evaluation as a tool and process (K); Illustrate the functions of evaluation at different levels of implementation (U); Differentiate between diagnostic evaluation from Summative evaluation (U); Identify the resources for curriculum implementation (An); State the roles of teachers in curriculum organisation and implementation (K)

Suggested Readings

1. Dottrens, R. The Meaning of the Terms Curriculum and Syllabus, in The Primary School Curriculum, (France: UNESCO) pp79-89.
2. Dewey, J. The School and Society in Society and Education, Introduction by Philip W. Jackson (Chicago: The University of Chicago Press)
3. Pring, R. Curriculum Integration in The Curriculum: Content, Design and Development (ed), (London Institute of Education Bulletin, Spring). pp- 4-8.
4. Tyler Ralph, W. Basic Principles of Curriculum and Instruction. (University of Chicago Press).
5. Vallance, E. Hiding the Hidden Curriculum in Curriculum Theory Network. Stanford University 4:1, pp 5-21
6. Kumar, Krishna. Origins of India's 'Textbook Culture from Comparative Education Review 32(4) pp 452-464.
7. Bruner, J. Folk Pedagogies. In Leach, Jenny and Moon, Bob (eds) Learners and Pedagogy (pp4-20). London: Paul Chapman Publishing in Association with the Open University.
8. Keddie, Nell. Classroom Knowledge in Young, M.F. D. (ed), Knowledge and Control. (London: Collier Macmillan)
9. Coleman, J. The Concept of Equality of Educational Opportunity in Equality and Achievement in Education. (Boulder: Westview Press)
10. Winch, C. Constructing Worthwhile Curricula in Quality and Education (Oxford: Blackwell) pp45-56
11. Akkari, A. Socialization, Learning and Basic Education in Islamic Contexts in Educational Theories and Practices from Majority World (ed), Sage, New Delhi, pp220-244.
12. Bernstein, B. Class and Pedagogies: Visible and Invisible in Karabel and Hasley (ed) Power and Ideology in Education. (Oxford University Press)
13. Hoare. Q and Smith G. N. On Education in Selection from The Prison Notebook of Antonio Gramsci (ed). (India: Orient Longman Pvt Ltd)
14. Freire, Paulo chapter 2 Pedagogy of the Oppressed (New York: Seabury Press)
15. Education for Poor: Quality and Relevance? British Journal of Sociology of Education 13(4)
16. Kohlberg, L and Meyer, R. Development as the Aim of Education Harvard Education review 42(4)
17. Tanner, Laurel N. The Meaning of Curriculum in Dewey's Laboratory School (1896-1904) Journal of Curriculum Studies, 23(2) 101-117
18. Kumar, K. What is Worth Teaching? In What is Worth Teaching (Hyderabad, Orient Longman)

EDTP0022: PRINCIPLES AND TECHNIQUES OF TEACHING AND PEDAGOGY

(3 Credits - 45 hours)

Objective: *The course on Principles and Techniques of Teaching and Pedagogy introduces the students to the concept, nature and scope of teaching. It also acquaints them with the principles, levels, strategies and skills of teaching. It will enable the students to understand the process of teaching and its various components. The theoretical perspective of teaching will help them in constructing the foundation of teaching while the models of teaching will guide them in practical aspects of teaching. Knowing the storehouse of teaching methods will enable the students to use them judiciously and wisely. Pedagogy will enable the students to understand teaching as an art and science. The students will also be able to update themselves with the innovative pedagogies.*

Module I: Concept and aspects of teaching (10 hours)

Teaching: Concept, nature and scope; Teaching competency: Understanding the child, understanding the subject, contextualization, punctuality, regularity, integrity, humility, accountability, humanism, empathy, enthusiasm; Skills of teaching: Explaining, questioning, stimulus variation, reinforcement, achieving closure, etc.; Integration of different teaching skills and Strategies of teaching: Autocratic, Permissive, Democratic.

Study the biographies of famous teachers and develop teacher profiles within historical and contemporary perspectives.

Module II: Theories and models of teaching (10 hours)

Principles and maxims of teaching; Theories of teaching: behaviourism, cognitivism, constructivism, co-operative approach; Models of teaching: information processing models, social models, behavioural models and personal models

Demonstration on models of teaching by students

Module III: Teaching Methods (15 hours)

Teacher-centred methods: lecture, demonstration, team-teaching, mastery learning strategy; Learner-centred methods: programmed learning, personalized system of instruction, problem solving method; Activity-centred methods: seminar, workshops, peer-tutoring, group discussion, projects, heuristic method, panel discussion, brainstorming, symposium and role-play; Teaching aids: significance, types and uses

Classroom teaching practice

Module IV: Recent developments in Pedagogy (10 hours)

Pedagogy: concept and significance; History of pedagogy: Indian, Greek and Roman history of pedagogy; Innovative pedagogy: crossover learning, learning through argumentation, incidental learning, learning by doing, embodied learning; Pedagogical approaches for diversity in society and its interface with the classroom

Analysis of teaching in a real classroom situation

COURSE/LEARNING OUTCOMES

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

Module I: Define the term teaching (K); Explain the nature of teaching (U); State the scope of teaching (K); Apply the theories in classroom practice (Ap); List the teaching competencies (K); Define teaching skill (K); Explain different teaching skills (U); Use different teaching skills in classroom (AP); Write the meaning autocratic teaching (K); Explain the features of autocratic teaching (U); State the meaning of permissive teaching (K); Analyze the permissive teaching (An); Explain the permissive teaching (U); Apply the permissive teaching in classroom (Ap); Define the democratic teaching (K); Explain the features of democratic teaching (U); Observe and evaluate the teaching (E)

Module II: State the principles of teaching (K); Explain the principles of teaching (U); Define the maxims of teaching (K); Use the principles and maxims in classroom teaching (Ap); Name the theories of teaching (K); Analyze the theories of teaching (Ap); Evaluate the any piece of research work (E); Explain the theories in classroom practice (AP); Analyze the different theories of teaching (AP); Summarize the different theories of teaching (SN); Examine the different theories (E); Explain the concepts of behaviorism, cognitivism and constructivism (U); Differentiate between behaviorism, cognitivism and constructivism (U); Use cognitivism and constructivism in practice (Ap); State the meaning of models of teaching (K); State the elements of model of teaching (K); Explain the different models of teaching (U); Use the various models of teaching in classroom (Ap)

Module III: Write the meaning of method of teaching (K); Define teacher centric method (K); Name the teacher centric method of teaching (K); Explain the different teacher centric centric methods (U); State the merits and demerits of teacher centric method (K); Demonstrate the teacher centric method of teaching (Ap); Define mastery learning (K); Explain the mastery learning teaching strategy or approach

(U); Differentiate between the teacher centric and learners centric teaching strategies (U); Apply mastery learning strategy in the classroom (Ap); Analyze the features of mastery learning strategy (An); Explain the features of programmed instruction (PI) and personalized system of instruction (PSI). (U); Summarize the structure of PI and PSI. (S); Assess the effectiveness of PI and PSI as teaching strategies (E); Explain the problem solving method, activity centre method, seminar , tutorial, brain storming, discussion etc. (U); Explain the nature , utility and types of teaching aids (U); Use the teaching aids in classroom for teaching effectively (Ap)

Module IV: State the concept and significance of pedagogy (K); Explain the concepts of pedagogy (U); Analyze the elements of pedagogy (An); Explain the historical background of pedagogy (U); Write the meaning of innovative pedagogy (K); Demonstrate the innovative pedagogy in the classroom (Ap); Explain the concepts of crossover learning, learning through argumentation, incidental learning, learning by doing etc. (U); Explain the pedagogical approaches in diversifies society (U); Analyze the classroom teaching (AN); Use new pedagogical approaches in different situations (AP)

Suggested Readings

1. Aggarwal, J. C. Principles, methods and techniques of teaching. Delhi: Vikas Pub House.
2. Anderson. L. W.et al. International Encyclopedia of Teaching and Training Education, Pergmon press.
3. Joyce, B. & Weil, M. Models of teaching. New Delhi: Prentice Hall.
4. Jangira, N. K.Professional Enculturation: Innovative Experiments in Teaching and Training, New Delhi; Bookworth of India.
5. Ashton-Warner, S. Teacher. New York: Simon & Schuster.
6. Hall, G. E. & Quinn, L. F. & Gollnick, D. M. Introduction to Teaching: Making a Difference in Student Learning. Sage Publisher.
7. Puri, U. Teaching Techniques. ND: Pragun.
8. Sharma, B. L. & Saxena B. M. Methods of Teaching. Meerut: R. Lall.
9. Sharma, T. R. & Bhargava, R. Modern Teaching Aids. Agra: HP Bhargav Books.

EDTE0023: TEACHER EDUCATION

(3 Credits - 45 hours)

Objectives: *The course in teacher education is designed to familiarize the students with the fundamentals of teacher education and the changes that were brought about as a result of the changes in the educational scenario. It will also enable the students to understand the concept and structure of teacher education, teaching as a profession and provide insight into the developments and trends in teacher education.*

Module I: Concept and Fundamentals of Teacher Education (13 hours)

Meaning, nature and scope of teacher education; Aims and objectives of teacher education; Historical perspectives of teacher education - Kothari Commission, National Commission on Teachers (1983-85), NPE (1986), Revised POA (1992); Recent developments in teacher education - NCF 2005, NKC 2007 & NCFTE 2009. History and status of Teacher Education in North East India. Problems and issues of Teacher Education in N.E. India.

Comparative analysis of Teacher education in the past and present.

Module II: Teaching as a Profession (12 hours)

Approaches to teacher education: Behaviouristic and constructivist approaches; Modification of teaching behaviour: Simulated teaching, Flanders' Interaction Analysis; Performance appraisal of teacher; Teacher effectiveness; Code of conduct and ethics in teacher education.

Classroom observation and analysis using Flanders' Interaction Analysis

Module III: Structure of Teacher Education Programmes (10 hours)

Role of professional organizations and bodies of Teacher Education; Pre-service and In- service teacher education; Teacher education by open and distance learning; Role of different agencies in quality assurance – MHRD, UGC, NCERT, NCTE, SCERT, NAAC, RIE, SIE, IASE, UGC-HRDC

Analysis of a distance learning teacher education programme

Module IV: Recent trends in Teacher Education (10 hours)

Internship, Practice teaching for developing an effective teacher, Integrated Teacher education programme; Action research; ICT in teacher education; preparing teachers for inclusive classrooms; Issues and challenges in teacher education.

Analyse the course structure of an integrated teacher education programme.

COURSE/LEARNING OUTCOMES

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

Module I: State the meaning of teacher education (K); Illustrate the nature and scope of teacher education (U); Write the aims and objectives of teacher education (K); Describe the historical background of teacher education in India. (K); State the recommendations of Kothari Commission and National Commission on teachers (K); Explain the mechanism of growth and development of teaching profession as per NPE-1986 and POA – 1992 (U); Use some innovations in teaching-learning process (Ap); Explain the recent developments in teacher education (U); Analyze NCFSE- 2005, NKC and NCFTE-2009 (AN); Apply the important recommendations of NCFSE, NKC and NCFTE in practice (AP)

Module II: State the basic features of Behavioristic approach to teacher education (K); Use the Behavioristic approach in teacher education programmes (Ap); Define constructivism (K); Explain constructivist approach to teacher education (U); Differentiate between the behaviourist approach and constructivistic approach to teacher education (Ap); Write the meaning of modification of behavior of teachers (K); Explain the simulated teaching as an approach (U); Apply simulated teaching approach for inculcating some social skills among the pupil teachers (Ap); Explain FIACS in detail (U); Analyze the behavior of the teacher by using FIACS (Ap); Evaluate the teacher (E); Define the term ' code of conduct ' (K); Apply code of conduct and ethics in teaching profession (Ap)

Module III: State the nature of pre-service teacher education programme (K); State the objectives of pre-service teacher education programme (K); Explain the course structure of pre-service teacher education programme (U); Analyze the course content of pre-service teacher education programme (An); Use the designed curriculum of pre-service teacher education programme (Ap); Explain the concept of in-service teacher education programme (U); Analyze the components of in –service teacher education (AN); Summarize the features of in-service teacher education programmes (S); Evaluate the pre-service teacher education programme of an institution (E); Write the meaning of open and distance learning (K); Explain the features of open and distance learning (U); Use open and distance learning system for teacher education programmes (Ap); Describe the role of different agencies in teacher education programmes like – MHRD,UGC,NCERT,NCTE,SCERT,RTE etc.(K)

Module IV: Write the meaning of internship (K); Explain the objectives of school internship (U); Perform internship in schools effectively (Ap); Analyze the components of school internship (An); Assess the school internship (E); Define practice teaching (K); Write the objectives of practice teaching (K); Make the lesson plan and the use it in classroom for teaching (Ap); Analyze the components of lesson (An); Synthesize the content of the lesson (S); Evaluate the performance of students (E); Explain the concept of integrated teacher education programme (U); Analyze the elements of integrated teacher education programmes (An); Evaluate the integrated teacher education programme of an institution (E); Define inclusive education (K); Explain the features of inclusive education (U); Use ICT in Teacher education (Ap); Prepare teachers for inclusive education and use those teachers in inclusive classrooms (Ap); Define action research (K); Analyze the features of action research (An); Explain the features and steps of action research (U); Apply action research and solve the problem (Ap)

Suggested Readings

1. Aggarwal J.C.Teacher education, theory and practices. New Delhi: Doaba Home.
2. Altekur. A.S. Education in ancient India. Banaras: Nand kishore Bros.
3. Anderson.L.W.et al. International Encyclopedia of Teaching and Training Education. Pergmon press.
4. Biddle, B.J., and Ellena. Contemporary research on teacher-effectiveness.
5. Buch. M.B. First survey of research in Education. Baroda: SERD.

6. Buch.M.B. Second survey of research in Education. Baroda: SERD.
7. Buch.M.B. Reading in in-service education. Sardar Patel Palasane, M.M. University.
8. Dunkin Michael J. The international encyclopedia of teaching and teacher education, Pergmon education forum, Vol 4 no 12, New York.
9. Harvilas, S. and Naik .J.P. A history of education in India. Bombay: Macmillan and co.
10. Hittlilman, D.R. A model for a competency based teacher preparation in Program-teacher education Forum, vol 4 no 12, New York.
11. Jangira N.K. Teacher training and teacher effectiveness an experience in Teaching. New Delhi: National Publishing House.
12. Kumar. T. P. Teacher education. APH Publishing Corporation.
13. NCERT 1968: The Third Indian year book on education. New Delhi: NCERT.
14. NCTE, Teacher education curriculum (1978): A Framework. New Delhi: NCERT.
15. Shrimali .K.L. Better teacher Education. New Delhi: Ministry of education Govt. of India.

EDME0024: MEASUREMENT AND EVALUATION IN EDUCATION

(3 credits - 45 hrs)

Objectives: *The course aims at providing fundamental knowledge and skills on measurement and evaluation in education. It will also help the students to understand and evolve suitable and appropriate evaluation strategies while assessing performance. The course will acquaint the students with the functions, problems and current trends in educational measurement and enable them to develop basic skills and competencies in the use of various types of evaluation and assessment tools and techniques, their administration, analysis, interpretation, reporting and feedback and to construct a standardized test.*

Module I: Educational Measurement (7 hours)

Overview of measurement and assessment; Types of measurement - psychological and physical; Functions of measurement - Prognosis, Diagnosis, Research; Scales of measurement, Properties and Types - Nominal, Ordinal, Equal interval, Ratio; General problems of measurement; High stakes' testing, Performance and portfolio assessment.

Critical evaluation of the current trends in educational measurement

Module II: Dimensions of Educational measurement and Evaluation (10 hours)

Diagnostic, Aptitude, Achievement, Intelligence; Mode of assessment - formal, informal, formative, summative, continuous, terminal, process, product, internal and external; Process of assessment - Teacher-made test, standardized test, Norm reference test and criterion reference test.

Review of Standford-Binet Test and General Aptitude Test Battery (GATB)

Module III: Reliability and Validity of a Test (8 hours)

a) Overview of reliability - Methods of estimating reliability with computation - test retests method, Equivalent forms method, Split half method, Kuder-Richardson method; Inter-rater consistency; Interpreting reliability coefficient; factors influencing reliability measures.
b) Nature of validity, major considerations in validation – content consideration, construct consideration, test-criterion relationship, consideration of consequences; Methods of estimating validity; factors influencing validity; Relationship between reliability and validity.

Practice session on estimating reliability and validity

Module IV: Tools and techniques for educational measurement (10 hours)

Overview of constructing various types of objective tests; Guidelines for writing objective test items; Essay questions: forms, uses, guidelines for constructing, scoring criteria. Interpretive exercises: nature, forms, and uses of the interpretive exercises, Advantages and limitations

Administration of a group test of intelligence using a standardized tool

Module V: Standardization of a test (10 hours)

Planning the test: Determining the objective and test specification, preparing the preliminary format - writing, arrangement, review and editing of test items; tryout of the test - administration, scoring and item analysis; preparing the final form of the test - selection of items, fixing the time limit, direction to the examinee, preparation of scoring key; administration of the final form of the test

- determining validity, reliability, norms, standard scores; manual of the test, interpretation of test results, characteristics and uses of standardized test.

Students will prepare, administer and standardize a test, following the set procedures of standardization of a test

COURSE/LEARNING OUTCOMES

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

Module I: Define the concept of measurement (K); State the features of measurement (K); Explain the principles of measurement (U); Name the types of measurement (K); Explain the different types of measurement (U); Illustrate the functions of measurement (U); Differentiate between prognostic and diagnostic functions of measurement (U); Illustrate the different scales of measurement (U); Apply the different scales in different situation (Ap); Analyze the process of measurement (An); Synthesize the characteristics of effective process of measurement (K); State the current trends in educational measurement (K); Find out the different abilities of the students (Ap)

Module II: State the different attributes of a student (K); Measure the different attributes of a student (Ap); Explain the different modes of measurement (U); Differentiate between formal and informal measurement and formative and summative process of measurement (U); Define the term evaluation (K); State the features of evaluation (K) Explain the features of evaluation (U); Explain the principles and steps of evaluation (U); Differentiate between the norm referenced evaluation and criterion referenced evaluation (U); Develop a teacher made test (Ap); Synthesize the process of internal evaluation (S); Analyze the external evaluation (A); Judge the worth of an object scientifically (E)

Module III: State the meaning of reliability (K) ; Analyze the concept of reliability (A); Name the methods of computing co-efficient of reliability (K); Apply the different methods of computing co-efficient of reliability (A); Explain the different factors affecting reliability (U); Interpret the computed co-efficient of reliability (U); Define the term validity (K); State the major consideration (K); Explain the different considerations (Ap); Identify the various considerations (Ap); Name the different types of validity (K); Explain the types of validity (U); Apply the different types of validity in different situation (Ap); Find out the content validity of test items (Ap); Analyze content and construct types of validity (An); Identify the factors affecting validity (Ap); Synthesize the factors affecting validity (S); State the relationship between reliability and validity (K)

Module IV: State the purpose of classroom testing (K); Write the meaning of test item (K); State the types of test items (K); Differentiate between objective type test and essay type test items (U); Write the guidelines for writing the objective type test questions (K); Develop the objective type test (Ap); Analyze the test items (An); Explain the concept of essay type test (U); State the guidelines for essay type test items (K); Develop the essay type test (Ap); Write the merits and demerits of objective and essay type test (K); Explain the nature and forms of interpretative exercise (U); Interpret the interpretative exercises (U); Use the interpretative exercises in practice (Ap)

Module V: Define an achievement test (K); Write the objective and specifications of the test (K); Explain the different steps of preparation of the test (U); State the aspects of planning of a test (K); Develop the preliminary draft of a test (Ap); Analyze the items of the preliminary draft of the test (An); Summarize the items and make a final draft of the test (S); Evaluate the final draft of the test (E); Find out the reliability and validity of the test (Ap); Use the test for the purpose which it meant (Ap); Write features of a standardized test (K); Develop the manual of the test (Ap)

Suggested Readings

1. Gregory, R. J. Psychological testing: History, principles and application. Delhi: Pearson Education pvt. Ltd.
2. Kaplan, R.M. & Saccuzzo, D. P. Psychological testing: Principles, applications, and issues. Kundli Haryana: Thomson Wadsworth.
3. Kubiszyn, T. & Borich, G. Educational testing and measurement: Classroom application and practice. Kundli Haryana: John Wiley &Sons, Inc.
4. Linn, R. L. & Gronlund, N. E. Measurement and assessment in teaching. New Delhi: Pearson Education.

5. Sharma, R. A. Essentials of measurement in education and psychology. Meerut: R. Lall Book Depot.
6. Sidhu, K. S. New approaches to measurement and evaluation. New Delhi: Sterling Publishers Pvt. Ltd.
7. Ebel, R. L. & Frisbie, D. A. Essentials of educational measurement. New Delhi: Prentice-Hall of India Pvt. Ltd.
8. Patel, R. N. Educational evaluation theory and practice. Mumbai, India: Himalaya Publishing House Pvt., Ltd.
9. Singh, A. K. Tests, measurements, and research methods in behavioural sciences. Patna: Bharati Bhawan Publishers and Distributors.
10. Swain, S. K., Pradhan, C., & Khatoi, P. K. Educational measurement statistics and guidance. New Delhi: Kalyani Publishers.

EDPL0025: EDUCATIONAL LAW AND GOVERNMENT POLICY

(4 credits - 60 Hours)

Objective: *The course on Educational Law and Government Policy provides students a foundation to understand the legal, ethical, and policy dimensions of education. It offers an introductory survey of government policy issues, commission reports and laws governing schools with a special emphasis on case law. Detailed discussions will be held on constitutional provisions related to education and minority issues while understanding RTE, RTI and other relevant laws and ordinances.*

Module I (10 Hours)

Jurisprudence, Provisions of criminal and civil laws pertaining to educational institutions; FIR; Arrest; Bail; Detention; Search.

Module II (15 Hours)

Relevant provisions from the constitution of India relating to education; Minority institution Act; Fundamental Rights (Article 13, 15, 21A, 28 & 30); Fundamental Duties 51A; Directive Principles of State Policy (37); Fifth and sixth schedule provisions.

Module III (5 Hours)

Landmark judgments related to education

Module IV (15 Hours)

Government policies, commissions and recommendations; The Panchayats Act (243B, G); The Municipalities Act (243Q, W); Fifth and sixth schedule provisions

Module V (15 Hours)

The Right of Children to Free and Compulsory Education (RTE) Act, 2009; Right to Information (RTI) Act 2005; North-Eastern education code

COURSE/LEARNING OUTCOMES

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

Module I: Know the scientific study of law (K); State the provisions of criminal and civil laws related to educational institutions (K); Explain the provisions of criminal and civil laws in relation to educational institutions (U); Differentiate between the criminal and civic laws (U); Apply the laws for making and running educational institutions effectively (AP); Explain the concepts like FIR, Arrest, Bail, Remand etc. (U)

Module II: List the relevant provisions of Indian constitution related to education (K); Explain the different provisions relating to education in Indian Constitution (U); Explain the Minority act (U); Define fundamental right (K); State the different Fundamental Rights (K); Use the Fundamental Rights in life (Ap); Explain the Fundamental Rights (U); Demonstrate the Fundamental defects in real life situation (Ap); State the Article – 45 of Indian Constitution (K); State the efforts made by Government of India in accordance with Article -45 (K); Find out the effect of article- 45 of the Indian Constitution (Ap); Explain 42nd Amendment in Indian Constitution (Ap); State the Constitutional provisions like- Article -27,28,28 (1), 29 (2), 30,30

(2), 45,46,337,350A (K); Explain 83rd Amendment in Indian Constitution (U); Explain 86th Amendment in Indian Constitution (U); State the salient features of RTE Act,2009 (K); State the Directive state policy (K)

Module III: List the significant judgements given by the court related to education (K); Analyze the judgements relate to education (An); Follow those judgements in practice (Ap)

MODULE IV: State the different commissions and committees on education in India (K); Explain Indian education commission (1882-83), Indian University commission (1902), University education commission(1948-49),Secondary education commission (1952-53),(1964-65) (U); Explain the features of NPE-1986,POA-1992(U); State the Panchayats Act (243B,G) and Municipalities Act (243 W) (K); Use the Panchayat and Municipalities for making education more vibrant (Ap)

Module V: Describe the Rights Based Framework of education (K); Explain the concept of UEE (U); State the different interventions for achieving the goal of UEE (K); Implement the prescriptions of Article-21A (AP); State the need of RTE,Act- 2009(K); Implement SSA in accordance with RTE,Act (AP)

Suggested Readings

1. Citizen's charter
2. Jain, M. P. Indian Constitutional Law. Jain Book house. Delhi
3. National Policy on Education 1986
4. Pandey, J.N. Constitutional Law. Jain Book house. Delhi
5. Report to the People on Education 2010-11 (MHRD)
6. Sadgopal, A. Right to education vs. right to education act. Social Scientist, 38(9/12), 17-50. http://eoc.du.ac.in/RTE%20-%20 notified.pdf

EDFM0026: FINANCIAL MANAGEMENT AND ACCOUNTING

(3 Credits - 45 hours)

Objective: *The purpose of this course is to provide students with working knowledge of accounts and finance in relation to education. The course will prepare students to understand taxation regulations related to education.*

Module I: Introduction

Evaluation of Financial Accounting; Difference between Accounting and Book Keeping; Accounting Concepts; Principles, Bases and Policies.

Module II: Journal

Double Entry Accounting; Journal; Posting; Ledger.

Module III: Balance Sheet

Trial Balance; Final Account – Trading Account, Profit And Loss Account, Receipt And Payment Account; Income Expenditure Accounts; Balance Sheets.

Module IV: Financial Management

Decision Making; Meaning and Scope; Cost Analysis; Budgetary Control; Standard Costing; Financial Analysis; Relevant Cost; Management Accounting Framework; Function of Management Accounting; Internal Audit; School Accounting and Auditing; Investment.

Module V: Taxation Management

Basic Concepts; Deduction from Gross Total Salaries; Income From House, Property; Profits and Gains of Business and Profession; Capital Gains; Income from other Sources; Set off and Carry Forward of Losses; Assessment of Individuals and Computation of Tax at Source, Assessment of Companies and Fringe Benefit and Service Tax. VAT/ GST.

COURSE/LEARNING OUTCOMES

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

Module I: State the meaning of evaluation of financial accounting (K); Illustrate the concept of evaluation of financial accounting (U); Define financial accounting (K); Evaluate financial accounting (E); Define book

keeping (K); Differentiate between accounting and book keeping (U); State principles of accounting (K); Use the principles in accounting (Ap); Explain the bases and policies of financial accounting (U)

Module II: Define double entry accounting (K); Explain the features of double entry accounting (U); Define journal (K); Explain the concept of journal and its utility (U); Explain the concept of posting (U); Differentiate between journal and posting (U); Define ledger (K); Prepare the ledger (Ap)

Module III: Write the meaning of balance sheet (K); Explain the basic features of a balance sheet (U); Define trial account (K); Explain the basics of trial balance (U); Prepare the balance sheet (Ap); Define 'final account' (K); Explain final account and trading account (U); Explain profit and loss accounts (U); Differentiate between profit and loss accounts (U); Write the meaning of receipt and payment (K); Differentiate between receipt and payment (AP); Explain the income and expenditure accounts (U); Prepare the income and expenditure accounts (AP)

Module IV: Describe the nature and scope of decision making (K); Explain the basic features of effective decision making (U); Define 'cost analysis' (K); Explain the components of 'cost analysis' (U); Find out the cost effectiveness (Ap); State the concept of budgeting control (K); explain the features of budgetary control (U); Define 'standard cost' (K); Explain the concept of standard cost (U); Do the cost analysis (Ap); Define financial analysis (K); Explain the components of financial analysis (U); Do the financial analysis (Ap); Explain the term 'relevant cost' (U); Identify the relevant cost (Ap): Explain the nature and scope of management accounting framework (U); write the functions of management accounting (K); Explain the features of internal auditing (U); State the meaning of school accounting and auditing (K); Do the school accounting and auditing (Ap); Explain the concept of investment (U)

Module V: State the basic concept of taxation management (K); State the different deductions from gross total salary (K); Explain the concept of gross salary (U); Explain the nature of different deductions from gross salary (U); Explain the nature of capital gains and income from other sources (U); Set off and carry forward of losses (K); Compute the income tax of a salaried and a business man (Ap); Analyze the income of a salaried man(An); Analyze the income of a business man (An); Explain the concepts of service tax, VAT, and GST (U)

Suggested Readings

1. Block, S. B., G. A. Hirt, & B. R. Danielsen. Foundations of Financial Management. New York, NY: McGraw-Hill/Irwin.
2. Das, K.R., Sinha, K.M., & Choudhury, P. Theory and practice of bookkeeping and accountancy. Guwahati: lawyers book stall.
3. Lal, J & Srivastva, S. Financial Accounting: Principles & Practices. New Delhi: Chand Publications.
4. Wilson, M. Advanced Accountancy. Chennai: Scitech Publications.

EDLE0027: LIFE SPAN DEVELOPMENT AND EDUCATION

(3 Credits - 45 hours)

Objectives: *This paper gives an overview of cognitive, emotional, psycho-sexual, social and moral development during the lifespan of an individual. Various theories of understanding human development are presented and discussed with a view to enable students to understand human growth and development and the role of education in holistic development of an individual.*

Module I: Introduction to Life Span Development (8 hours)

Life Span Perspective: Importance of studying Life-Span Development, Characteristics of life-span development, Nature of Development, Scope of Life span development. Theories of Development (Brief discussion of all theories), Influence of Socialization and Development.

Analyze the role of education in socialization and development of the child.

Module II: Biological Bases of Human Development and Anatomy of the Nervous system (14 hours)

The Evolutionary perspective and Heredity-Environment Correlations, genetic foundation, Conception, effect of Teratogens on Prenatal Development, Neonatal health - Low birth weight, Neonatal Assessment; Neuron: Structure, types and functions. Structure of the nervous system, physiological basis of the action potential (neural response); Structure and function of the brain: fore

brain, mid brain, hind brain, cerebral cortex, temporal, parietal and occipital lobes; prefrontal cortex. The effect of hormones on the nervous system.

Debate on heredity and environment: essential factors affecting human development.

Module III: Physical development across life span (11 hours)

Physical growth during childhood, adolescence and old-age brain development across life span, Bio-Psycho-Social health model, aging, biological theories of aging and death.

Discussion on educational implications of stages of physical development

Module IV: Emotional and Moral Development (12 hours)

a) Development of Emotion, Temperament, Attachment, Love, intimacy, sexuality, self-identity, gender identity and personality across the life span.
b) Theories of moral development. Changes in moral reasoning (Kohlberg's Theory). Development of values, Religion, Spirituality and Meaning in Life, Fowler's Theory

'Emotions are springs of human actions'- A group discussion on teachers' role in bringing about balanced emotional development of students

COURSE/LEARNING OUTCOMES

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

Module I: Understand the meaning of life span (K); Explain the process of life (U); Write about the concept of life span (K); Explain the importance of life span development (U); State the characteristics of lifespan development (K); Differentiate between growth and development (U); Understand the meaning of development (K); Analyze the nature of development (An); Illustrate the scope of life span development (Ap); Analyze the theories of development (An); Apply the principles of the theories of development in educating our children (Ap); State the meaning of socialization (K); Discuss the influence of socialization on development process of an individual (Ap); Summarize the role of education in development of a child (S)

Module II: Understand the contributions of heredity and environment on the human development (U); Understand about the biological bases of human development (U); Identify the major developmental periods of an individual (Ap); Find out the effect of teratogens on prenatal development (K); Analyze the problems faced in neonatal health (AN); Apply the knowledge in real life situations (Ap); State the meaning of neurons (K); Illustrate the structure of a neuron (Ap); Describe the types and functions of a neuron (U); Explain the structure of nervous system (U); Understand the physiological basis of neural response (U); Illustrate the structure of brain (Ap); Write the functions of the brain parts (K); Explain the effect of hormone on the nervous system (U)

Module III: State the developmental stages of a child (K); Understand the characteristics of a child at various stages of childhood (U); Describe the physical development aspect of a child at the various stages (U); Identify the problems faced by a child during the physical development (Ap); Explain the period of adolescence (U); Find out the characteristics of the stage of adolescence (Ap); Understand the physical development of an adolescent (U) ; State the bio-psycho social health model (K); Understand the concept of aging and death (U); Find out the educational implications of the stages of physical development (Ap)

Module IV: State the meaning of emotion (K); Write about the different types of emotions (K); Understand the emotional development of an individual at different stages of development (U); Understand the meaning of temperament, love, intimacy in relation to emotional development (U); Understand the concept of sexuality , self identity, gender identity in relation with emotional development (U); Explain the major theories of moral development (U); Find out the implications of the theories of moral development in an individual's life (Ap); Explain the process of value development in an individual (U); Understand the concept of religion development and spirituality development in an individual (U); Understand the Fowler's faith development theory (U); Identify the role of teachers in bringing about a balanced emotional development of students (Ap)

Suggested Readings

1. Allyn and Bacon, S. M. An introduction to Physiological Psychology. USA: Random House
2. Berk, L.E. Child Development. New Delhi: Prentice Hall.
3. Bhaskar, R. Fundamentals of child psychology. Delhi: Swastik Publishers and Distributers
4. Carlson, N.R. Physiology of behaviour. Boston
5. Chatterje,C., Suhita, P., Priyadarshi,C. and Vijayaraghavan, M.(Eds). Discourses on Aging and Dying. Los Angeles: Sage
6. Hurlock, E.B. Child development. New Delhi: Tata McGraw-Hill Publishing Company Limited
7. Hurlock, E.B. A Life-Span Approach. New Delhi :Tata McGraw-Hill Publishing Company Limited
8. Leukel, F. Introduction to physiological psychology. New Delhi: CPS Publishers
9. Mallon, B. Dying, death and grief, working with adult bereavement. Los Angeles: Sage
10. Mishra, A.K. Psychology of Aging. Jaipur: Sublime Publications
11. Morgan, T.H and Steller, A.(1965).Physiological Psychology. New York: McGraw Hill
12. Santrock, J.W. Life –Span development. New Delhi: Tata McGraw-Hill
13. Santrock,J.W. Child Development. New Delhi: Tata McGraw-Hill Edition
14. Sharma,R. N. and Sharma, R. Child Psychology. New Delhi: Atlantic

EDLI0028: LEARNING AND INDIVIDUAL DIFFERENCES

(3 Credits - 45 hours)

Objectives: *The course on Learning and Individual Difference provides the students an understanding of the concept of learning, its nature, scope, types and styles. It acquaints the students with the factors influencing learning. It introduces the students to the concept of Transfer of Learning, its types, theories and the educational implications of transfer of learning. It also provides insights to the students on individual difference, its determinants, types and its implications on learning in particular and educational programme as a whole.*

Module l: Understanding Learning (10 hours)

Learning: Concept and Scope; Nature of learning: learning as a process and learning as an outcome; Laws of learning; Types of learning: factual, associations, conceptual, procedural, generalizations, principles and rules; Methods of effective learning; Learning curves - Types, features and its educational implications; Plateaus in Learning; Learning styles.

Students analyze their own learning styles

Module ll: Factors Influencing Learning (12 hours)

Factors influencing learning - Intellectual, Emotional, Physical and Social; Concept and nature of attention, determinants of attention, relationship with interest; Concept, nature and types of motivation – intrinsic, extrinsic and achievement; Learning and maturation; Learning to think, reason and solve problems

Discuss the role of teacher in addressing various factors influencing learning

Module III: Transfer of learning (10 hours)

Transfer of learning - Concept, Importance, Nature; Types of transfer of learning; Theories of transfer of learning - Theory of mental discipline, Theory of identical elements, Theory of generalization and theory of ideals; Methods of enhancing transfer of learning

Developing a narrative of personal experiences on the basis of transfer of learning in various situations

Module IV: Individual Difference (13 hours)

Concept of individual difference; Dimensions of individual difference; Determinants: Role of heredity and environment, their inter-relationship; Types/varieties of individual differences - Physical, mental, motor, emotional, interest and aptitude, attitudes, social and moral development. Individual difference and education; Influence of individual differences on learning outcomes; Provisions for individual differences in educational institutions; Implications of individual differences for organizing educational programmes

Sharing session on the problems and issues related to individual differences as faced by the students

COURSE/LEARNING OUTCOMES

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

Module I: Define 'learning'(K); Anlyze the definition of learning (An); Construct their own definition (Ap); Explain the nature and scope of learning (U); Summarize the basic features of learning (S); Evaluate the learning of an individual (E); State the laws of learning (K); Explain the laws of learning (U); Apply the laws of learning in the process of their learning (Ap); Name the types of learning (K); Explain the different principles of learning (U); Use different methods for effective learning (Ap); Explain the learning curve by indicating the types and features (U); State the meaning of plateaus in learning(K); dentify using different learning styles (Ap); Analyze the learning styles of their classmates(An); Evaluate the effectiveness of learning styles (E)

Module II: State the factors affecting the process of learning (K); explain the physical and social factors influencing the process of learning (U); Define the term 'attention'(K); Explain the determinants of attention (U); Find out the relationship between attention and interest (Ap); State the meaning of motivation (K); Name the types of motivation (K); Describe the learning and maturation (K); Find out the level of maturation and its effect on learning (Ap); Use components of learning in practice and solving the problem (Ap)

Module III: Define the concept of transfer of learning (K); Explain the nature and types of transfer of learning (U); Name the theories of transfer of learning (K); Explain the theory of mental discipline (U); Apply the theory of discipline in creating learning among the students (Ap); Analyze the theory of identical elements (An); Apply the theory of identical elements in teaching –learning process (Ap); Differentiate between the theory of generalizations and theory of ideals (Ap); Synthesize the educational implications of transfer of learning (S); Explain the methods of enhancing transfer of learnings (U)

Module IV: Describe the meaning of individual difference (K); State the dimensions of individual difference (K); Explain the significance of individual differences (U); State the determinants of individual differences (K); Explain the heredity and environment in relation to individual differences (U); Find out the influence of environment on the individual differences of students (Ap); Analyze the causes of individual differences (An); Classify the individual differences in different categories (Ap); Explain the effect of individual differences on learnings outcomes of the students (U); State the provisions for individual differences in educational institutions (K); Use the provisions for facilitating differently abled students in educational institutions (Ap); Identify the individual differences and using in organizing various activities in the educational institutions (Ap)

Suggested Readings

1. Bhatnagar, S. Advanced Educational Psychology. Agra: Bhargava Book House.
2. Chand, T. Educational Psychology. Agra: Bhargava Book House.
3. Crow, R.B. & Crow, A. Educational Psychology. New Delhi: Eurasia Publishing House.
4. Dececee, J. P. The Psychology of Learning & Instruction. New Delhi, Prentice Hall.
5. Dhir, R.N. Educational Psychology. Chandigarh: Abhishek Publication.
6. Driscoll, M. P. Psychology of Learning for Instruction. Boston, Allyn and Bacon
7. Gagne, R. M. The Conditions of Learning. New York, Rinehart &Winston
8. Guilford, J.P. The Nature of Human Intelligence. New York: McGraw Hill.
9. Hall, C & Hall, E. Human relations in education. Routledge.
10. Holt, J. How children fail? Penguin.
11. Hulac, D. M., & Benson, N. Getting Students to Work Smarter and Harder: Decreasing Off-Task Behaviour through Interpersonal Techniques. School Psychology Forum,5(1), 29-36.
12. Judd, C.H. Educational Psychology, Guwahati: Nivedita DK Distributions.
13. Kumar, K. What is worth teaching? Orient Black Swan.
14. Kuppuswamy, B. Advanced Educational Psychology. Jalandhar: Jalandhar University
15. M. Gauvain & M. Cole, (Eds). Readings on the development of children. New York: W. H. Freeman & Co.
16. Mangal, S. K. Essentials of Teaching Learning and Information Technology. Ludhiana: Tandon Publishers.

17. Mangal,S.K. Advanced Educational Psychology. New Delhi: Prentice hall of India.
18. Vygotsky, L. Interaction between learning and development. In Gauvain and Cole (Eds) Readings on the development of children. New York: Scientific American books.

EDFE0101: FOUNDATIONS OF EDUCATION

(4 credits – 60 hours)

***Objectives**: This course on Foundations of Education aims at*

- *Acquainting students with the meaning, aims and objectives of education*
- *Providing the students with a holistic view of the forms and bases of education*
- *Helping them to identify the various dimensions of education and educational institutions*
- *Helping them to understand the importance and needs of child-centred education and the various methods of education*

Module I: Meaning, Aims and Objective of Education (16 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 (14 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.

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'education' (K); Explain the meaning and nature of education as a concept (U); State the objectives of education (K); Illustrate the functions of education (U); Analyze education as a process and a product (AN); Establish education as a discipline (AP); State individual, social and national aims of education (K); Differentiate between individual and social aims of education (AP); Differentiate between the aims and objectives of education (AP); Explain the four pillars of education as per Delor's Report (U)

Module II: Describe the features of formal education (K); Write about non-formal education (K); Illustrate the concepts of formal and non-formal education (U); State the concept and importance of informal education (K); Explain the philosophical basis of education (U); Synthesize the philosophical basis of education (Sn); Explain the psychological and sociological bases of education (U); Illustrate the biological basis of education (U)

Module III: State the dimensions of a learner (K); State the qualities of a teacher (K); Explain the relationship between teacher and learner (U); Define the term 'Curriculum' (K); Explain the various dimensions of curriculum (U); Analyze the curriculum (AN); Use the curriculum in practice (AP); Evaluate the curriculum (E); State the features of a good school (K); Explain the rules family, social and religious institutions in the field of education (U)

Module IV: State the concept of child centred education (K); Explain the features of child centred education (U); Make the process of education child centred in nature (Ap); Write the meaning and significance of play way method in education (K); Explain the contributions of Maria Montessori in pre-primary education

(U); State the concept of Basic education (K); Analyze the basic features of basic education (An); Find out the scope and space of Basic education in NCFSE-2005 (AP); Explain the structure of Project method of teaching and learning (U); Apply project method for teaching and creating learning among the students (Ap)

Suggested Readings

1. Aggarwal, J.C. (2017). Theory and Principles of Education. New Delhi: Vikas Publishing.
2. Chakraborty. J.C (1982). Modern Education: Its aims and principles. Calcutta: S.Chakraborty.
3. Chandra, S.S. and Sharma, R.K (2004). Principles of Education. New Delhi: Atlantic Publisher.
4. Chaube. S.P and Chaube, A. (2007). Foundations of Education. Noida: Vikas Publication.
5. Daly. A. J. (2010). Social Network Theory and Educational Change. California: Harvard Education Press.
6. Gutek, G. L. (2004). The Montessori method. London: Rowman and Littlefield.
7. Hayden, M. and Thompson, J (eds.) (1998). International Education: Principles and Practice. London: Routledge Falmer Taylor & Francis Group.
8. Isaacs, B. (2012). Understanding the Montessori approach: Early years' education in practice. New York: Routledge.
9. Kundu, D. and Tarun, R.M. (1990). Modern theory and principle of education. New Delhi: The world press private limited.
10. Saxena, N.R. S (2014). Philosophical and sociological foundations of education. Meerut: Vinay Rakheja.

EDPF0102: PHILOSOPHICAL FOUNDATIONS OF EDUCATION

(4 Credits – 60 credits)

Objectives: *This course aims to*

- *assist learners to understand the theoretical bases of education.*
- *help students to reflect upon the philosophical ideologies of Western and Indian thinkers.*
- *develop in the students an understanding of the link between educational philosophy and national values*
- *make students comprehend the basics of Philosophy of Knowledge and Value as a part of education.*

Module I: Philosophy and Education (10 hours)

Introduction to the historical and philosophical traditions in education - Socrates and philosophical ideals, relationship and influence of philosophy on education

Module II: Western and Indian Philosophical ideologies (15 hours)

Comparative analysis of Western and Indian Philosophical ideologies:

a) Indian: Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, Aurobindo Ghosh, Krishnamurti.
b) Western: Plato, Jean Jacques Rousseau, Friedrich Froebel, John Dewey, Paulo Freire.

Module III: Schools of Philosophy and National Values (15 hours)

a) Indian schools of Philosophy: Vedic philosophies and Buddhism - in terms of knowledge, reality and value.
b) 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.
c) Inculcation of core national values as enshrined in the Constitution of India

Module IV: Education and Epistemology (10 hours)

Knowledge - Nature, role of knowledge, scientific inquiry, senses and feelings, experience (empiricism), reasoning and logic - inductive and deductive

Module V: Education and Axiology (10 hours)

Values - conceptual basis, need and importance, role of education, morality and actions, aesthetics, ethics - Kantian ethics, responsibility and freedom

COURSE/LEARNING OUTCOMES

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

Module I: Define 'philosophy' (K); Explain the historical background of philosophical traditions (U); State the contributions of Socrates in philosophy (K); Describe the different philosophies (K); ind the applications of different philosophies in education (Ap)

Module II: Explain the features of Indian Philosophical Ideologies (U); Explain the features of western Philosophical ideologies (U); Compare the Indian and Western Philosophical ideologies (Ap); State the contributions of Indian thinkers like: Swami Vivekananda, Rabindranath Tagore, Gandhi etc. (K); Explain the contributions of western thinkers like Plato , Rousseau, Froebel, Dewey and Freire (U)

Module III: Explain the Vedic philosophy (U); Analyze the Vedic philosophy in terms of knowledge , reality and values (An); State the philosophy of Buddhism (K); Analyze the philosophy of Buddhism in terms of knowledge, reality and values (AN); Practice the philosophy of Buddhism in life (Ap); Use the western schools of philosophy in education (Ap); Find out the basic features of naturalism , idealism, pragmatism , realism and humanism (Ap); Explain the core national values as per Indian Constitution (U); Use the national core values in life (Ap)

Module IV: State the concept of 'Knowledge' (K); Explain the concept of 'Knowledge' (U); State the methods of knowledge (K); Compare the methods of knowledge (Ap); Define scientific method of acquiring knowledge (K); Explain the concepts of inductive and deductive reasoning (U)

Module V: Define the term 'value (K); Explain the conceptual framework of values (U); Identify and classify the values (Ap); Practice the different values in real life situations (Ap); Define ethics (K); Explain the concepts of responsibility and freedom (U)

Suggested Readings

1. Ayer, A.J.,The Problem of Knowledge. Penguin.
2. Dewey, J., Democracy and Education. Macmillan, New York.
3. Dewey, J., Experience and Education. Macmillan, New York.
4. Durkheim, E., Education and Sociology. Free Press, Chicago.
5. Froebel, F , The Education of Man. Fairfield, Kelley, New Jersey.
6. Hirst, P.H., Knowledge and the Curriculum. Routledge and Kegan Paul.
7. Hirst, P.H. and Peters, The Logic of Education. Routledge and Kegan Paul.
8. Hobbes, T., Leviathan. Collier-Macmillan.
9. Hume, D.,. An Enquiry Concerning Human Understanding. La Salle.
10. Kant, I.,Critique of Pure Reason. Dent.
11. Moore, T.W.,. Educational Theory: An Introduction. Routledge and Kegan Paul.
12. Peters, R.S., Ethics and Education. Allen and Unwin.

EDTP0103: THEORIES AND PRINCIPLES OF EDUCATION

(3 Credits - 45 hours)

Objectives: *The objectives of this course are:*

- *to acquaint the students of Education with the fundamental aspects of education, with special reference to the dimensions of education suggested by Ducasse*
- *to give them an understanding of the process of conscious learning and issues in formal discipline*
- *to develop a critical outlook towards current trends in education*

Module I: Understanding 'Education' (10 hours)

Divergent description of Education, education as a process, functions of education (context of individual and social aim, factors influencing functions), education and schooling, education and indoctrination, heredity and educational attainment, individual differences in education.

Module II: Facets of Education (12 hours)

a) Aspects of education - explanation, interpretation, application, perspective, empathy, self-knowledge.
b) Ducasse's dimensions of education - intellectual education, physical education,vocational education, education in social dexterity, education of the will, aesthetic education, moral and religious education, liberal education.

Module III: Conscious Learning and Formal Discipline (10 hours)

a) Conscious Learning - factors in conscious learning, the evolution of judgement, the evolution of ideas.
b) Formal Discipline - rise of the concept of formal discipline, criticism by psychologists, positive discipline as formal discipline.

Module IV: Current trends in Education (13 hours)

a) Indian constitution and education, globalization and education, privatization in education, modernization of Indian education
b) Developing trends in environmental education, value education, human rights education etc.

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'Education' (K); Explain the process of education (U); State the functions of Education (K); Identify the factors influencing the process of Education (Ap); Explain the factors influencing the process of Education (U); Differentiate between Education and Indoctrination (Ap); Analyze the components of Indoctrination (An); Synthesize the segments of the process of Education (S); Explain the contributions of heredity and environment in the process of education (U); Explain the concept of individual differences in Education (U); Identify the individual differences among the students and teaching accordingly (Ap)

Module II: State the aspects of education (K); Explain the concepts of perspective and empathy (U); Define the imparting of knowledge and knowledge itself (K); Explain the process of comprehension including translation and interpretation (U); Apply the knowledge in real life situations (AP); Analyze the knowledge (AN); Summarize the knowledge and building a theory (S); Evaluate the theory (E); State the different dimensions of education as given by Duccasea (E); Explain intellectual, physical and vocational education (U); Explain education in social dexterity, education of the will (U); State the meaning of moral and religious education (K); Apply moral education in real life situation (Ap)

Module III: Define conscious learning (K); Explain the factors of conscious learning (U); State the meaning of evolution of judgment (K); Write about the evolution of idea (K); Differentiate between the idea and evolution of judgment (AP); Explain the concept of formal discipline (U); Reflect positive formal discipline in our behaviour (Ap)

Module IV: State the provisions in Indian constitution about education (K); Explain the Article-45 of Indian Constitution (U); Explain some of the other provisions indicated n Indian Constitution (U); Define the term 'Globalization' (K); Explain the globalization of education (U); State the features of privatization of education (K); Explain the features of modernized Indian Education (U); Define 'environmental education', 'value education' and 'human rights education' (K); Apply the basics of environmental education and value education in our lives (Ap)

Suggested Readings

1. Moore, T.W. Punishment and Education. Proceedings of the Philosophy of Education Society of Great Britain.
2. Newman, J.H. On the Scope and Nature of University Education. Dent.
3. Peters, R.S. Essays on Educators. Allen & Unwin.
4. Piaget, J. The Moral Judgment of the Child. Routledge & Kegan Paul.
5. Plato. The Republic. Penguin.
6. Rousseau, J.J. Emile. Dent.
7. Ryle, G. The Concept of Mind. Penguin.

8. Scheffler, I. The Language of Education. Charles C.Thomas.
9. Snook, I.A. Indoctrination and Education. Routledge & Kegan Paul.
10. Spencer, H. Education. Dent.
11. Skinner, B.F. Walden Two. Macmillan, New York.
12. White, P.A. Democracy and the Public Interest in the Philosophy of Education, Oxford Readings in Philosophy. Oxford University Press

EDES0104: EDUCATION AND SOCIETY

(3 credits – 45 hours)

Objectives: *This course on Education and Society will enable the students to:*

- *Understand and describe the relationship between society and education*
- *Elaborate on the roles played by education in bringing about social change*
- *Appreciate the importance of education for social change, national integration and international understanding in a diverse social context*
- *Identify current social problems and suggest ways and means to tackle them.*

Module I: Sociology and Education and Agencies of Education (12 hours)

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 (10 hours)

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 (15 hours)

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 (8 hours)

Equalization of educational opportunities; role of education in solving social problems such as illiteracy, nutrition, sanitation and unemployment; lifelong education

COURSE/LEARNING OUTCOMES

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

Module I: Define 'sociology' (K); Write the meaning of educational sociology (K); Explain the concept of sociology of education (Ap); Find out the relationship between sociology and education (Ap); State the sociological determinants of education (K); Explain the role of family, school, community and religious agencies in education (U); Describe the state as an agency for the development of education (K)

Module II: Define the term 'culture' (K); Explain the nature and components of culture (U); Find out the features of the culture of a particular ethnic group (Ap); Explain the process of transmission and preservation of culture (U); Explain the concept of 'cultural lag' (U); State the factors affecting the social change (K); Illustrate the social mobility and stratification (U); Find out the impact of education on social change in any society (Ap)

Module III: Define the social group (K); Explain the nature and features of a social group (U); State the types of social groups (K); Explain the concept and significance of social interaction (U); Identify the impact of social interaction of the life of the people (AP); Explain the concept of national integration (U); Identify the factors influencing the sense of national integration (AP); Illustrate the role of education in the process of national integration (U); Explain the significance of International understanding (U); Define the concept of democracy (K); State the features of democracy (K); Practice the democratic values (AP)

Module IV: State the concept of equal educational opportunities (K); Illustrate the provisions of equal educational opportunities (U); Find out the problem of unequal educational opportunities in the society

(AP); State the constitutional provisions for equal educational opportunities (K); State measures adopted by the Indian Government for the removal of illiteracy (K); Explain the problem of health and nutrition (U); State some of the health and nutrition programmes in India (K); Define 'unemployment' (K); Explain the causes of unemployment (U); State the measures for checking the problems of unemployment (K); Explain the concept of lifelong education (U)

Suggested Readings

1. Dash, B.N. (2004). Teacher and Education in Emerging Society. New Delhi: Neel Kamal Publication
2. Gul, S. B. and Khan, Z. N. (2010). Philosophical and sociological foundations of education. Create Space.
3. Khana, S.D. (2000). Education in the Emerging Indian Society. Delhi: Doaba House.
4. Kumar, T.P and Talawar, M. S. (2010). Philosophical and sociological foundations of education. Mumbai: Himalaya publishing house.
5. Sachdeve, M.S. and Sharma, K.K. (2015). Contemporary India and Education. United States: Twenty first century publications.
6. Saxena, N.R. S. (2014). Philosophical and sociological foundations of education. Meerut: Vinay Rakheja.
7. Sharma, M (2011). Philosophical and sociological foundation of education. Guwahati: Eastern Book House.
8. Sharma, R.S. (1998). Perspective in Modern Education. Delhi: Neel Kamal Publication.
9. Singh, Y.K. (2008). Sociological foundations of education. New Delhi: A P H Publishing Corporation.
10. Singh, Y.K.(2000). Education in Modern India. New Delhi: Deep and Deep Publications.

EDLE0105: LIFE SKILLS EDUCATION

(3 credits – 45 hours)

Objectives: *A holistic approach to the human body, mainly the connection between the brain and the body will enhance learning and growth. With this in mind, the course on Life Skills Education aims to*

- *train the students to integrate academic skills with physical skills and competency development*
- *prepare and provide the students with intrinsic motivation to achieve their goal of life*

Module I: Understanding of Life Skills (13 hours)

Skills and life skills; Origin and development of Life Skills; Understanding life skills; Significance of life skills; Introduction to 10 core skills: Social, thinking and coping skills.

Module II: Social skills (12 hours)

Understanding self - self-concept, self-esteem, self-control, self-realization, self-awareness; Communication - types, styles, barriers, skills of effective communication; Interpersonal relationships - healthy relationship, Empathy: altruism, empathy and voluntarism.

Module III: Cognitive skills (10 hours)

Cognitive skills - nature, elements, types; Critical thinking - nature, stages; Creative thinking - nature, stages; Problem solving: factors, steps; Decision making - process, need, consequences.

Module IV: Coping Skills (10 hours)

Coping with emotion: definition, characteristics, types, classification - wheel model, two dimensional approach, coping strategies; Coping with stress: stressors, sources of stress; General adaptive syndrome model of stress coping strategies

COURSE/LEARNING OUTCOMES

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

Module I: Differentiate a skill from a talent (U); Classify a general skill from specific skill (An); State transferable/functional skill (K); Classify skills on the bases of personal trait/attitude, functional skill and knowledge based (An); Define life skill and life skill education (K); Summarize the significance of life skill education (S); List down the components of life skills (K)

Module II: Define self-concept (K); Differentiate self-concept from self-awareness (U); Infer different factors that influence self-concept of an individual (An); Apply different methods to improve their knowledge of themselves (Ap); Relate different theories of self- understanding in their daily life (An); Interpret the actions and view-points of people about themselves using social comparison theory of self- understanding (Ap); Explain the concept of self-awareness (U); Identify people who possess self-awareness (An); Formulate strategies for developing or enhancing self-awareness (Ap); Synthesize the various level of self-awareness development in human being (S); Define self-esteem (K); Illustrate the outward signs of positive self-esteem (U); Assess the significance of self-esteem in the life of an individual (E); Enumerate the different factors for developing self-esteem (U); Explain the significance of parenting style as an important factor or an hindrance towards developing self-esteem among children (K); Suggest tips for improving one's self-esteem (Ap); Differentiate self-esteem from self-efficacy (An); State the six pillars of self-esteem (K); Define empathy (K); Differentiate empathy from sympathy (An); Relate empathy with sympathy (AP); Explain the different types of empathy (U); Elucidate the different dimensions of empathy (U)

Module III: Define thinking (K); State the key elements of thinking (K); Define a concept and its development (K); Define creativity (K); Relate the investment theory of creativity with the actual practice in the day to day life (Ap); Summarize the resources of creativity (S); Identify the characteristics of a creative individual (An); Assess the stages of creative thinking (E); Propose different techniques for enhancing creativity (Ap); Explain critical thinking (U); Point out the prominent features of critical thinking (An); Determine the impediments of critical thinking (An); Identify some of the educational practices that impede development of critical thinking among students (An); Suggests ways and means to develop critical thinking among students (U); Explain decision making process (U); Identify the types of decision making that we make in life (An); Explain the decision making procedure for arriving at a proper decision (U)

Module IV: Define emotion (K); Recall the basics of coping with emotion (K); Assess the advantage of coping with emotion (E); Define stress (K); Explain the types of stress (U); Identify the stressors during their time of stress (An); Point out the importance of stress in their life (An) To generalize the symptoms of stress (S); Determine the ways to control stress (E); Predict the outcomes of stress (U); Explain the wheel model of emotion (U); Name the primary emotions (K); Illustrate that emotion is a combination of two or more primary emotion (U)

Suggested Readings

1. Bharath, S., & Kumar, K. K. Health Promotion Using Life Skills Education Approach for Adolescents in Schools--Development of a Model. Journal of Indian Association For Child And Adolescent Mental Health, 4(1), 5-11.
2. Compton, N. The Indispensable Book of Practical Life Skills, Hammond
3. Dudhade, B. A. Life Skills Education, Neelkamal Publication
4. Forde, S. D. Look after Yourself, or Look after One Another? An Analysis of Life Skills in Sport for Development and Peace HIV Prevention Curriculum. Sociology of Sport Journal, 31(3), 287-303.
5. Jeeraporn, K., Rutja, P., Nantawon, S., Villarruel, A. M., & Dechavudh, N. The Effect of a Parent Training Program, In Conjunction with a Life Skills Training Program for School-age Children, on Children's Life Skills, and Parents' Child-rearing Skills and Perceptions of Support for Child Life Skills Development. Pacific Rim International Journal of Nursing Research, 17(1), 3-27.
6. Kar, A. K. Importance of Life Skills for the Professionals of 21st Century. IUP Journal of Soft Skills, 5(3), 35-45.
7. Mitra, B. Personality Development and Soft Skills, Oxford University Press
8. Pestalozzi,T. Life Skills 101: A Practical Guide to Leaving Home and Living on Your Own, Stonewood Publications
9. Pharaoh, H., Frantz, J., & Smith, M. Life skills as predictors of engagement in health risk behaviours: A survey of secondary school learners. African Journal for Physical, Health Education, Recreation & Dance, 70-81.
10. Rao, K. R. & Dinakar, P. Life Skills Education, Neelkamal Publication
11. Trottier, C., & Robitaille, S. Fostering Life Skills Development in High School and Community Sport: A Comparative Analysis of the Coach's Role. Sport Psychologist, 28(1), 10-21.
12. Verma, S. Development of Life Skills and Professional Practice (WBSCTE), Vikas Publications

13. Woititz, J. G. & Garner, Alan. Life Skills for Adult Children, Health Communications publications
14. Shankar, R. The Art of Stress - Free Living, Neelkamal Publications
15. Nair, V. Master of Life Skills, HarperCollins India
16. Friel, J. & Friel, L. Adult Children: Secrets of Dysfunctional Families, Health Communications.

EDGE0106: GENDER EDUCATION

(4 credits - 60 hours)

Objectives: *The course on Gender Education aims to*

- *provide a critical perspective on the gendered structure of society covering an array of sectors*
- *understand the concept and importance of gender justice and equality.*
- *analyze the status of education of girls in schools and develop an insight into policy, perspectives, issues and concerns of girl's education in India*
- *To sensitize students about the gender issues in general and education in particular*

Module I: Gender studies (13 hours)

Concept, Need, Scope; Gender studies as an academic discipline; Gender and Economy and Work Participation; Gender and globalization; Gender and education

Module II: Identification of structures of domination and control (12 hours)

Society, Family and school in India; Issues in school education - Problems of access, enrollment, retention, stagnation, drop-out and push out; Higher Education and Professional Spaces.

Module III: Gender and Education (10 hours)

Gender as the Basis of Inequality - Issue of patriarchy, hierarchy, power, dominance, subjugation; gender disparity in Education – gender bias in school curriculum, Andro construction of knowledge and educational goals from gender perspective.

Module IV: Issues of Indian women (10 hours)

Family, caste, class, culture, religion related issues; Women's education; Co-education - its educational implications; Literacy and Non-formal education for women's development; Education of Girl child in India: present status and challenges ahead

Module V: Women's Movements and routes towards change (15 hours)

Pre-independent, post Independent and current women's movements; National committees and commissions for women; governmental and non-governmental organizations for women and child development; Community participation for education of the girl child; Constitutional provisions, policies, programmes for women.

COURSE/LEARNING OUTCOMES

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

Module I: Define the term 'gender and 'sex' (K); Differentiate between gender and sex (U); Write about the meaning of gender studies (K); Understand the need of gender studies (U); Illustrate the scope of gender education (U); Analyze the need of gender studies in the present context (An); Explain the importance of gender studies as an academic discipline (U); Understand the role of gender in the field of economy and work (U); Find out the relationship between gender and globalization (Ap); Identify the role of gender and education (I); Critically analyze the role of gender in the system of education (An)

Module II: Explain the concept 'society', 'family' and 'school' in India (U); Understand the role of society , family and school (U); Identify the issues in school education (Ap); Analyze the problems of access, enrollment retention, stagnation, drop out and push out (An); Explain how gender influence the issues in education system. (U); Understand the system of higher education (U); State the problems of higher education in India (K); Summarize the role of gender in higher education (S); Analyze the role of gender in professional spaces (An)

Module III: Understand gender as the basis of inequality (U); Explain the issue of patriarchy (U); Analyze the problems like hierarchy, power, dominance and subjugation (An); Explain the concept of gender disparity (U); Find out the status of gender disparity in India (An); Understand how gender biasness takes place in school curriculum (U); Explain the concept of andro construction of knowledge (U).

Module IV: State the issues faced by Indian women (K); Understand family in relation with the issues of Indian women (U); Understand caste and class in relation with the issues of gender (U); Find out the influence of culture and religion in the gender issues (Ap); Write about women education (K); Explain the status of women education in India (U); Find out the problems of women education (An); State the meaning of co-education (K); Find out the relevance of non formal education for women's development (Ap); Find out the present status of girl child and their education in India (Ap).

Module V: State the important women's movements taken place before independence (K); State the women movements taken place after the independence in India (K); Find out the current woman movements across the globe (Ap); Explain the role of the woman movements (U); List out the national commissions and committees for woman (Ap); Understand the role of community participation for education for girl child (U); State the constitutional provisions in India for gender equality and women (K); Describe about the policies and programmes for women in India (U)

Suggested Readings

1. Apple,Michael W. & Smith,Christian L.(ed.) The Politics of the Textbook, Routledge,New York.
2. Bhasin,Kamla. What is Patriarchy? Kali for Women,New Delhi
3. Bhog,Dipta. Gender and Curriculum, Review of Women Studies, Economic and Political Weekly,37(17):1638-1642
4. Chakravarti,Uma. Rewriting History;The Life and Times of Pandita Ramabai. OUP;Delhi.
5. Geetha,V. Gender: Stree; Kolkata.
6. Giroux,H . Ideology,Culture and the Process of Schooling. Falmer Press,London
7. Kumar,Krishna. What is Worth Teaching,Orient Blackswan, Delhi
8. MHRD-Ramamurty Committee Report (1990)-Towards enlightened and humane society, Delhi
9. Narasaiah. M.L. Women, Children and Poverty. New Delhi: Discover Publishing House
10. NCERT-National Curriculum Framework 2005, N.C.E.R.T. New Delhi
11. NCERT-National Curriculum Framework 2005 Position Paper no. 3.1 by National Focus Group on Problems of Scheduled Caste and Scheduled Tribe Children,N.C.E.R.T. New Delhi
12. NCERT-National Curriculum Framework 2005 Position Paper no.3.2 by National Focus Group on Gender issues in Education, N.C.E.R.T. New Delhi
13. NCERT-National Curriculum Framework for School Education 2000, N.C.E.R.T. New Delhi
14. Parvin, M.R. Empowerment of Women: Strategies and Systems for Gender Justice. New Delhi: Dominant Publishers
15. Rao. D.B. Education for Women. New Delhi: Discover Publishing House
16. Rao. D.B. International Encyclopedia of Women. New Delhi: Discover Publishing House
17. Sindhuja, P. Economic Empowerment of Women through Self-Help Groups. New Delhi: Discover Publishing House
18. Skelton, C. The SAGE Handbook of Gender and Education. New Delhi: Sage

EDPB0107: PSYCHOLOGICAL BASES OF EDUCATION

(4 credit-60 hours)

Objectives:

- *To create awareness about the psychological behaviour of individual.*
- *To understand the significance of psychology in the process of education.*
- *To make the students well aware of the nature of psychology as a discipline.*
- *To create some skills of handling some equipment and tests.*

Module I: Psychology as a Science of Behaviour (10 Hours)

Meaning of Psychology, Nature and fields of psychology, Educational Psychology-its meaning, nature and scope, Relationship between Education and psychology.

Module II: Psychology of Growth and Development (10 Hours)

Introduction to growth and development; principles and factors of development, stages of development, Theories of development: Erickson's theory of Psycho-social development

Module III: Learning and Theories of Learning (15 Hours)

Meaning, Nature of Learning, learning and maturation, types of learning, Laws of learning, theories of learning: Trial and Error learning, Classical Conditioning, Operant Conditioning; Factors affecting learning, Individual differences and its educational implications

Module IV: Intelligence and its theories (13 Hours)

Intelligence: Definition,, Natureand Theories: Two Factor Theory of Intelligence, Guildford structure of Intellect, Intelligent Quotient (IQ), Emotional Intelligence, Assessment of Intelligence.

Module V: Personality and its Theories (12 Hours)

Meaning and Nature, Theories of personality: Type and Trait Theory, Determinants of personality, Assessment of personality: projective techniques.

COURSE/LEARNING OUTCOMES

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

Module I: Write the meaning of psychology (K); Define the term Psychology (K); explain the nature and field of Psychology (U); State the definition of Educational Psychology (K), Analyse the meaning of Educational Psychology (AN); Explain the meaning, Nature and Scope of Educational Psychology (U); Synthesis the Scope of Educational Psychology (S); use the knowledge of Educational Psychology in Practice (A); establish relationship between Education and Psychology (A)

Module II: State the meaning of Human Growth and Development (K); Differentiate between Human Growth and Development (U); Explain the Factors affecting the Human Growth and Development (U); State the principles of Human Growth and Development (K); Identify the Growth and Development in different Stages of Human being (A); Recall the different stages of Human Growth and Development (K); Analyse the theory of Psycho Social Development given by Erickson (A); Apply the Erickson's Theory in Growth and Development of Individuals

Module III: State the meaning of Learning (K); Explain the Nature of Learning (U); Relate Learning with Maturation (U); Write the Meaning of Classical Conditioning (K); Illustrate the Operant Conditioning (U); State the Factors affecting Learning (K); Identify differences in some individuals (A)

Module IV: Define the term Intelligence (K); Explain Two Factor Theory of Intelligence (U); Analyse the Guilford Structure of Intellect (A); Write the meaning of Intelligence Quotient (K); find out the Intelligence Quotient of an Individual (A); Assess the intelligence of Individuals (E)

Module V: Write the definition of personality (K); state the nature of Personality (K); Explain the Meaning and Nature of Personality (U); Name the Theories of Personality (K); Write about the Type and Trait Theory (K); Use Type and Trait Theory to identify the types of Personalities (A); Explain the determinants of Personality (U); Name the Tests of Personality Assessment Tests (K); Use the Projective Techniques to assess the Personality (A); Test the personality (E)

Suggested Readings

1. Chauhan, S.S. (2004): Advanced Educational Psychology, Vikas Publishing House Pvt. Ltd, New Delhi.
2. Chatterjee, S.K.(2017: Advanced Educational Psychology, Books and allied Pvt. Ltd. Calcutta,
3. Dandapani, S.(2013): A textbook of Advanced Educational Psychology, Anmol Publications Pvt. Ltd
4. Kuppuswami, B.(Ed.)(1963): Advanced Educational Psychology, Jalandhar: University Publications
5. Mangal, S.K., Advanced Educational Psychology, Prentice hall of India, Pvt Ltd. New Delhi
6. Morgan, C.T (1961): Introduction to Psychology, New York: McGraw-Hill.

EDHR0108: HUMAN RIGHTS EDUCATION

(3 Credits -45 hours)

Objectives:

- *To make the students well aware of the concepts of Human Rights and Human Rights Education*
- *To familiarize the students with the rights of children and their education*
- *To create awareness among the students about the issues of gender equity and human rights of girl education*
- *To acquaint with the approach of inculcating value education*

Module I: Introduction to Human Rights Education (12 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 (11 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 (10 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 (12 Hours)

Concept of Value; Sources of Value: Biological, Psychological, Sociological and Spiritual; Meaning, nature and objectives of Value Education; Value clarification approach

COURSE/LEARNING OUTCOMES

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

Module I: State the origin and historical account of Human Rights Knowledge (K); Describe the UN Charter and UDHR (U); Define Human Rights (K); Explain the concept of Human Rights Education (U); Write about the Constitutional Provisions for Human Rights in India (K); Apply the Knowledge of Human Rights in life (A)

Module II: Define International Covenants (K); Describe Economic, Social and Cultural Covenants (U); State Conventions of Rights of Child (K); Explain the role of ILO (U); State the RTE Act 2009 (K); Relate the RTE Act 2009 to Quality Education (A)

Module III: Explain the Human Rights Protection Act (U); State the role of NHRC, SHRCs, UN, UNESCO (K); Explain the Curriculum Frame Work of Human Rights Education (U); Prepare the Curriculum of Human Rights Education (A); State the approaches of Teaching Human Rights Education (K); Explain the Approaches of Teaching of Human Rights Education (U); Use of Approaches to teach Human Rights Education in Classroom (A)

Module IV: Write about the concept of Values (K); State the Sources of Values (K); Explain Biological, Psychological, Sociological and Spiritual Values (U); Define the concept of Value Education (K); Describe the Nature and Objectives of Value Education (U); Use of Value Clarification Approach in the process of inculcating Values among the students (A)

Suggested Readings

1. Bhardwaj, T.R (2007). Education of Human Value. New Delhi: Mittal Pub.
2. Dhand, M. (2002). Teaching Human Rights- A Handbook for Teacher Educators. Bhopal: Asian Institute of Human Rights Education
3. Donnelly, J. (2003). Universal Human Rights in Theory and Practice. New Delhi: Sterling
4. NCERT. (1996). Human Rights: A Source Book. New Delhi: NCERT
5. Mohanty, J (2009). Human Rights Education. New Delhi: Deep and Deep Publications
6. Rama, J. M. (1997). Human Rights an Indian Values. New Delhi: NCTE

EDPE0109: POPULATION EDUCATION

(3 credit-45 hours)

Objectives:

- *To make the students well aware of the growing population*
- *To make the students acquainted with the effects of over population*
- *To make them aware of the ways and means of controlling the growing population*
- *To sensitize the students about the quality of life*

Module I: Indian Population (11 Hours)

Trend of Indian Population since 1901; Population scenario in North East of India; Population explosion, optimum population ,under population and over population, population scenario in the world; Quality of life

Module II: Introduction to Population Education (12 Hours)

Definition, nature ,objectives and scope of population education; Curriculum of population education for school stages; Approaches for teaching population education and preparation of teachers

Module III: Population Education Policies and Programme in India (13 Hours)

Population Education and Five Year Plans of India; Population education policies and programmes in India with special reference to Family planning; Mass media and population education; Nature and need of family life education

Module IV: Evaluation in Population Education (9Hrs)

Concepts of evaluation and measurement; Schemes of Evaluation: Formative and summative; Evaluation in Population education;Evaluation of students and population education programmes

COURSE/LEARNING OUTCOMES

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

Module I: Explain the trend of Indian Population since 1901 (U); State the Population Scenario in North East India (K); Define Population Explosion (K); Describe Optimum Population, Under Population, Over Population (U); Identify the Over populated Areas of India (A); Explain Population Scenario in the world (U); Relate Population with Quality of life (A)

Module II: Define Population Education (K); Explain the Nature of Population Education (U); State the objectives of Population Education (K); Find out the Scope of Population Education (A); Describe the preparation of Curriculum of Population Education (U); Develop the Curriculum of Population Education for Secondary School Stage Students (A); Explain the Approaches for Teaching Population Education (U)

Module III: Identify the status of Population education in Five years Plans of India (A); Explain Population Education Policies and Programmes in India (U); Write the Meaning of Family Planning (K); Describe the methods to be adopted for making family planning successful (U); Describe the role of Mass Media in Popularising Population education (U); Explain the nature and need of family life Education (U)

Module IV: State the meaning of Measurement (K); Write the definition of Evaluation (K); Explain the relationship between Measurement and Evaluation (U); State the meaning of Formative and Summative Evaluation (K); Evaluate the Performance of the Students in Population Education (E)

Suggested Readings

1. Aggarwal, J.C (2003): Population Education, Delhi: Shipra Publications
2. Dubey, S.N (2001): Population of India, 2001, Delhi: Authors Press, Laxminagar
3. Gupta, P.K (2005): Population Education: Meerut,R.Lall Book Depot
4. Kapoor, K.C & Kapoor, A. (2013): Population Education, Guwahati, EBH, Publications
5. Kapoor, K.C.(2005): Effectiveness of training Modalities in Population Education for Secondary School Teachers of Arunachal Pradesh and their Attitude towards Population Education,(Unpublished Report)
6. Mehta, T.S and Chandra, R. (1972): Population Education (Selected Readings).New Delhi: NCERT.

7. Nanda, S.K (2005): Population Education: Delhi House, Book Sellers and Publishers.
8. NCERT (1987): National Source Book on Population Education. New Delhi: NCERT
9. UNESCO (1986): Teaching Methodologies for Population Education. Bangkok: Regional Office, UNESCO

EDEI0110: DEVELOPMENT OF EDUCATION IN INDIA

(4 credits-60 hours)

Objectives:

- *To acquaint the students with the Ancient and Medieval system of Education in India.*
- *To enable the students to understand the development of education during the British rule in India.*
- *To enable the students to know about the different educational policy adopted by British Rule.*
- *To acquaint the students with the development of Education in Independent India.*
- *To acquaint the students with the development of Education in Assam*
- *To make the students well aware of the contemporary concerns and issues of Indian Education.*
- *To familiarize the students with various initiatives of the Government of India like SSA, Mid Day Meal etc.*

Module I: Education in Ancient India (12 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 (13 Hours)

A brief introduction to the Educational Activities of East India Company and Christian Missionary in India.

Educational Reforms and Recommendations of : Charter Act of 1813, Macaulay's Minute 1835, Wood's Despatch; Hunter Commission, 1882, Lord Curzon's Educational Policy, 1904, Sadler's Commission, 1917, Wardha Scheme of Education, 1937,Sargent Report, 1944.

Module III: Education in Post Independence Era (13 Hours)

Educational Reforms and Recommendations of: University Education Commission (1948-1949), Secondary Education Commission (1952-53), Kothari Commission (1964-1966), National Policy on Education (1968, 1986 and 1992), Development of Education in Assam-Primary, Secondary, University and Women Education

Module IV: Vocationalization of Education (10 Hours)

Concept, Scope and need of Vocational Education; Objectives of Vocational education at +2 stage; Vocationalization and National Development, NPE-1986 and POA-1992 with reference to Vocational Education.

Module V: Issues and Challenges in Indian Education at School Stage (12 Hrs)

Concept of UEE and its problems, Physical, Social and Quality access in relation to UEE; Operation Blackboard (OBB), District Primary Education Programme (DPEP), Sarva Shiksha Abhiyan (SSA) and RTE- Act 2009; Quality of Education at Secondary School Stage and Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Use of ICT.

COURSE/LEARNING OUTCOMES

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

Module I: State the meaning of Vedic System of Education (K); Explain the aims, methods of teaching the curriculum during Vedic Period (U); State the relationship between teacher and students in Vedic Period (K); state the features of education during the Buddhist Period (K); Explain the system of Education during Medieval Period (U); Identify the values prevailing during Vedic, Buddhist and Medieval Periods among the teachers and students (A); Explain the role of Missionaries in the field of education (U); State the activities of East India Company relating to education in India (K)

Module II: Write the recommendations made in Charter Act of 1813 (K); Analyse the Macaulay's Minute 1835 (A); State the contributions of Wood's Despatch, Hunter Commission, Lord Curzon's Educational Policy and Sadler's Commission in the field of Indian Education (K); Explain the Wardha Scheme of Education (U); State Sargent Report in the India Context (K)

Module III: State the features of University Education Commission (1948-1949) (K); Explain Secondary Education Commission (U); Write the effectiveness of Kothari Commission (K); Analyse the features of NPE, 1986 and Programme of Action, 1992 (A); Explain the growth and development of Primary, Secondary, University and Women Education in Assam (U)

Module IV: Describe the nature and scope of Vocational Education (U); Define Vocational Education (K); State the Objectives of Vocational Education for +2 School stage (K); Synthesize the features of Vocational Education found in NPE, 1986 (S)

Module V: Write the meaning and purpose of UEE (K); State the problems of UEE in India (K); Explain the concept of Operational Black Board and DPEP in ensuring UEE (U); state the basic features of SSA and RTE, Act 2009 relating to quality education at Elementary Schools in India (K); Explain the features of RMSA (U)

Suggested Readings

1. Goswami,S. & Das Sarma , P (2012). Development of Education in India, Shanti Prakashan.
2. GOI (1964-1966):'Education and National Development". Ministry of Education, Government of India 1966.
3. Govt. of India, Ministry of Human Resource Development, Policy of Action, 1992, New Delhi
4. Mohanty, J., (1986). School Education in Emerging Society, Sterling Publishers
5. Mukerjee, S.N., (1966). History of Education in India, Acharya Book Depot.
6. NCERT (1986). School Education in India – Present Status and Future Needs, New Delhi.
7. Nurullah , S. & Naik, J.P.(1974) History of Education in India, Mc. Millan Company. India.
8. Rawat,P.L (2006).: History of Indian Education, Ram Prasad & Sons, Bhopal.

EDET0111: EDUCATIONAL THINKERS

(3 credits- 45 hours)

***Objectives**:*

- *To create awareness among the students about the different educational thinkers of the world and India.*
- *To familiarize the students about the different philosophies of some eminent educational philosophers.*
- *To create awareness among the students about the role of teachers and various methods of teaching in the field of education.*

Module I: A- Indian Thinkers (11 Hours)

Swami Dayanand (1825-1883): Philosophy, aims of Education and values; Swami Vivekananda (1863-1902): Philosophy Principles, Character Building, Discipline and values; Rabindranath Tagore (1861-1914): Tagore's Philosophy and its features, basic contributions in the field of Education.

Module II: B-Indian Thinkers (12 Hous)

M.K Gandhi (1869-1948) : Features of Gandhian Educational Philosophy, Objectives of Education and Gandhiji's view on Education , Concept of Basic Education and its relevance in 21st century.

Sri Aurobindo (1872-1950): Life Sketch , Philosophy of life, Views on Education , Teachers and teaching , Concept of Ashram School, International Centre of Education.

Module III: A- Western Thinkers (12 Hours)

Jean Jacques Rousseau: Life Sketch , Philosophy of Education , Self Education of Rousseau Idolizes Nature, Naturalism, Negative Education, The Emile-its importance , Basic Ideas of Rousseau's Philosophy.

John Dewey : Life Sketch, Philosophy of Life,Laboratory School,Methods of teaching.

Module IV: B – Western Thinkers (10 Hours)

Friedrich August Froebel (1782-1852): Philosophy and Principles,Concept of Kindergarten and its features and relevance in present context.

Maria Montessori (1870-1952): Life sketch , Educational Philosophy and Principles,Role of Teacher,Concept of Children's House

COURSE/LEARNING OUTCOMES

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

Module I: Give the life sketch of Swami Dayanand, Vivekanand and Rabindranath Tagore (K); Explain the contributions made by Indian thinkers like of Swami Dayanand, Vivekanand and Rabindranath Tagore (U); Analyse the thoughts of Vivekananda in character building of the individuals (Ap); Apply the Philosophies of Swami Dayanand, Vivekanand and Rabindranath Tagore in making curriculum (An)

Module II: Explain the features of Gandhian Philosophy of Education (U); State the objectives of education according to Gandhiji (K); Explain the concept of Basic Education (U); Give the life sketch Sri Aurobindo (K); State the features of Education as per Sri Aurobindo (K); Explain the concept of Ashram School (U); State the features of International centre of education (K)

Module III: Explain the basic features of educational philosophy given by Rousseau (U); State the concept of Self education (K); State the educational Philosophy of Emile (K); Explain the contributions of John Dewey in the field of education (U)

Module IV: State the contributions of Frobel in the field of Education (K); Write the Principles and concept of Kindergarten (K); Identify the relevance of Kindergarten in 21st century (A); Explain the contributions of Maria Montessori in the field of Pre-primary education (U)

Suggested Readings

1. Aggarwal,J.C (2002) : Psychological,Philosophical and Sociological Foundations of Education,ShipraPublications,Delhi
2. Goswami,M.K (2006) : Educational Thoughts and Essays,Asian Books PvtLtd,New Delhi
3. Kumar,T.P (2011) : Great Philosophers of Education,APH Publishing Corporation,DaryaGanj ,New Delhi
4. Rai,B.C (2000) : Principles of Education,Prakashan Kendra ,Lucknow.
5. Safaya S (2010): Modern Theory and Principles of Education,Dahnpat Rai Publishing Company PvtLtd,New Delhi
6. Singh,Y.K (2013) : Philosophical Foundations of Education,APH Publishing Corporation,New Delhi
7. Sur Roy,T. (2013): Educational Thinkers Oriental and Occidental,Ashok Publications, Guwahati
8. Taneja,V.R (2009) : Educational Thought and Practice,Sterling Publishers PvtLtd,New Delhi

EDEC0112: EARLY CHILDHOOD CARE AND EDUCATION (ECCE): A PERSPECTIVE

(3 Credits-45 Hours)

Objectives:

- *To promote awareness about the need and significance of ECCE.*
- *To acquaint the trainees about the policies and programmes of ECCE in India.*
- *To make the trainees well aware of the different philosophers of some western and Indian educationist concerning to ECCE.*
- *To make the trainees well aware of some agencies involved in ECCE.*

Module I: Nature of ECCE (12 Hours)

Meaning, Definitions and Significance of ECCE in the context of Universalization of Elementary Education Objectives and scope of ECCE; ECCE and Human Resource Development

Module II: Philosophies on ECCE (12 Hours)

John Dewey, Maria Montessori, Fredrieck Froebel; RabindraNathTagore and Tarabai Modak

Module III: Policies and Programmes on ECCE (11 Hours)

ECCE before independence and after independence of India; National Children's Policy 1974; NPE-1986 and POA-1992; Convention on Rights of child, 1989

Module IV: Initiatives and Interventions (10 Hours)

Government, Private and NGO's; ICDS and SSA; Preschool Education and training programmes; ECCE and National Curriculum Framework

COURSE/LEARNING OUTCOMES

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

Module I: State the definition of ECCE (K); Explain the significance of ECCE in the context of UEE (U); State the objectives of ECCE (K); Explain the scope of ECCE (U); Describe the role of ECCE in Human Resource Development (U)

Module II: Explain the philosophy of John Dewey in the context of ECCE (U); State the contributions made by Maria Montessori in the growth and development of ECCE (K); Describe the philosophy of Frobel to gear up the growth and development of ECCE (U); Explain the contributions made by Rabindranath Tagore and Tarabai Modak in the field of ECCE (U)

Module III: State the basic features of ECCE before Indian Independence and after independence (K); Explain the basic features of national children's policy 1974 (U); Find out the place and space of ECCE in NPE, 1986 (A); Describe the convention on rights of child 1989 (U)

Module IV: Explain the role of central and state governments in the growth and development of ECCE in India (U); State the contributions made by NGO's in the field of ECCE (K); Analyse the functions of ICDS in the context of ECCE (A); State the objectives of SSA in the context of Pre-school education (K); Describe the process of preparing the teachers for ECCE (U); Find out the relationship between National Curriculum Frame work and ECCE (Ap)

Suggested Readings

1. Braun, S.J & Edwards,E.P(1972): History and Theory of Early childhood Education, Ohio, Charles, A.ones Publishing Co.
2. Desai, K.G.(1976): Effectiveness of kindergarten Education : Allahabad, United Publishers.
3. Koul,V.(et.al)(1993): Early Childhood Care and Education: An Assessment, New Delhi, NCERT.
4. MHRD (1986): A Guide Book for Anganwadi Workers Dept. Of Women & Child Development, MHRD, Govt. of India
5. Montessori Maria (1969): The Montessori Method, NewYork, Shockan Book
6. Montessori Maria (1986): The child in the Family,NewYork,Avon Books
7. Thakur,Aruna (1972): Perspectives in Pre-School Education, Bombay, Poplr Pradhan Pvt Ltd
8. Upadhay,G.C (1999): A study of Pre-school component and its perception and extend of Utilization by Community, NewDehi, NCERT
9. Viruru Radhika (2001): Early Childhood Education, NewDelhi, Sage Publications

EDJG6002: JOURNALING - A TECHNIQUE FOR PERSONAL AND ACADEMIC GROWTH

(3 credits)

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.

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 on every Friday. Journaling have 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.

During the semester, students have to visit a school in pairs at least ten times and conduct an audit. The audit reports need to be submitted in scientific format at the end of the semester after the presentation. Marks will be awarded after assessing the work.

COURSE/LEARNING OUTCOMES

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

Suggested Readings

1. Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter?. Higher education, 62(3), 279-301. Retrieved from http://download.springer.com on 19th July 2016
2. Dhankar, Rohit (2013). Can reflective practice be taught? Teacher Plus 2013. (http://www.teacherplus.org/cover-story/can-reflective-practice-be-taught)
3. Hubbs, D. L., and Brand, C. F. (2005). The paper mirror: Understanding reflective journaling. Journal of Experiential Education, 28(1), 60-71.
4. Liuolienė, A., and Metiūnienė, R. (2009). Students' Learning Through Reflective Journaling. Coactivity / Santalka, 17(4), 32-37. doi:10.3846/1822-430X.2009.17.4.32-37
5. Lowe, G. M., Prout, P., and Murcia, K. (2013). I See, I Think I Wonder: An Evaluation of Journaling as a Critical Reflective Practice Tool for Aiding Teachers in Challenging or Confronting Contexts. Australian Journal Of Teacher Edu

EDES6003 : EDUCATIONAL SEMINAR I
EDES6009 : EDUCATIONAL SEMINAR II
(2 credits)

During the course of the programme, students are expected to present a series of seminars which will address fundamental intellectual, conceptual and practical issues in current educational philosophy and application. They may also deal with other relevant topics such as use of ICT in education, design of new and innovative curricula, methodological issues in education, etc. Students will be assisted through guest lectures, discussions, field work in education related institutions and active engagement with faculty members. During these interactions students will be provided with an opportunity to explore how best to bring new interdisciplinary scholarship, technology and critical thinking into the development of the chosen seminar area. They will also consider alternative pedagogic strategies, teaching techniques and technologies. Students will prepare and present a final paper based on these seminars. The course will be evaluated on the basis of the seminars and the final paper.

EDSV6004: SCHOOL VISITS
(2 Credits)

Objective:

School visits provide an opportunity to the students, to experience the ground reality of the schools. During their visit to the schools, the students can experience a new environment, meet new people, and also offer their services to the schools. It is also helpful for the students to clarify, establish, co-relate and co-ordinate accurate concepts regarding the various schools that they plan to visit - interpretations and appreciations and enable them to make their learning about the schools more concrete, effective, interesting, inspirational, meaningful and vivid. Through school visits, the understanding on schools - concepts and phenomena may be easily clarified and assimilated. They can get to know about the proper functioning and management of schools, along with the teaching-learning process. The students are required to maintain a journal and submit a written periodical report. They are also expected to make a presentation of his/her experiences during the school visits. Students will be required to produce a certificate from the Head of the Institution regarding his/her performance in the Institutions they have visited. The focus of school visits would be mostly on

- *Enabling resources of school: availability, adequacy and usability*
- *Teaching-learning and Assessment*

- *Productive community participation.*
- *Analysis of school syllabus and textbooks.*
- *Inclusion, health and safety*
- *School leadership and management.*

Assessment of School visits

- Mentors will be allotted for each student. It will be the responsibility of the respective mentors to allot marks for the student's individual reflective journals.
- A presentation will be made by all the students for updating their review progress and for adequate feedback from the faculty members.
- Marks shall be allotted to each students in accordance with the performance of the tasks mentioned above. Students shall also be required to prepare a report, analysing the experiences of the school visits.

Basis of Assessment	Marks
Reflective journals	20
Presentation made on the basis of review progress for faculty feedback.	20
Objective assessment based on the tasks (Presentation)	60
Total	**100**

EDDI6005: DISSERTATION PHASE I

(2 Credits)

Every student shall undertake a research project work under the supervision and guidance of a faculty member. The students are expected to complete the literature review and present a research proposal during the first phase. The dates, mode and components of evaluation and the weightages attached to them shall be published by the department at the beginning of the semester.

EDSA6006: SCHOOL AUDIT

(2 credit)

'School' is the core of any educational endeavour. Understanding school as a unit of the education system is central to the programme on education. The need for effective schools and improving school performance to provide quality education for children is being increasingly felt in the Indian education system. The quality initiatives in school education sector necessitate focusing on school, the idea and standard of a good school, its performance and improvement. Therefore, a growing emphasis is being placed upon developing a school audit programme, as central to school improvement. The school audit is part of the academic activity that a student should take up in order to have a comprehensive and conclusive idea of a school.

The followings are the objectives and the rationale of a school audit:

- To analyze the uniqueness of each school in its context, size, conditions and resources
- To evaluate the incorporation of the spirit of Nationalism and national values among the students in the school
- To evaluate the school- its performance and maintaining standard
- To critically analyze the ongoing school practices, identify its strengths and areas for improvement
- To enrich our students with teaching-learning practices through reflection and collective sharing of experiences
- To instill in the students the concept of an ideal school that embraces changes and encourages sustainable transformation

The expected outcomes of the school audit

Students conducting school audit will develop an understanding about various parameters of a 'quality school'. They will get an opportunity to practice systematic observation and analysis of various activities carried out in the schools. Through school audit students will also imbibe the ability of critically and constructively looking into the school practices as a step towards building a good school. It will enable them to appreciate the need of a quality school.

As the students undertake school audit, faculty members will guide, supervise and accompany the students through conceptual understanding of school audit, the process of auditing and factual reporting. Students are required to maintain a weekly journal of the school audit and submit the same to the department. At the end of the semester, the students are expected to come out with the audit report of the school and make a final presentation in the department. The final document of school audit will be kept with the department and a copy of it will be sent to the concerned school.

The final audit report of the school submitted by the students will be a an appraisal of the performance of the school and the roles and functions of various stakeholders of the school. It will help them in clarifying the roles and responsibilities of the staff and management of the school. It will guide them to critically look at the effectiveness of their style of functioning and the types of activities incorporated in their system of education. Further, this exercise will be a tool to cross examine their system of education and the future outlook of the school. More importantly, it will help the school to identify its strengths and weaknesses and to recognize the areas where improvements can be made and the scope for being the best school.

Assessment of School Audit

- A presentation will be made by all the students during the mid of the semester, for updating their review progress and for adequate feedback from the faculty members.
- Marks could be allotted to each student as per the tasks mentioned above so that there is objectivity in assessment. A report, analysing the experiences of the school visits has also to be prepared.

Basis of Assessment	**Marks**
Reflective journals	30
Presentation made on the basis of review progress for faculty feedback	20
Objective assessment based on the tasks (Presentation)	50
Total Marks	**100**

EDOC0029: ORGANISATIONAL COMMUNICATION

(3 Credits- 45 hours)

Objectives:

- *To enable the students to learn effective professional communication styles.*
- *To create some organizational communication skills among the students*
- *To make the students well aware of the process of feedback and professional boundaries.*

Module I Conceptual Framework of Communication (10 hours)

Concept and functions of Communication; Communication and four senses; Communication process, communication model and its elements; scope of communication

Module II Organisational Communication (12 hours)

Relationship between Organisation and Communication; common modes of communication in an organisation: writing, conversation, reading, media, charts, proceedings, T.V. telephone, e-mail and other modes of communication; Formal and informal communication; practical approaches in understanding administrative communication: cross communication, downward communication, upward communication

Module III Communication Techniques (13 hours)

Presentation skills, effective use of voice in presentation: articulation, tone, pitch; making effective presentations; use of visual aids in presentation; communication in teams: project teams, quality improvement teams, virtual teams; communicative dimension of team work- roles, norms, decision-making processes and management of conflict.

Module IV Feedback and professional boundaries (10hours)

Feedback, Administrative feedback, models of feedback, assessing the listening skills; maintaining Professional Communication- professional boundaries, violation and maintaining of boundaries

COURSE/LEARNING OUTCOMES

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

Module I: Define communication (K); Summarize the importance of communication (S); Explain communication process (U); Identify the barriers of communication (An); Assess the communication process in their daily life (E); List the forms of communication (K); Differentiate between minutes and memos (An); Interpret the advantages of communication (U); List down the different types of oral communication (K); Infer the various types of non-verbal communication that they use in their daily life (Ap); Elaborate on the scopes of communication (U)

Module II: Define organisational communication (K); Explain the importance of communication in an organisation (U); Identify some of the common modes of communication in an organisation (An); Evaluate the types of modes that are effective in communication in an organisation (E); Name the forms of communication in an organisation (K); Classify the different types of formal communication (An); Judge the advantage and disadvantage of formal communication in an organisation (E); List down the types of non-formal communication in an organisation (K); Draft business letters for various purposes. (Ap)

Module III: Identify some of the effective presentation skills (An); Apply some of the presentation skills in their presentations (Ap).; Make effective use of voice in presentation (Ap); Incorporate visual aids in communication (Ap); Define team (K); List down different types of team in an organisation (K); Analyze the communicative dimensions of team work (An); Incorporate decision making processes in their daily life (Ap); Assess the effective method in conflict resolution (E)

Module IV: Define feedback (K); Ascertain the need and significance of feedback (An); State the concept of Administrative feedback (K); Explain the purpose of administrative feedback (U); Interpret the different forms of feedback (U); Illustrate Jeo-hari Window model of feedback (U); Apply Jeo-hari Window to assess themselves (Ap); Explain Ladder of Inference as a model of feedback (U); Judge the best model of feedback in their own work place (Ap) Explain the meaning of professional boundaries (K); Identify some of the common violation of professional boundaries (An) ; Generalize the ways and means for maintaining professional boundaries (S)

Suggested Readings

1. Baker, G.S. Fitly Spoken: Developing Effective communication and social skill. New York: Paperback
2. Gillis, T. The IABC Handbook of organisational communication: A guide to internal communication, public relations, Marketing and Leadership. New York: Jossey-Bass.
3. Hardman, E. Active Listening 101: How to turn down your volume to turn up your communication skills
4. Hargie, O. Skilled Interpersonal Communication: Research Theory and Practice. London: Routledge.
5. Harris, E. T. and Nelson, D. M. Applied organisational communication: Theory and practice in global environment. London: Routledge.
6. Krishnamachuryulu, R. & Lalitha. Business communication: Global Media
7. Lewis K. L. Organisation change: Creating change through strategies communication. New York. Wiley.
8. Miller, K. Organisational Communication: Approaches and Processes: London: Wadswroth Publishing
9. Tourish, D and Hargie, O. Key Issues in organizational communication. London: Routledge.

Specialisation: Educational Leadership

EDEA0030: EDUCATIONAL ADMINISTRATION

(3 Credits-45 hours)

Objectives:

- To enable students to acquire knowledge and skills in the field of educational administration.
- This create awareness about among the students about the fundamental educational administrative functions.
- To enable the learners to have some leadership qualities.

Module I Conceptual Framework of Educational Administration (12 hours)

Nature and scope of educational administration; Objectives of educational administration; Elements of educational administration; Characteristics of successful administration; Democratic administration.

Module II School Management (10 hours)

Concept of School; Need of school; School management; Headmaster/Principal as the school manager and her/his qualities; Role of teachers and community in school management; Infrastructural resource management

Module III Concept of Supervision (12 hours)

Meaning of supervision; Difference between supervision and administration; Effective supervision; Functional basis of supervision; Supervision as leadership

Module IV Evaluation and Supervision. (11 hours)

Concept of evaluation; Principles of evaluation; Evaluation of supervisory programme; Evaluation of Educational administrative programme; Evaluation as a continuous programme for quality improvement

COURSE/LEARNING OUTCOMES

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

Module I: Write the definition of educational administration (K); Explain the concept of educational administration (U); Illustrate the scope of educational administration (U); Write different objectives of educational administration (K); Analyze the definition of educational administration (An); Synthesize the definition of educational administration (S); Construct his/her own definitions (U); Explain the different elements of educational administration (U); State the important features of successful educational administration (K); Differentiate between educational administration and educational management (U); State the concept of democratic administration (K); Use the democratic education administrative in practice (Ap); Identify the democratic educational administration (Ap)

Module II: write the historical background of the concept 'school' (K); Explain the concept of school (U); Describe the need of school (K); Define the term management (K); Explain the concept of school management (U); State the role of headmaster as school manager (K); Perform the role of a successful headmaster (AP); State the role of teachers in school management (K); Differentiate between the role of headmaster and teachers in school management (U); Explain the questions of an effective and efficient Headmaster / Principal (U); Find out the relationship between the role of headmaster and teachers (AP); Analyze the duties of head master and teachers (AN); Summarize the role of community in school management (S); Define physical resources of a school (K); Use the resources for judiciously and giving maximum output (Ap)

Module III: Write the meaning of supervision (K); Explain the concept of supervision (U); Analyze the elements of supervision (An); Explain the elements of supervision (U); Establish the relationship among the elements of supervision (An); Differentiate between supervision and administrative (U); Explain the features of an effective supervision (U); Use the aspects of effective supervision (U); State the functional basis of supervision (K); Explain the functional basis of supervision (K); Apply the effect of supervision on the teaching learning process (Ap); State the qualities of a good supervisor (K)

Module IV: Define the term 'evaluation' (K); Explain the different principles of evaluation (U); Apply the principles in supervisory work (Ap); Explain the steps of evaluation (U); Evaluate the supervisory programme (E); Evaluate the educational administration (E); Find out the problems in supervisory programme and giving the solution (Ap); State features of an effective evaluation programme (K)

Suggested Readings

1. Adams,H.P & Duckey,F.G. Basic Principles of supervision.
2. Arif, S., & Sohail, A. What Really Works in Leading a School? International Journal of Learning, 16(10), 695-707.
3. Boghossian, P. Behaviorism, Constructivism, and Socratic Pedagogy. Educational Philosophy & Theory, 38(6), 713-722.
4. Cara, C. The Power of One with Many Revisited: Creating Inclusive, Accessible, Collaborative Education for All. International Journal of Learning, 14(8), 221-233.
5. Chandler, L. Design Dynamics and Mastery: A Multi-modal Teaching Tool for Design Students. International Journal of Learning, 14(5), 51-57.
6. Donahoo, S. & Hunter, R. Teaching Leaders to Lead Teachers: Educational Administration in the Era of Constant Crisis. Advances in Educational Administration, Volume 10, 1–4. Elsevier Ltd.
7. English, F. (ed.). Encyclopedia Educational leadership and Administration (Vol. 1). Sage Publication: Thousand Oaks.
8. Stanley, A. G. & Samier, E. A.Political Approaches to Educational Administration and Leadership. Routledge: New York.
9. Starratt, R. Centering Educational Administration: Cultivating Meaning, Community, and Responsibility. Lawrence Erlbaum Associates, Publishers: New Jersey
10. Tarc, A. Education as Humanism of the Other. Educational Philosophy & Theory, 37(6), 833-849.
11. White, R. & Cooper, K. (Ed.). Principals in Succession Transfer and Rotation in Educational Administration. Springer: New York.

EDSR0031: ETHICS AND SOCIAL RESPONSIBILITY IN EDUCATION

(3 credits- 45 hours)

Objectives:

- *To acquaint the students with the conceptual framework of ethics*
- *To create awareness among the students about social responsibility*
- *To enable the students to have theoretical perspectives of ethics and social responsibility*

Module I Educational Ethics (9 hours)

Concept of Ethics and educational ethics; Need of ethics in educational settings; Components of ethics; types of values, morals

Module II Theoretical Perspectives of ethics (12 hours)

Ethical theories: Utilitarianism, Kantian ethics, Natural rights theories; religious ethics; virtue ethics; Kantian vs utilitarian; gender and ethics; ethics and leadership. Concept of ego: psychological, ethical, rational. Moral philosophy

Module III Ethics and Social Responsibilities (12 hours)

Concept of social responsibility; Need of social responsibility; Types of social responsibility; Social responsibility of educators; Strategies of social responsibility

Module IV Professional Development (12 hours)

Concept of profession; Criteria for a profession; Teaching as a profession; Workplace and code of conduct, Technology and globalization in relation to professional ethics and developmental activities

COURSE/LEARNING OUTCOMES

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

Module I: State the meaning of ethics (K); Explain the concept of ethics (U); Illustrate the need and purpose of ethics (U); Find out the relevance of ethics in 21st century (Ap); Write the importance of ethics in education system (K); Find out the components of ethics (Ap); Understand the relationship between values, morals and ethics (U); Differentiate between values, morals and ethics (U)

Module II: Understand the theoretical perspective of ethics (U); State the ethical theories (K); Explain the utilitarianism theory of ethics (U); Explain the Kantian theory of ethics (U); Explain the natural rights theory of ethics (U); Explain the religious theory of ethics (U); Find out the differences between Kantian and utilitarian theory of ethics (Ap); Understand the relationship among gender and ethics and leadership and ethics (U); State the meaning of ego (K); Explain the types of ego (U)

Module III: Write about the meaning of social responsibility (K); Explain the need of social responsibility (U); Find out the role of social responsibility (Ap); Analyze the problems of DPEP (An); Explain the types of social responsibility (U); Find out the effects of social responsibility on the development of ethics (Ap); Evaluate the social responsibility of teachers (Ap); Explain the strategies of social responsibility (U)

Module IV: Write about the meaning of profession (K); State the criteria of a profession (K); Identify how ethics influences a profession (Ap); Understand the importance of teaching as profession (U); Evaluate the role of ethics in a workplace (Ap); Describe the code of conduct of a teacher as per the rule of UGC (U); Explain the impact of technology on the development of ethics; Analyze the influence of globalization on ethics and developmental activities (An)

Suggested Readings

1. Hill, I. Curriculum Development and Ethics in International Education: Education for Disarmament, pp 49-58. Retrieved from Disarmament Forum.
2. Raina, R. Situating Ethics in Technology and Science, Economic and Political Weekly, june 5, (vol xlv no 23)
3. Roddick, A. Professionalism and Ethics. In Understanding Facilitation: Theory and Principles (pp 189 - 216).Christine Hogan. London: Kogan Page.
4. Sikand, Y. Deoband's Fatwas on Muslim Women, Economic and Political Weekly. May 22, (vol xlv no 21)
5. Sreekumar, N. Ethics, profession and developmental concerns, Economic and Political. Weekly June 26,

Specialization: Educational Psychology

EDSP0032: COUNSELLING SKILLS FOR EDUCATIONAL PSYCHOLOGISTS

(3 Credits-45 hours)

Objectives:

- *To create understanding among the students about the conceptual framework of counselling skills*
- *To orient students about the skills of educational psychologists for counselling*
- *To make the students well aware of the process of identifying counselling skills*

Module I Introduction to Counselling (12 hours)

Meaning, nature, objectives and scope of counselling, counselling as a process: factors affecting counselling process, stages of counselling process, types: individual and group; approaches of counselling: Directive, Non-directive and Eclectic Counselling

Module II Theories of Counselling (12 hours)

Gestalt Counselling, Psychoanalytic Counselling, Cognitive Psychologists, Personality -Cattle's Truth Theory, Behavioral Counselling

Module III Introduction to Educational Psychologists (11 hours)

Concept of Educational psychologists, need of educational psychologists, educational psychology as a career, key skills for educational psychologists, concept of guidance ,need and types of guidance, guidance and counselling services, tools and techniques to be used for student counselling process

Module IV Teacher as a Guide and Counsellor (10 hours.)

Role of teacher as an educational psychologist, guidance worker and counsellor, Counselling skills: Building trust, Listening, Attending, Building rapport, Demonstrating Empathy, Observing; Difference between counsellors, educational psychologists, clinical psychologists

COURSE/LEARNING OUTCOMES

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

Module I: Write the meaning of counselling (K); Explain the nature and scope of counseling (U); List down the objectives of counselling (K); Understand counselling as a process (U); Find out the factors affecting counselling (Ap); List down the stages of counselling process (U); explain the types of counselling namely individual and group counselling. (U); Describe the approaches of counselling namely directive, non-directive and eclectic counselling (U)

Module II: List down the different theories of Counselling (K); Explain the gestalt theory of counselling (U); Explain the Psychoanalytic theory of counselling (U); Explain the Catell's truth theory (U); Understand the behavioral counselling theory (U); Compare the different theories of Counselling (An)

Module III: Create understanding about the conceptual framework of Educational Psychology (K); Understand who are called as Educational psychologists (U); Identify the need of educational psychologists (An); Understand educational psychologists can be taken as a career (U); List out the key skills needed for educational psychologists (K); Assess the skills needed in day to day life as a counselor (E); Understand the concept of guidance (U); Point out the need of guidance (U); Classify the types of guidance (U); Summarize the importance of guidance and counselling services in our society (E); Find out the tools and techniques to be used for student counselling (AP)

Module IV: Define the role of a teacher as an educational psychologist (K); Assess the role of teacher in counselling process (E); Identify the counselling skills (AP); Analyze the importance of counselling skills for the students (AN); Evaluate the significance of listening, attending , empathy and observing as a skill of counselling (E); Differentiate between counselors and educational psychologists (U); Differentiate between counselors and clinical psychologist (U); Understand the relationship between the educational psychologist, clinical psychologists and counselors (U)

Suggested Readings

1. Kinra, K. K, (2008) Guidance and Counselling, Pearson India
2. Alam, Shah. (2008) Basics of Guidance and Counselling, Global Vision Publishing House
3. Hansen, J. C. (1982) Counseling Process and Procedures. New York: Macmillan.
4. Madhukar, I. (2000) Guidance and Counseling. Authors Press.
5. NCERT.(2009) Guidance and Counseling. Module –I, NCERT, New Delhi
6. NCERT. (2009) Guidance and Counseling, Module –II NCERT, New Delhi
7. NCERT. (2009)Guidance and Counseling. Module –IX NCERT, New Delhi
8. Oberoi, S.C. (2016) Guidance and Counseling. Paperback, R.Lall publishers
9. Pandey, V.C. (2005) Educational Guidance and Counseling. Isha Books
10. Rao, S.N. (1993) Counseling and Guidance, McGraw Hill Education

EDCA0033: CHILD AND ADOLESCENT MENTAL HEALTH

(3 credits-45 hours)

Objectives:

- *To create awareness among the students about mental health of children and adolescents*
- *To acquaint the students with the critical issues of children and adolescents*
- *To acquaint the students with various problems pertaining to mental health of child and adolescents*
- *To create understanding among the students about parenting and role of teachers in the mental health of children and adolescents.*

Module I Introduction to Mental Health (11 hours)

Concept of mental health: Historical background of mental health, objectives, scope, and need of mental health, factors affecting mental health; characteristics of a mentally healthy person; Mental health promotion, preventive intervention & treatment

Module II Mental Health as a Primary Health Concern among children (12 hours)

Childhood as critical stage of development: Child mental health as a primary health concern, factors affecting child mental health; Children with problem behaviours and developmental difficulties-language difficulties, Autism, Need for a comprehensive mental health system; Integrated approaches to early childhood mental health; Government policies and programs addressing childhood well-being

Module III Mental Health as a Concern among Adolescents (12 hours)

Concept of adolescents and adolescence, Adolescence as a period and its characteristics, Adolescence as period of stress and storm; Indicators of mental health development among adolescents, Introduction to problem behaviours among adolescents - delinquency, anxiety, conflict, stress, depression, drug abuse, substance abuse, alcoholism, adjustment mechanisms

Module IV Education and Mental Health (10 hours)

Mental health services in schools; child guidance clinic; Role of parents and teachers in fostering mental health among children and adolescents; promoting psychological well-being among children and adolescents; guidance and counseling

COURSE/LEARNING OUTCOMES

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

Module I: Give the historical background of mental health (K); Define the mental health (K); State the objectives of mental health (K); Explain the need and scope of mental health (U); Write the factors affecting mental health (K); Find out the characteristics of mentally healthy person (Ap); Illustrate the ways and means to promote mental health (U); Describe preventive measures for mental health (K); Apply treatments for restoring the mental health (Ap)

Module II: State the features of childhood stage (K); Explain the mental health as the primary aspect in childhood (U); Illustrate the factors affecting mental health in childhood (U); Identify the children with problematic behavior and some developmental difficulties (Ap); State the comprehensive mental health system (K); Analyze the comprehensive mental health system (An); Explain the integrated approaches to early childhood mental health (U); State the Government policies and programmes for the childhood well-being (K)

Module III: Define the concept of adolescent and adolescence (K); Explain the features of adolescence period (U); Explain adolescence as a period of stress and storm (U); State the indicators of mental health development among adolescents (K); Find out the problems of adolescents (Ap); Find out the solutions of the problems of adolescents (Ap); Describe the mechanism of adjustment for adolescent (K)

Module IV: Investigate the status of mental health of school going children (Ap); Classify the students in accordance with their level of mental health (Ap); Provide some mental health services to the students belonging to low level of mental health (Ap); Explain the concept of child guidance clinic (U); State the role of child guidance clinic in helping the children concerning to their mental health (K); Explain the role of parents and teachers in helping the enhancement of mental health of the children (U); Define the term 'well-being' (K); Promote psychological well-being among the school going children through guidance and counseling (Ap)

Suggested Readings

1. Chauhan, S.S. (2010). Advanced Educational Psychology, Noida. Vikas Publishing House Pvt. Ltd.
2. Goswamee, G. (2008) Child Development and Child Care. Guwahati: Arun Prakashan
3. Hadfield, J.A., (1952) Psychology and Mental Health, A Contribution to developmental Psychology, George Allen & Unwind
4. Kapur, M. (1995) Mental Health of Indian Children. New Delhi: Sage Publications.
5. NCERT. (2009) Developing Mental Health and Coping Skills, Module 10, NCERT, New Delhi
6. Nayar, S. U. (2012) Child and Adolescent Mental Health. New Delhi: Sage Publications.
7. Sharma, Neerja (1999) Understanding Adolescence. New Delhi. National Book Trust, India.

EDDI6007: DISSERTATION PHASE II

The students of final semester will have to compile their research study in the form of dissertation. Each dissertation has to be systematically structured following proper methodology of educational research. To set the dissertations in a standardized pattern the supervisor should ensure that it follows proper sequence containing following aspects:

A. Preliminary section
   1. Title page
   2. Approval sheet
   3. Acknowledgments
   4. Table of contents
   5. List of tables (if any)
   6. List of figures (if any)

B. Main body
   1. Introduction
      - Conceptual framework of the theme
      - Some relevant studies
      - Rationale/Justification of the study
      - Statement of the problems
      - Operational terms
      - Statement of the study
      - Objectives of the study
      - Hypotheses
      - Delimitation of the study
   2. Review of related literature
   3. Method and Procedure of the study
      - Procedures used
      - Methods of gathering data
      - Description of data gathering tools
   4. Presentation and Analysis of Data
      - Texts
      - Tables
      - Figures
      - Statistical treatment
      - Analysis of data gathered and interpretations
   5. Conclusion
      - Brief restatement of problems and procedures
      - Major findings and conclusion
      - Educational implications
      - Recommendations for further research

C. Reference section
   1. References (APA sixth edition)
   2. Appendix

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 3rd semester where the students will work on research proposal, literature review and first part of the data collection. In the 4th semester they will complete data collection, analysis, preparation of 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.

EDIN6008: INTERNSHIP

The sustained engagement with the school over a period of time is known as 'school internship' which equips the prospective practitioners to build a repertoire of professional understandings, competencies and skills, and positive attitude to schooling, administration and teaching. (School internship: framework and guidelines, NCTE, 2016)

Following suggestions are made to make internship a meaningful learning experience.

- Students to maintain reflective journal through-out internship. The emphasis should be on analysis and reflection.
- Following are the tasks to be completed by the students: (school internship: framework and guidelines, NCTE, 2016)
  a) Understanding the Internship School and the community around.
  b) Observing the classroom teaching of regular teachers.
  c) Preparation of case study of the internship school and the innovative activities that the school undertakes.
  d) Preparation of Teaching Plans and Unit Plans.
  e) Teaching the units of the prescribed syllabus in any two subjects currently being taught in the school along with sessions for teachers/ community members/students on aspects of leadership: decision making, all of us are leaders, motivation, visioning, strategizing, problem solving and so on.
  f) Mobilization and development of teaching-learning resources.
  g) Preparation of question papers and other assessment tools.
  h) Undertake action research project on at least one problem area of schooling.
  i) Assist Head of the school/administrators.

Assessment of Internship: 100 Marks

Marks will be divided as per the tasks mentioned above. Each of the tasks will be assessed.

MCMN0025: MEDIA IN NORTHEAST INDIA

(3 Credits – 45 hours)

Course Objective: *To provide learners with an in-depth understanding of the history, geography, culture and politics of Northeast India; To acquaint learners with the historical background of the press in Northeast India along with the distinguished journalists and writers from the region; To provide an overview of the current status of the media industry in the region and its future prospects.*

Module I: Introduction to Northeast India (15 hours)

Brief History of Northeast India, Geography; People and Language, Culture and Customs, Significant Social and Political Movements in Northeast India

Module II: History of Media in Northeast (15 hours)

Growth and Development of Press in the Northeast, Role of Christian Missionaries in the Development of the Press, Basic Features of the Press in Northeast, Noted Journalist and Writers of the Region

Module III: Current Status of Media in Northeast (15 hours)

Current Trends and Media Organizations in the Region, Ownership Pattern and Status of Journalists, Problems and Challenges of the Press in Northeast, Limitations of Regional Media, New Media In Northeast, Future Scopes and Prospects of Media Industry in the Region

COURSE/LEARNING OUTCOMES

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

CO1: Understand the complex socio-cultural and political mosaic of the region
CO2: Demonstrate an understanding of the history of the Press in Northeast India and evolution of the mediated environment of the region
CO3: Identify opportunities and challenges in the evolving media industry of the region

Suggested Readings

1. Kabi, K. H & Patnaik , S. N (2015). Media, Conflict and Peace in Northeast India. Vij Books Pvt. Ltd, New Delhi.
2. Gurney, A. K. History of the Sibsagar Field. Assam Mission, Nowgaon Jubilee Publication.
3. Barpujari, H.K. The American Missionaries and North-East India (1836-1900 AD). Spectrum Publications, Guawahti/Delhi, 1986.
4. Baruah, S. P. Press in Assam—Origin and Development. Lawyer's Book Stall, Guwahati.
5. Baruah, Sanjib. Beyond Counter-insurgency: Breaking the Impasse in Northeast India. Oxford University Press.
6. Das, Samir Kumar. Governing India's Northeast. Springer.

MCRC0026: RURAL COMMUNICATION

(3 Credits – 45 hours)

Module I: Rural Communication and Participation (9 hours)

Community and Rurality-Concept and Definition, Communication Structure in Rural Settings-Folk and Traditional Media, Radio in Rural Communication, Media and Communication Habits among Rural Communities, Media Penetration and Changing Ruaralities, Rural Communication Channels-Village Meetings, Village Market, Role of Rural Communication Channels in Local Governance.

Module II: Documenting Development in Rural Settings (9 hours)

Rural Development, Role of Communication in Rural Development, Communication as a Component in Rural Development, Documenting and Analysing Rural Development and Communication Agenda, Cases from India, Rural Health and Communication, Crisis and Natural Disaster Communication, Agricultural Communication, Communicating Education and Agriculture, Communication and Extension Activities in Rural Settings, ICT and Rural Governance.

Module III: Evaluating Communication Needs in Rural Areas (9 hours)

Media and Communication Awareness Among the Rural Mass, Assessing the Urban Rural Divide, Communication Divide-Knowledge and Infrastructure, Need for Media and Communication Literacy, Communication Needs in Rural Context, Communication Research in Rural Context-Participatory Action Research-Survey Research-EAR-FGD, Documentation of Existing Communication Practices in Rural Context, Communication Needs with Respect to Promotion of Health, Education, Employment, Agriculture, Natural Resource Management, and Human Rights

Module IV: Channelizing Development in a Rural Context (9 hours)

Contextualising Paulo Freire in the Process of Rural Development and Rural Communication, Context Specific Communication-Local Culture, Tradition, Language and Folk Art Forms, Intercommunity Communication, Utilising Intra-community Communication Channels, Utilising Community Media for Participatory Communication, Disseminating Community Specific Information and Disbursing Local Knowledge, Participatory Action and Rural Development

Module V: Practicum (9 hours)

As part of this module, students are required to conduct community outreach programmes in rural areas on issues of rural development.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the social, economic, political and cultural framework of rural communication
CO2: Address the challenges with suitable responses for the identified rural communication
CO3: Demonstrate the ability to engage in the management of rural communication

Suggested Readings

1. Castello, R. D. (2006). Framework on Effective Rural Communication for Development. FAO: Rome.
2. Berrigan, F. J. (1979). Community Communications: The Role of Community Media in Development. UNESCO: Paris.
3. Freire, P. (1970). Pedagogy of the Oppressed. Continuum: New York.
4. Acunzo, M. (2014). Communication for Rural Development: Sourcebook. FAO: Rome.
5. Santucci, F. M. (2005). Strategic Communication for Rural Development. World Bank.

MCPC0105: PROFESSIONAL COMMUNICATION

(3 credits – 45 hours)

Course Objective: *To equip learners with the essential knowledge, skills and attitudes for effective communication; To equip learners with the essential knowledge and techniques of professional writing; To enable learners to dynamically engage with presentation and communication skills; To learn the role of non-verbal communication in effective communication.*

Module 1: Professional writing (15 hours)

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 2: Professional Presentation Skills (15 hours)

Presentation skills, 7 P's of presentation, Use of visual aids in a presentation, Non-verbal communication in a presentation situation

Module 3: Verbal, Non-verbal and Listening Skills (15 hours)

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, Non-verbal communication

COURSE/LEARNING OUTCOMES:

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

CO1: Demonstrate a holistic understanding of the principles of professional communication
CO2: Deliver effective presentations using a range of materials including text, visual, sounds and technology
CO3: Acquire professional writing skills in business letters, email, press release, articles etc.
CO4: Demonstrate awareness of the nature and importance of body language and listening skills in acts of communicative intention
CO5: Demonstrate the essential skills to effectively work in various professional contexts

Suggested Readings:

1. Hargie, 0wen. *Skilled Interpersonal Communication: Research Theory and Practice.* Routledge.
2. Hardman, Emilia. *Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills*. Kindle Edition.
3. Krishnamacharyulu and Lalitha. *Business Communication.* Himalayan Publishing House, New Delhi.
4. Anderson, Chris. *TED Talks: The Official TED guide to Public Speaking*. Nicholas Brealey Publishing.
5. Matsumoto, David; Frank, Mark G. and Hwang, Hyi Sung. *Nonverbal Communication: Science and Applications*. Sage Publications.

MCBP0106 : BASICS OF PHOTOGRAPHY

(3credits – 45 hours)

Course Objective: *To provide learners an introductory yet broad-based understanding of digital photography; To make learners proficient in digital image post-production and presentation techniques; To equip learners with all aspects of creative image production including capturing and rendering of lights; editing and critique; and print production.*

Module I: Introduction to Photography (4 hours)

Why photography, How photography works, Brief history of photography, Changing attitude towards photography, Basic optics – wavelengths and colour; shadows; reflection and refraction; light intensity and distance

Module II: Digital Camera Basics (15 hours)

Essential components of digital camera, Digital camera sensors, Digital image capture and file formats, Photographic lenses, Exposure triangle, Exposure meter, Exposure Stops, Focal length, Depth of field, Image stabilization, White balance, Lens filters, Camera kits and accessories

Module III: Introduction to Lighting (6 hours)

Basic characteristics of lighting, Recognizing sources of light, Light quality and intensity, Relationship between light source and subject, Manipulating natural light, Lighting equipments, Practical lighting problems

Module IV: Photographic Composition (8 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: Digital Image - Post-production and Presentation (12 hours)

Overview, Organising photographs, Saving digital file, Basic image editing, Getting one's work noticed, Pictures on the world wide web, Building one's own site, Getting connected, Stock photography

COURSE/LEARNING OUTCOMES:

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

CO1: Demonstrate an understanding and working knowledge of digital SLR cameras
CO2: Demonstrate an understanding of composition and image design process
CO3: Demonstrate competency in image editing and output techniques

CO4: To create, analyse and critique one's own artistic output
CO5: Demonstrate an awareness of safe and responsible work practices

Suggested Readings:

1. Langford, Michael; Fox, Anna and Smith, Richard Sawdon. *Langford's Basic Photography.* Focal Press.
2. Peterson, Bryan. *Understanding Exposure*. Amphoto Books.
3. Comon, Paul R. *Fundamentals of Photo Composition*. Sterling Publications.
4. Judge, Al. *Mastering Digital Cameras*. Createspace Independent Pub.

MCHE0107: HISTORY AND EVOLUTION OF MEDIA

(4 Credits – 60 hours)

Course Objective: *To acquaint learners about history and development of various mass media channels; To impart knowledge on how different technological transitions have shaped media industries; To introduce learners to the evolution of digital media and other emerging trends.*

Module I: Origin of Press and Evolution (15 hours)

Invention of Printing Press, Evolution of Print Media, Development of Press in India

Module II: Radio and Its Evolution (15 hours)

The Coming of Radio, History of Radio Broadcasting, Development of AIR; FM Radio; Community Radio Stations

Module III: Television and Its Evolution (15 hours)

Coming of Television, Public and Private Broadcasting System, Coming of Cable TV; Satellite TV; Direct-To-Home (DTH)

Module IV: Digital Media and its Revolution (15 hours)

Birth of Internet and Online Newspaper, Emergence of Web Radio, Web TV, Social Media

COURSE/LEARNING OUTCOMES

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

CO1: Demonstrate an understanding of major events and developments in mass media history and practice especially in the context of India
CO2: Think critically about the relationship between media and development in Indian society, culture and politics
CO3: Develop an understanding of the evolving role of social media messages on individual and the society

Suggested Readings

1. Kumar, Keval J. Mass Communication in India. Jaico Publishing House, New Delhi.
2. Schramm, Wilbur. The Story of Human Communication: Cave Painting to Microchip. Harpercollins College Div.
3. Luthra, H.R. Indian Broadcasting. Publication Division, New Delhi.
4. Ahuja, B.N and Chhabra, S.S. History of Indian Press: Growth of Newspapers in India. Surjeet Publications, Delhi (1996)
5. Lievrouw, L.A. and Livingstone, Sonia. The Handbook of New Media. Sage Publications, New Delhi.

MCCM0108: COMMUNICATION THEORIES AND MODELS

(3 Credits – 45 hours)

Course Objective: *To introduce learners to the major theoretical positions used in communication studies; To equip learners with knowledge of the basic communication models, key terms and concepts used in the discipline; To introduce learners to a broad range of theories in order to evaluate communication in its many forms and investigate its relationship to society and culture.*

Module I: Introduction to Communication (5 hours)

Communication – Definition; Concept and Meaning, Communication Process; Elements of Communication, Types of Communication – Intrapersonal; Interpersonal; Group and Mass Communication, Barriers to Communication

Module II: Communication Models (8 hours)

Aristotle's Model, SMCR Model, Harold Lasswell's Model, Shannon and Weaver's Model, David Berlo's Model

Module III: Early Effects Theory (10 hours)

Magic Bullet/Hypodermic Needle Theory, Two Step Flow Theory, Multi Step Flow Theory, Diffusion of Innovation Theory, Cognitive Dissonance Theory

Module IV: Limited Effects Theory (12 hours)

Selective Exposure; Perception; Retention, Cultivation Theory, Uses and Gratification Theory, Dependency Theory, Agenda Setting Theory, Gate Keeping Theory

Module V: Normative Theories (10 hours)

Authoritarian Theory, Libertarian Theory, Soviet Communist Theory, Social Responsibility Theory, Democratic Participatory Theory

COURSE/LEARNING OUTCOMES

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

CO1: Understand the foundational material of communication studies
CO2: Become conversant with key terms, models, concepts and a range of theories about communication
CO3: Understand the conceptual connection between communication models and theories about communication
CO4: Develop critical thinking and analytical skills expressed in written and verbal modes

Suggested Readings

1. McQuail, Dennis. McQuail's Mass Communication Theory. Sage Publications, New Delhi.
2. Stevenson, N. (1997). Understanding Media Culture: Social Theory and Mass Communication.
3. Singhal, A. & Rogers, E. M. India's Communication Revolution: From Bullock Carts to Cyber Marts. Sage Publications, New Delhi.
4. Chandler, Daniel and Munday, Roy. A Dictionary of Media and Communication. Oxford University Press.
5. Fiske, J. (1997) Introduction to Communication Studies. Routledge, New York.

MCFM0109: TRADITIONAL FOLK MEDIA

(3 Credits – 45 hours)

Course Objective: *To acquaint learners with the definition, role and potential of folk media in contemporary times; to introduce learners to the scope and nature of traditional folk media in India; to explore the rich variety of folk media in Northeast India; to train learners in the various techniques of street play and puppetry performances.*

Module I: Meaning of Traditional folk media (7 hours)

Role and importance of Performing Arts; Types of Performing Arts; Definitions and types of Traditional Media; Strength and Advantages of Traditional Media; Status of Folk Media in India today; Challenges faced by Folk Media; Major forms of folk media in India

Module II: Nature and Scope of Folk and Traditional 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 – Directorate of Field Publicity (DFP), Songs and Drama Division, NGOs, Social Action Groups

Module III: Traditional Media of Northeast India (7 hours)

Types of Traditional Folk Media in Northeast India, Musical Instruments and their social appeal in Northeastern Societies, Folk fusion, Representations of folk forms in North East, Various folk forms of Assam and its significance – Bihu songs, Lokageet, Bhaona, Lullabies, Ojapali, Ainaam, Sattriya, Borgeet

Module IV: Street theatre and Puppetry (8 hours)

Influence of folk theatre on street theatre, role of street theatre in the Indian Freedom struggle, street theatre for social change, 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: Traditional Folk Media in practice (15 hours)

As part of the course students will be trained in various techniques of street play and puppetry. At the end of the semester the students will stage street play and puppet performance in the vicinity of the university.

COURSE/LEARNING OUTCOMES

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

CO1: Identify the different varieties of folk forms of communication that are popular in India
CO2: Identify the different varieties of folk forms of communication that are popular in Northeast India
CO3: Enlist the general characteristics of folk media
CO4: Develop an understanding of how folk media reflects societal concerns
CO5: Ability to apply puppetry and street theatre to bring positive social change in the community

Suggested Readings

1. Parmar, Shyam. Traditional Folk Media in India. Gekha Books.
2. Ghosh, Sampa and Banerjee, K. Utpal. Puppets in India and Abroad. National Book Trust, New Delhi.
3. Kumar, Sathish. Role of Traditional Folk Arts as Media of Mass Communication. Lambert Academic Publishing, London
4. Naskar, Reshmi. The Role of Folk Media and Participatory Communication in Rural Development: An Exploratory Case Study of Combating Child Marriage in Malda. Global Media Journal. Volume 2, No.2, December 2011, pp 1-9.
5. Bhushan, Chandra. Assam: Its Heritage and Culture. Kalpaz Publications, New Delhi.

MCIC0110: INTRODUCTION TO COMPUTER APPLICATION

(3 Credits – 45 hours)

Course Objective: *To provide learners an introductory understanding of word-processing tool; To make learners proficient in the fundamentals of an image editing software; To equip learners with fundamentals of creative page layout techniques.*

Module I: Word Processing Tool (10 hours)

Word Processing Basic: Introduction to Word Processing; Getting started with Word Processing software; Menu Bar; Using the Help; Using icons below menu bar; saving documents; Page Setup; Printing of documents; Paragraph marks and inter word space.

Text creation and Manipulation: Paragraph and Tab setting; Text selection; Cut, Copy, and Paste; Font and Size selection; Text Alignment; Font size and colour; Paragraph Indenting; Bullets and Numbering; Handling Multiple Documents: Opening and closing multiple documents; Cut, Copy, and Paste across multiple documents; Table Manipulation: Rows, Columns and Cells; Draw table; Changing Cell Width and Height; Text Alignment inside cells; Borders for Table; Printing: Print setting; Print Preview; Print selected page

Module II: Image Editing Tool (15)

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 III: Page Layout Tool (20)

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 color, Applying Fills; Strokes; and Effects, Publish work as PDF, Proof-reading, Print setting

COURSE/LEARNING OUTCOMES

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

CO1: Demonstrate skills in the development of print and on-line publications
CO2: Demonstrate skills in various techniques of word-processing tool
CO3: Demonstrate competency in image editing
CO4: Engage with the conceptual and technical aspects of design such as logo, banner, brochure, poster-making etc.

Suggested Readings

1. Jain, Satish and Geetha, M. MS-Office 2010 Training Guide. BPB Publications.
2. Weverka, Peter. MS-Office 2013 All-in-one for dummies. Wiley.
3. Adobe Photoshop Official Guide
4. Adobe Indesign official guide

MCLE0111: MEDIA LAWS AND ETHICS

(4 Credits – 60 hours)

Course Objective: *To introduce students on the constitutional provisions related to media in India while understanding Freedom of Speech and Expression, Freedom of the Press; RTI and Right to Privacy; To introduce learners to a broad range of specific ethical and legal issues pertinent to various aspects of the media in India; To expose students to the ethical issues in mass media for media producers as well as media consumers.*

Module I: Introduction to Indian Constitution (20 hours)

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 II: Media Laws (20 hours)

Freedom of Press and Reasonable Restriction, Defamation, Contempt of Court, Sedition and Obscenity, Emergence of Censorship, Vernacular Press Act, Right to Information Act, IT Act and Cyber Law 2000

Module III: Media and Ethical Principles (20 hours)

Importance of Media Ethics, Fairness and Objectivity, Right to Privacy, Ethics in Print and Broadcast Media, Code of Ethics in Advertising and Films

COURSE/LEARNING OUTCOMES

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

CO1: Explain the salient features of the Indian Constitution
CO2: Understand and apply the legal issues relevant to media in India
CO3: Critically analyse a range of ethical issues, perspectives and debates relevant to media

CO4: Explain purpose and role of media professionals in modern society

Suggested Readings

1. Basu, D.D. (2004). Introduction to the Constitution of India. Prentice-Hall of India.
2. Thakurta, Paranjoy Guha (2011). Media Ethics: Truth, Fairness and Objectivity. New Delhi: OUP.
3. Manna, B. (2006). Mass Media and Related Laws in India. Academic Publishers.
4. Singh, P.P. et. al. (1998). Media, Ethics and Laws. Anmol.
5. Prabhakar, M. et. al. (1999). A Compendium of Codes of Conduct for Media Professional. University Book House.

MCIJ0112: INTRODUCTION TO JOURNALISM

(3 Credits – 45 hours)

Course Objective: *To introduce learners to the professional practice of contemporary journalism through consideration of the nature and role of news and current affairs in society; To equip learners with the skills required for reporting across media platforms; To engage learners in the analysis and production of journalism with a focus on news and current affairs.*

Module I: Understanding News (8 hours)

News-Meaning; Definition; Nature, Elements and Types of News; News Value, Source of News; News Gathering; News Agencies, Structure of a news organisation, Skills of News Reporting

Module II: Techniques of News Writing and Reporting (10 hours)

Writing Formats, Writing for Newspaper and Magazine, Writing for Electronic Media, Writing for New Media - Digital publications and Social media, Techniques of News Editing

Module III: Editing: Techniques and Practice (7 hours)

Newspaper Size & Content, Masthead; Front Page; Placement of Photographs & Cartoons, Overall Page Design; Editorial Page; Readability, Proof- Reading; Symbols; Style Sheets

Module IV: Photojournalism (8 hours)

Photojournalism - Meaning; Types, Ethics of photojournalism, Photographing a single-image news and feature assignment, Techniques for developing and structuring professional calibre long-form photo stories, Edit; caption; keyword and organize photos

Module V: Practicum (12 hours)

Publication/Lab Journal, Field reporting, Layout Design, Photo Feature

COURSE/LEARNING OUTCOMES

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

CO1: Develop knowledge and understanding of the role of journalism in society
CO2: Develop writing and editing skills pertinent to contemporary journalism
CO3: Develop skills in photojournalism
CO4: Demonstrate skills in critical reflection on professional practice

Suggested Readings

1. Srivastava, M.V. The Journalistic Hand Book. Sterling Publishers, New Delhi
2. Chadda, Sativa. Modern Journalism and News writing. Popular Prakashan, Bombay
3. Rangaswami, Parthasarathi. Basic Journalism. Macmillan India Ltd.
4. Kessler, Lauren & McDonald, Duncan. (1996). When Words Collide: A Media Writer's Guide to Grammar and Style. Belmont, California: Wadsworth.
5. Clark, Roy Peter. (2006). Writing Tools: 50 Essential Strategies for Every Writer. Little Brown.

MCMS0113: MEDIA AND SOCIETY

(4 Credits – 60 hours)

Objective: *To provide learners with the opportunity to explore issues in the interaction between mass media and society; To provide an in-depth understanding of the impact of mass media; To provide learners with an understanding of mass media and its democratic influences and social functions; To explore the emerging trends in mediated communication.*

Module I: Media and Democracy (15 hours)

Media and Modernization, Media and Culture - Mass culture; Popular culture; Cultural hybridity, Media; Public Sphere and Public Opinion, Media and Representation, Media Literacy

Module II: Impact of Media (15 hours)

Media and Socialization, Media and Democracy, Media and Mobilization-Social; Political and Cultural, Mediated Culture and its Impact

Module III: Media and Social Issues (15 hours)

Media and Social Responsibility, Media and Human Rights, Sociology of News, Media; Conflict and Peace

Module IV: Emerging Trends in Media (15 hours)

New Media and Society, Globalisation and Media, Multicultural Society, Virtual Reality

COURSE/LEARNING OUTCOMES

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

CO1: Explain the role of media in the shaping and development of culture and society
CO2: Explain the relationship between media and social issues and aspects of society
CO3: Describe democratic/political potential of mass media
CO4: Recognize the recent development in mass media channels and its social impact
CO5: Critically appreciate the cultural and social role of the media

Suggested Readings

1. IGNOU (1992) Introduction to Mass Communication
2. Kumar Keval J. (2012) Mass Communication in India, Jaico Publishing House, New Delhi, Fourth Edition
3. Schramm Wilbur, Roberts Donald F. (ed), (1971)The Process and Effects of Communication, University of Illinois Press.
4. Fiske John (1982) Introduction to Communication Studies, Routledge.
5. Rogers Everett M., A History of Communication Study, The Free Press

MCDP0114: DESKTOP PUBLISHING – II

(3 Credits – 45 hours)

Course Objective: *To make learners proficient in the fundamentals of an image editing software; To equip learners with fundamentals of creative page layout techniques; To make learners proficient in various creative techniques of design.*

Module II: Image Editing Tool (15 hours)

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 III: Page Layout Tool (15 hours)

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, Work faster by customizing page layout software, Selecting page size, Working with text, Working with objects and layers, Applying and managing color, Applying Fills; Strokes; and Effects, Publish work as PDF, Proof-reading, Print setting

Module III – Practicum (15 hours)

Logo design, Letterhead design, Visiting card design, Calendar design, Poster design

COURSE/LEARNING OUTCOMES

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

CO1: Gain skills in various techniques of a page layout tool.
CO2: Demonstrate competency in image editing.
CO3: Engage with the conceptual and technical aspects of design such as logo, banner, brochure, poster-making etc.

Suggested Readings

1. Adobe Photoshop official guide
2. Adobe Indesign official guide

MCMN0115: MEDIA IN NORTH EAST INDIA

(4 Credits – 60 hours)

Course Objective: *To provide learners with an in-depth understanding of the history, geography, culture and politics of Northeast India; To acquaint learners with the historical background of the press in Northeast India along with the distinguished journalists and writers from the region; To provide an overview of the current status of the media industry in the region and its future prospects.*

Module I: Introduction to Northeast India (20 hours)

Brief History of Northeast India, Geography; People and Language, Culture and Customs, Significant Social and Political Movements in Northeast India

Module II: History of Media in Northeast (20 hours)

Growth and Development of Press in the Northeast, Role of Christian Missionaries in the Development of the Press, Basic Features of the Press in Northeast, Noted Journalist and Writers of the Region

Module III: Current Status of Media in Northeast (20 hours)

Current Trends and Media Organizations in the Region, Ownership Pattern and Status of Journalists, Problems and Challenges of the Press in Northeast, Limitations of Regional Media, New Media In Northeast, Future Scopes and Prospects of Media Industry in the Region

Suggested Readings:

1. Kabi, K. H & Patnaik , S. N (2015). Media, Conflict and Peace in Northeast India. Vij Books Pvt. Ltd, New Delhi.
2. Gurney, A. K. History of the Sibsagar Field. Assam Mission, Nowgaon Jubilee Publication.
3. Barpujari, H.K. The American Missionaries and North-East India (1836-1900 AD). Spectrum Publications, Guwahati/Delhi, 1986.
4. Baruah, S. P. Press in Assam—Origin and Development. Lawyer's Book Stall, Guwahati.
5. Baruah, Sanjib. Beyond Counter-insurgency: Breaking the Impasse in Northeast India. Oxford University Press.
6. Das, Samir Kumar. Governing India's Northeast. Springer.

COURSE/LEARNING OUTCOMES

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

CO1: Understand the complex socio-cultural and political mosaic of the region
CO2: Demonstrate an understanding of the history of the Press in Northeast India and evolution of the mediated environment of the region
CO3: Identify opportunities and challenges in the evolving media industry of the region

MCHE0116: HISTORY AND EVOLUTION OF MEDIA

(3 Credits – 45 hours)

Course Objective: *To acquaint learners about history and development of various mass media channels; To impart knowledge on how different technological transitions have shaped media industries; To introduce learners to the evolution of digital media and other emerging trends.*

Module I: Origin of Press and Evolution (12 hours)

Invention of Printing Press, Evolution of Print Media, Development of Press in India

Module II: Radio and Its Evolution (10 hours)

The Coming of Radio, History of Radio Broadcasting, Development of AIR; FM Radio; Community Radio Stations

Module III: Television and Its Evolution (10 hours)

Coming of Television, Public and Private Broadcasting System, Coming of Cable TV; Satellite TV; Direct-To-Home (DTH)

Module IV: Digital Media and its Revolution (13 hours)

Birth of Internet and Online Newspaper, Emergence of Web Radio, Web TV, Social Media

COURSE/LEARNING OUTCOMES

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

CO1: Demonstrate an understanding of major events and developments in mass media history and practice especially in the context of India.
CO2: Think critically about the relationship between media and development in Indian society, culture and politics.
CO3: Develop an understanding of the evolving role of social media messages on individual and the society.

Suggested Readings:

1. Kumar, Keval J. Mass Communication in India. Jaico Publishing House, New Delhi.
2. Schramm, Wilbur. The Story of Human Communication: Cave Painting to Microchip. Harpercollins College Div.
3. Luthra, H.R. Indian Broadcasting. Publication Division, New Delhi.
4. Ahuja, B.N and Chhabra, S.S. History of Indian Press: Growth of Newspapers in India. Surjeet Publications, Delhi (1996).
5. Lievrouw, L.A. and Livingstone, Sonia. The Handbook of New Media. Sage Publications, New Delhi.

LSGE0004: GENERAL ENGLISH I

(4 credits – 60 hours)

***Objective**: The objective of this course is to introduce students to a body of literature that includes three different genres – fiction, drama and poetry – from English literature. This course expects them to examine the implication of ideas and explore the different themes and motifs in relation to the socio-cultural contexts in which the mentioned texts were written. This course also aims at equipping the learners with the basic skills of effective communication in English language by introducing a module on basic concepts in English grammar.*

Module I: Selected novel (15 hours)

a. Jane Austen – Sense and Sensibility

Module II: Selected Dramas (18 hours)

a. A Doll's House – Henrik Ibsen
b. The Birthday Party – Harold Pinter

Module III: Selected Poems (12 hours)

a. My Mother at Sixty-six – Kamala Das
b. Death Be Not Proud – John Donne
c. The World is Too Much with Us – William Wordsworth
d. The Blessed Damozel – D G Rossetti

Module IV: Basic English Grammar (15 hours)

Parts of Speech, Time, Tense, Aspect, Determiners, Phrases and Clauses, Active and Passive Voice, Direct and Indirect Speech, Basic Sentence Structures, Subject-Verb Agreement, Punctuation.

COURSE/LEARNING OUTCOMES

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

CO1: Define various genres of literature, viz. novels, drama and poetry and they are able to write about the selected writers and their important literary works. (Knowledge)
CO2: Interpret the selected literary works and they are able to explain the plot, theme and character of thenovels and dramas. (Comprehension)
CO3: Use the correct form of grammar while using the English language and they are able to identify and solve grammatical problems. (Application)
CO4: Offer critical interpretation or criticism of the literary texts, critically analyse the themes and compare and contrast the different characters of the selected novels and dramas. (Analysis)
CO5: Summarize and critically appreciate the selected poems and other literary texts. (Synthesis)
CO6: Assess and evaluate the selected novels, dramas and poems vis-à-vis their context and socio-political and cultural background. (Evaluation)

LSGE0005: GENERAL ENGLISH II

(4 credits – 60 hours)

***Objective:** This course introduces students to the literary form of short stories and essays through a selection of representative texts from different eras of English literature. This course aims at developing the language skills of the learners by teaching them the different forms of writing and helping them improve their vocabulary in English language.*

Module I: Selected Short Stories (20 hours)

a. The Happy Prince – Oscar Wilde
b. A Career – R K Narayan
c. The Open Window – Hector Hugh Munro
d. The Last Leaf – O' Henry

Module II: Selected Essays (20 hours)

a. My Days – R K Narayan
b. The Origin of Species – Charles Darwin
c. Homage to Gandhi – Jawaharlal Nehru
d. Of Friendship – Francis Bacon

Module III: Language and Composition (20 hours)

Vocabulary building, Synonyms and Antonyms, Common Idioms and Phrases, One-Word Substitution, Confusing Word Pairs, Letter writing, Application writing, Precis writing, Paragraph writing, C V writing, Memo writing, Notice, Advertisement, Dialogue writing, Letter to the editor, Poster writing.

COURSE / LEARNING OUTCOMES

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

CO1: Define various genres of literature, viz. short stories and essays and they are able to write about the selected writers and their important literary works. (Knowledge)
CO2: Interpret the selected literary works and they are able to explain the themes and characters of the essays and short stories. (Comprehension)
CO3: Use the correct form of language and composition in English and they are able to identify and solve grammatical problems. (Application)
CO4: Offer critical interpretation or criticism of the literary texts, critically analyse and compare the themes of the selected texts. (Analysis)
CO5: Summarize and critically appreciate the selected short stories and essays. (Synthesis)
CO6: Assess and evaluate the selected short stories and essays vis-à-vis their socio-political and cultural context. (Evaluation)

LSAE0007: ALTERNATIVE ENGLISH I

(4 credits – 60 hours)

Objective: *This paper is designed to present students with the opportunity to study key concepts and terms associated with three different genres of literature – poetry, novel and drama. The students are expected to examine the implication of ideas and relate these terms and concepts to the prescribed texts in this paper. This paper brings to the students a selection of poems, novels and dramas that are representative of important trends and formal experimentation.*

Module I: Introduction to Poetry: key terms and concepts (8 hours)

Verse, meter, rhyme, stress, accent, alliteration, assonance, consonance, antithesis, blank verse, conceit, iambic pentameter, heroic couplet, quatrain, stanza, foot, syllable, hyperbole, litotes, simile, metaphor, metonymy, verse libre, lyric, narrative, epic, haiku, sonnet, ode, elegy, dramatic monologue, idyll, pastoral, quatrain,refrain, onomatopoeia, apostrophe, personification, epithalamion, carpe diem, ballad.

Module II: Selected Poems (12 hours)

a. Ode to the West Wind – P B Shelley
b. The Professor – Nissim Ezekiel
c. The Second Coming – W B Yeats
d. Dover Beach – Matthew Arnold
e. The Love Song of J. Alfred Prufrock – T S Eliot
f. The Road Not Taken – Robert Frost

Module III: Introduction to Drama: key terms and concepts (8 hours)

Allegory, antagonist, aside, catastrophe, catharsis, character, chorus, climax, comedy, comic relief, conflict, denouement, deus ex machina, dialogue, dramatis personae, flashback, foil, fourth wall, monologue, narrator, parody, plot, point of view, resolution, reversal, satire, setting, soliloquy, tragedy, tragic flaw, tragic hero, three unities

Module IV: Selected Dramas (12 hours)

- **a.** Macbeth – William Shakespeare
- **b.** Waiting for Godot – Samuel Beckett
- **c.** Candida – G B Shaw
- **d.** She Stoops To Conquer – Oliver Goldsmith
- **e.** Nagamandala – GirishKarnad

Module V: Introduction to Novel: Key Terms (8 hours)

Novelette; novel; novel of incident, character, manners, formation/education; gothic novel; epistolary novel; picaresque novel; realistic novel; magic realism; documentary fiction; historical novel; social novel; anti novel; prose romances, bildungsroman, stream of consciousness, flat and round character, plot, theme and motifs

Module VI: Selected Novels (12 hours)

- **a.** Franz Kafka – The Trial
- **b.** AmitavGhosh – The Shadow Lines
- **c.** James Joyce – A Portrait of the Artist as a Young Man

COURSE / LEARNING OUTCOMES

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

CO1: Define various genres of literature, viz. novels, drama and poetry and they are able to write about the selected writers and their important literary works.
CO2: Interpret the selected literary works and they are able to explain the plot, theme and character of the novels and dramas.
CO3: Use the key terms of the genres of literature in meaningful contexts.
CO4: Offer critical interpretation or criticism of the literary texts, critically analyse the themes and compare and contrast the different characters of the selected novels and dramas.
CO5: Summarize and critically appreciate the selected poems and other literary texts.
CO6: Assess and evaluate the selected novels, dramas and poems vis-à-vis their context and socio-political and cultural background.

Suggested Readings

1. M H Abrams, A Glossary of Literary Terms, MacMillan Publishers
2. Peter Brooker, A Glossary of Cultural Theory, Hodder Education

LSAT0009: ALTERNATIVE ENGLISH II

(4 credits – 60 hours)

Objective: *This course introduces students to the literary forms of short fiction and essays taken from different periods of English literature. The learners are expected to analyse the texts and explore the different themes and motifs in relation to the socio-cultural context in which the prescribed texts are placed. This paper also seeks to introduce students to Linguistics as the scientific study of language and to familiarize them with the key concepts at different levels of language organisation.*

Module I: Selected Short Stories (20 hours)

a. The Purloined Letter – Edgar Allan Poe
b. The Doll's House – Katherine Mansfield
c. The Rocking Horse Winner – D H Lawrence
d. The Home-coming – Rabindranath Tagore

Module II: Selected Essays (20 hours)

a. A Room of One's Own – Virginia Woolf
b. The Chimney Sweeper – Charles Lamb
c. Introduction: The absurdity of the Absurd – Martin Esslin
d. Why Law is Indispensable – G B Shaw

Module III: Language and Linguistics: Key concepts (20 hours)

Language and linguistics; langue and parole; synchrony and diachrony; competence and performance; signifier and signified; phonology, morphology, syntax and semantics; organs of speech; vowel and consonant sounds; syllable; stress and intonation; morphs, morphemes and allomorphs; word-formation; idiolect, dialect and register; prefixes and suffixes; syntactic structures.

COURSE / LEARNING OUTCOMES

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

CO1: Define the genres of literature, viz. fiction and poetry and to write about the selected writers and their important literary works
CO2: Interpret the selected literary works and they are able to explain the plot, theme and character of the fictions and dramas
CO3: Use the themes of the literary works in in creative writing in various contexts
CO4: Offer critical interpretation or criticism of the literary texts, critically analyse the themes and compare and contrast the different characters of the selected fiction and poetry
CO5: Summarize and critically appreciate the selected poems and other literary texts
CO6: Assess and evaluate the selected fiction and poetry vis-à-vis their context and sociopolitical and cultural background.

Suggested Readings

1. John Lyons, Language and Linguistics: An Introduction, Cambridge University Press
2. David Crystal, Linguistics, Pelican
3. RK Bansal and JB Harrison, Spoken English – A Manual of Speech and Phonetics, Orient Blackswan

LSHE0010: HISTORY OF ENGLISH LITERATURE I: ELIZABETHAN TO ROMANTIC PERIOD

(4 Credits-60 hours)

Objective: *The objective of this course is to introduce students to selected texts of literature that includes three different genres – Poetry, Drama and Fiction – from the Elizabethan to the Romantic Period in English Literature. This course expects them to examine the implication of ideas and explore the different themes and texts in the context of the social and political history. This course also provides an overview of the literary and historical context of the mentioned period, in order to help the students to understand the texts better.*

Module I: The Literary History and its Context (20 hours)

Spanish Armada, Shakespeare's greatest tragedies and tragi-comedies, Prose writings of Bacon, Metaphysical poetry (John Donne and others), English Civil War, Puritan Interregnum, Restoration of Stuart Monarchy, Dissolution of the Commonwealth, Closure of Public Theatres, Restoration Comedies (Congreve and others, Heroic Drama (Dryden and others), Age of Sensibility (Pope and Johnson), Enlightenment, Rise of great novelists (Richardson, Fielding, and others…), Shift from sensibility to romanticism in Gray and other poets, Lyrical Ballads, Romantic Poetry (Wordsworth, Coleridge, Keats, and others), Gothic Romances (Anne Radcliffe and others...)

Module II: Selected English Poetry (10 hours)

a) 'A Valediction: Forbidding Mourning' by John Donne
b) 'Frost at Midnight' by S.T. Coleridge
c) 'La Belle Dame Sans Merci' by John Keats
d) 'The Indian Serenade' by P.B. Shelley
e) 'To a Butterfly' by William Wordsworth

Module III: Selected English Drama (15 hours)

a) A Midsummer Night's Dream by William Shakespeare
b) The Duchess of Malfi by John Webster

Module IV: Selected English Fiction (15 hours)

a) Frankenstein by Mary Shelley
b) Pride and Prejudice by Jane Austen

COURSE/LEARNING OUTCOMES

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

CO1: Recognize the different genres of Poetry, Drama and Fiction and state about the Literary History of English Literature and its context from the Elizabethan to Romantic Period.
CO2: Understand and explain, analyze and criticize these literary genres in terms of critical elements and literary devices found in the given texts, the meaning, linguistic aspects and the themes in the context of the social and political history.
CO3: Combine and organize the various elements in a given literary text in the form of writing and evaluate it as a work of literary art.

Suggested Readings

1. Ferguson, Margaret. et al. Eds. The Norton Anthology of Poetry. New York: London
2. Drabble, Margaret. ed. The Oxford Companion to English Literature. Oxford: OUP
3. Sanders, Andrew. The Short Oxford History of English Literature. Oxford: OUP
4. Wells, Stanley W. & Margaret De Grazia. The Cambridge Companion to Shakespeare. Cambridge: CUP
5. M.H. Abrams, Geoffrey Galt Harpham, A Glossary of Literary Terms, Cengage Learning

LSHL0011: HISTORY OF ENGLISH LITERATURE II: VICTORIAN TO CONTEMPORARY PERIOD

(4 Credits - 60 hours)

Objective: *The objective of this course is to introduce students to selected texts of literature that includes three different genres – Poetry, Drama and Fiction – from the Victorian Age to the Contemporary Period in English Literature. The learners are expected to analyse the texts and explore the different themes and motifs in relation to the literary and socio-cultural context in which the prescribed texts are placed.*

Module I: The Literary History and its Context (16 hours)

The Oxford Movement, Crisis in Religion in 19th Century, Pre-Raphaelites, Aestheticism, Consolidation of the British Empire, 'Scrutiny' and its Influence, The New Theatre, Postcolonial Literature, Post-Modernism, New Criticism, Globalisation, Impact of the two World Wars, Popular Culture, Deconstruction

Module II: Selected English Poetry (12 hours)

a) The Charge of the Light Brigade by Lord Alfred Tennyson
b) The Windhover by Gerard Manley Hopkins
c) 'The Journey of the Magi' by T.S. Eliot
d) Fern Hill by Dylan Thomas
e) 'My Last Duchess' by Robert Browning

Module III: Selected English Drama (16 hours)

a) Arms and the Man by G. B. Shaw
b) The Hairy Ape by Eugene O'Neill

Module IV: Selected English Fiction (16 hours)

a) Great Expectations by Charles Dickens
b) And The Mountains Echoed by Khalid Hosseini

COURSE/LEARNING OUTCOMES

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

CO1: Recognize the different genres of Poetry, Drama and Fiction and state about the Literary History of English Literature and its context from the Victorian to Contemporary period.
CO2: Understand and explain, analyze and criticize these literary genres in terms of critical elements and literary devices found in the given texts, the meaning, linguistic aspects and the themes in the context of the social and political history.
CO3: Combine and organize the various elements in a given literary text in the form of writing and evaluate it as a work of literary art.

Suggested Readings

1. Theatre of the Absurd by Martin Esslin
2. Palgrave's Golden Treasury.
3. David Green (ed.) The Winged Word.
4. David, Deidre. The Cambridge Companion to the Victorian Novel. Cambridge, CUP
5. Sanders, Andrew. The Short Oxford History of English Literature. Oxford: OUP
6. Eagleton, Terry. The English Novel. Oxford: Blackwell
7. M.H. Abrams, Geoffrey Galt Harpham, A Glossary of Literary Terms, Cengage Learning

LSFN0012: FUNCTIONAL ENGLISH

(3 Credits - 45 hours)

Objective: *This open elective course will enable the learners to use language effectively in a wide range of situations. This course aims to help the learners develop the skills of language learning, namely Listening, Speaking, reading and writing. It also aims to develop students' proficiency in English through meaningful communicative activities.*

Module I: Grammar in Communication (11 hours)

Nouns and noun groups; Phrasal verbs; Tense and temporal adjuncts; Speech Acts and mood; Modal auxiliaries; Simple, complex and compound sentences; Common mistakes in English grammar; Degrees of Comparison; Phrases, Clauses and Idioms in English; Tense, Voice and Narration; Differences between traditional grammar and functional grammar

Module II: Introduction to Phonetics (10 hours)

Speech Sounds; Classification and Description of Vowels and Consonants; Phonetic Symbols; Minimal Pairs; Syllable and Consonant Clusters; Word Accent and Sentence Intonation; Pronunciation drill and practice

Module III: Writing Skills (12 hours)

Grammar for writing; Vocabulary building; Tips for improving English writing skills; Kinds of sentences; Sentence Structures (Simple Sentences and Compound Sentences); Introduction to paragraph format and content; Types of writing; Friendly and formal letters; Essay writing; Narrative writing; Academic writing vs. Journalism; Blog writing; Editing and Revising

Module IV: Conversational Skills (12 hours)

Greetings; Introducing others; Welcoming; Bidding farewell; Appearing in an Interview; Talking about oneself: strengths, weaknesses, likes, dislikes, future plans, describing one's family; Face-to-face interaction in formal and informal situations; telephonic interactions; public speaking; presentation skills; Role play; Class presentations; Powerpoint presentations; Speaking with Confidence; Ways to overcome speech anxiety; Building credibility as a speaker

COURSE/LEARNING OUTCOMES

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

CO1: Define various grammatical items and they are able to recognize the accurate phonetic symbols to represent the sound of different words.
CO2: Interpret the grammatical rules related to the basic grammatical items and they are able to explain the difference between traditional and functional grammar.
CO3: Use the correct form of grammar while using the English language and they are able to use the correct pronunciation and other conversational and writing skills while speaking and writing in English.
CO4: Analyse different sentence structures and types of writing and ways of delivering speech by using formal language.
CO5: Summarize the rules of grammar and phonetic transcription and draw inference or conclusions of their analytical writing
CO6: Assess and examine the selected topics of their writing.

Suggested Readings

1. Leech, G. and J. Svartvik, A Communicative Grammar of English. Pearson, India. Pandey J. H., Complete Grammar, Shree Book Centre, Mumbai, India.
2. Murphy, R., Intermediate English Grammar. Cambridge Univ. Press, India.
3. Hewings, M., Advanced English Grammar. Cambridge Univ. Press, India.
4. Wren, P. C. and H. Martin, High School English Grammar and Composition, S. Chand and Co, New Delhi.
5. Balasubramanian, T., A Textbook of English Phonetics for Indian Students, Macmillan, New Delhi.
6. Sethi, J. and P. V. Dhamija, A Course in Phonetics and Spoken English, Ed., Prentice Hall, New Delhi.
7. Oxford Advanced Learner's Dictionary

LSCW0013: CREATIVE WRITING IN ENGLISH

(3 Credits - 45 hours)

Objective: *This course aims to provide the students across all disciplines, the required skills and professional knowledge about the art of writing. This course also helps in developing the creative ability of the learners who are interested in a professional career as a freelance writer.*

Module I: Creative Writing and its Significance (12 hours)

Introduction; Objectives of Creative writing; Different types of Creative Writing; Scope and Area of Creative Writing; Analysing a Creative composition; Origin of Thought and Birth of an Idea: Inspiration, Incubation, Implementation and Interpretation; Strategies of a Writer

Module II: General Principles of Writing (15 hours)

Mechanics of Writing: Cohesion, Coherence, Style, Context, 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 III: Forms of Creative Writing (18 hours)

Writing a film / book review; Narrative or discursive essay / article; Personal and business letters; Writing a Business proposal; Report writing; Poetry writing; Short story writing; Dramatic dialogue writing; Designing a Website; Poster writing; CV writing; Newspaper article and editorial; Emails and Blogs; Writing for Radio and Television

COURSE/LEARNING OUTCOMES

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

CO1: Define creative writing
CO2: State the important objectives of creative writing
CO3: Illustrate the different types of creative writing
CO4: Identify the strategies adopted by a writer
CO5: Analyse a creative composition
CO6: Differentiate between literal and figurative use of language
CO7: Summarise the mechanics of creative writing
CO8: Classify the different styles of writing
CO9: Write down the rules for good writing
CO10: Design a website or a poster
CO11: Apply the rules for creative writing while drafting/writing a book review, essay, article, proposal, etc.

Suggested Readings

1. Seely, John, The Oxford Guide to Writing and Speaking Oxford: Oxford University Press
2. Jones, Leo, Cambridge Advanced English: Student's Book New Delhi: Cambridge University Press
3. Everett, Nick, "Creative Writing and English." The Cambridge Quarterly. 34 (3)
4. Palmer, A.J., "Writing and Imagery - How to Deepen Your Creativity and Improve Your Writing." [Aber Books].

LSPD0014: POETRY, PROSE AND DRAMA: ELIZABETHAN TO RESTORATION PERIOD
(3 Credits-45 hours)

***Objective**: The objective of this course is to acquaint the students with representative selected texts from different genres from the Elizabethan to the Restoration Period in English Literature. The students are also expected to read the selected texts within this literary period with the understanding the circumstances that influenced and shaped literary production.*

Module I: Prose and Metaphysical Poetry (5 hours)

a) Francis Bacon's 'Of Youth and Age'
b) Andrew Marvell's 'To His Coy Mistress'

Module II: Tragedy and Tragi-comedy (20 hours)

a) Christopher Marlowe's The Tragical History of the Life and Death of Doctor Faustus
b) William Shakespeare's Measure for Measure

Module III: Restoration Comedy and Heroic Drama (20 hours)

a) The Way of the World by William Congreve
b) Absalom and Achitophel byJohn Dryden

COURSE/LEARNING OUTCOMES

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

CO1: Recognize the various genres of Prose and Metaphysical Poetry, Drama in the form of Tragedy, Tragi-comedy, Restoration Comedy and Heroic Drama.
CO2: Understand and explain the various elements that constitute an Essay and a Metaphysical Poetry and the Drama in the forms as mentioned above.
CO3: Analyze and criticize the representative selected texts from these different genres from the Elizabethan Period to the Restoration Period in English Literature.
CO4: Combine, organize and write the various literary aspects of the respective texts and examine them as a literary work of art.

Suggested Readings

1. Sanders, Andrew. *The Short Oxford History of English Literature.* Oxford: OUP
2. Willey, Basil. *The Seventeenth Century Background.*
3. Bredvold, L I. *The Intellectual Milieu of John Dryden.*
4. Bradbrook, M C. *Themes and Conventions of Elizabethan Tragedy.* Cambridge:CUP
5. Braunmuller, A R and Michael Hattaway. *The Cambridge Companion to English Renaissance Drama.* Cambridge: CUP
6. Gurr, Andrew. *The Shakespearean Stage.* Cambridge: CUP
7. M.H. Abrams, Geoffrey Galt Harpham, A Glossary of Literary Terms, Cengage Learning

LSPF0015: POETRY, PROSE AND FICTION: AUGUSTAN TO ROMANTIC PERIOD
(3 Credits-45 hours)

***Objective:** The objective of this course is to acquaint the students with representative selected texts from different genres from the Augustan to the Romantic Period in English Literature. The students are also expected to read the selected texts within this literary period with the understanding the circumstances that influenced and shaped literary production.*

Module I: Romantic Prose(15 hours)

a) Dream Children: A Reverie by Charles Lamb
b) The South-Sea House by Charles Lamb
c) On Going A Journey by William Hazlitt

Module II: Transitional Poetry and Romantic Poetry (15 hours)

a) 'Elegy Written In A Country Churchyard' by Thomas Gray
b) 'God Moves In A Mysterious Way'by William Cowper

c) Robert Burns' '*A Red, Red Rose'*
d) Samuel Taylor Coleridge's '*Christabel'*

Module III: Sentimental novel and Gothic Romance (15 hours)

a) Pamela by Samuel Richardson
b) Northanger Abbey by Jane Austen

COURSE/LEARNING OUTCOMES

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

CO1: Recognize the different genres of Romantic Prose as Essays, Transitional and Romantic Poetry and the work of Fiction in the form of Sentimental Novel and Gothic Romance.
CO2: Understand and explain the prescribed texts in terms of the critical elements and the literary devices used in the text, meaning, linguistic aspects and the literary period along with the background conditions that influenced and shaped the given literary texts.
CO3: Analyse and criticize the representative selected texts from the Augustan to the Romantic Period, in terms of the aforementioned parameters.
CO4: Combine and organize the various aspects of the literary texts in a proper format and examine it as a work of literary art.

Suggested Readings

1. F W Hilles and Harold Bloom. Eds. *From Sensibility to Romanticism.*
2. Alexander, Michael. *A History of English Literature.* Basingstoke Hampshire: Palgrave Macmillan.
3. W J Bate. *From Classic to Romantic*.
4. Bachelor, John. *The Art of Literary Biography.* Oxford: OUP
5. M.H. Abrams, Geoffrey Galt Harpham, A Glossary of Literary Terms, Cengage Learning
6. " Hazlitt's Selected Essays" by George Sampson, Kindle Edition, Gibb press
7. "The Essays Of Elia" by Charls Lamb, Classic reprint series

LSCS0016: COMMUNICATION SKILLS

(Audit)

Objective: *The objective of this audit course is to prepare students to be effective in their career in the corporate world where they will put to use their professional expertise. This course enables students*

- *To understand the difference between hard skills and soft skills*
- *To learn the importance of communication skills as part of the soft skills,*
- *To be familiar with the various features of effective communication, which includes verbal, non-verbal, written communication and body language.*

COURSE/LEARNING OUTCOMES

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

CO1: Recognise the difference between hard and soft skills
CO2: Understand the importance of communication skills
CO3: Analyse features of effective communication
CO4: Apply the soft skills in the corporate world

LSEC0018: ENGLISH COMMUNICATION

(2 Credits- 30 Hours)

Objective: *The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills.*

Module I: Introduction

Theory of Communication, Types and modes of Communication

Module II: Language of Communication:

Verbal and Non-verbal (Spoken and Written)
Personal, Social and Business
Barriers and Strategies
Intra-personal, Inter-personal and Group communication

Module III: Speaking Skills

Monologue, Dialogue, Group Discussion
Effective Communication/ Mis- Communication
Interview, Public Speech

Module IV: Reading and Understanding

Close Reading, Comprehension, Summary, Paraphrasing
Analysis and Interpretation
Translation (from Indian language to English and vice-versa)
Literary/Knowledge Texts

Module V: Writing Skills

Documenting, Report Writing, Making notes, Letter writing

COURSE/LEARNING OUTCOMES

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

CO1: Define the theories of Communication, its types and modes
CO2: Explain various dimensions of communication skills
CO3: Use the correct and suitable art of communication in today's world of complexities, multiplicities and competition
CO4: Analyze the difference in personal and professional interactions
CO5: Summarize various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments
CO6: Evaluate different documents and reports, prepared or presented

Suggested Readings

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul,Dr Brati Biswas

LSET0019: ENGLISH LANGUAGE TEACHING

(3 Credits: 45 Hours)

Objective: *The objective of this course is to introduce the students to the basic concepts of language learning and teaching. The course would expect the learner to familiarise with the principles and practice of ELT Pedagogy, Teaching methodology, Material development, Testing and Evaluation as key components of ELT.*

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 (10 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, Business Purpose.

Module IV: Language through Literature (5 hours)

Role of Literature in Language Learning. Teaching of Literature. Use of Language Model.

COURSE/LEARNING OUTCOMES

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

CO1: Define the concept of English Language Teaching. (*Knowledge*)
CO2: Understand the various components of English Language Teaching. (*Comprehension*)
CO3: Recognize the various Principles, approaches and Practice of English Language Teaching. (*Application*)
CO4: Analyze the structure of language, materials and approach in the teaching of English Language. (*Analysis*)
CO5: Summarize the fundamental concepts of Language learning and Teaching. (*Synthesis*)
CO6: Examine and evaluate the theoretical knowledge and the skills acquired for language learning and teaching. (*Evaluation*)

Suggested Readings

1. Ray Mackay, A Basic Introduction to English Language Teaching; Oxford.
2. Penny Ur, A Course in English language Teaching, CUP.

LSNE0020: NORTH-EAST INDIAN LITERATURE IN ENGLISH

(3 Credits: 45 Hours)

Objective: *The objective of this course is to expose students to the vast body of writings in English from India's North-east. The course is designed to introduce to student the emerging genres of North-east Indian literature- poetry, fiction and non-fictional prose writing. The course will help the students to explore and understand the specific issues such as the double challenge of truth and liberty, of identity and unity, of cultural loss and recovery, of ethnic specificity and aesthetic universality in the literature from the north-east India in English.*

Module I: Selected Poetry (15 hours)

a) Easterine Kire's 'Riddu Riddu' & 'Narcissus'
b) Robin Ngangom "My Invented Land"
c) Ilabunta Yumnam's 'Barak River You Are Beautiful'

Module II: Selected Fiction/Non-Fiction Writers (30 hours)

a) Mamang Dai's The Legends of Pensam
b) Arup Dutta's Kaziranga Trail

COURSE/LEARNING OUTCOMES

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

CO1: Understand the vast body of writings in English from India's North-east. (*Knowledge*)
CO2: Interpret the emerging genres of North-east Indian literature- poetry, fiction and non-fictional prose writing. (*Comprehension*)
CO3: Apply critical reading skills to the emerging and vibrant area of literature. (*Application*)
CO4: Address and analyse the specific issues such as the double challenge of truth and liberty, of identity and unity, of cultural loss and recovery, of ethnic specificity and aesthetic universality in the literature from the north-east India in English. (*Analysis*)
CO5: Summarise the contribution of writers from North-east India to the Indian English literary tradition. (*Synthesis*)

CO6: Examine and evaluate the essence of the literature from the North-east India vis-à-vis the contribution of the writers to the development of this unique kind of literary genre. (*Evaluation*)

Suggested Readings

1. Selected Texts (mentioned in the detailed course)
2. Misra, Tillotama. The Oxford Anthology of Writings From North East India: Poetry and Essays. OUP
3. Zama, Magarat Ch. Emerging Literatures From NorthEast India: The Dynamics of Culture, Society and Idetity, SAGE publications
4. Ngangom, Robin S. & Nongkynrih, Kynpham Singh. Dancing Earth: An Anthology of Poetry from North-east India.
5. Swami, Indu. Exploring North-East Indian Writings in English: 2 volumes

LSEP0021: CHAUCER TO ELIZABETHAN PERIOD - POETRY, DRAMA AND ROMANCE

(4 credits: 60 hours)

Objective: *The objective of this course is to introduce students to the selected texts of the three literary genres of Poetry, Drama and Romance from the age of Chaucer to Elizabethan Period. The learners of this course are expected to explore the themes and motifs in the prescribed texts in its historical and literary context.*

Module I: Selected Poetry (25 hours)

a) Geoffrey Chaucer's Prologue to The Canterbury Tales
b) Edmund Spenser's 'The Faerie Queen' (Book III)
c) William Shakespeare's Sonnets No. 34, 18, 29
d) Philip Sidney's 'Astrophel and Stella'

Module II: Selected Drama (20 hours)

a) Christopher Marlowe's The Jew of Malta
b) Ben Jonson's The Alchemist

Module III: Selected Romance (15 hours)

a) Sir Thomas More's Utopia

COURSE/LEARNING OUTCOMES

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

CO1: Define the fundamental concepts of the three genres of Poetry, Drama and Romance from the age of Chaucer to Elizabethan period. (Knowledge)
CO2: Have a comprehensive understanding of the characteristic features and forms of Poetry, Drama and Romance from the age of Chaucer to Elizabethan period. (Comprehension)
CO3: Identify the socio-political background and factors that influenced and shaped the literary texts of the period. (Application)
CO4: Analyze the given text critically in its literary context, use of various literary devices, thematic and symbolic significance and the use of Language and style. (Analysis)
CO5: Summarize the ideas derived after critical analysis of the given texts. (Synthesis)
CO6: Examine and evaluate the given text as a literary work of art. (Evaluation)

Suggested Readings

1. Texts of Selected Poetry, Drama and Romance.
2. Ferguson, Margaret. et al.Eds. The Norton Anthology of Poetry. New York: London.
3. Drabble, Margaret. ed. The Oxford Companion to English Literature. Oxford: OUP.
4. Shakespeare, William. William Shakespeare Sonnets, Rupa Publishers;

LSLS0022: LITERARY AND SOCIAL HISTORY OF ENGLAND - CHAUCER TO ELIZABETHAN PERIOD

(3 Credits: 45 Hours)

Objective: *The objective of this course is to familiarise the students to the social and literary tradition of England from the Medieval age to the coming up of the Elizabethan theatre. The aim of this course is to enable the students understand the socio-political events and developments that influenced and shaped the literary production during this period.*

Module I (15 hours)

a) The Church and Medieval Life
b) Towns and Villages in Medieval England
c) Feudalism
d) The English Manorial System and Medieval Agriculture

Module II (15 hours)

a) The Black Death and its Aftermath
b) Medieval English Theatre
c) Medieval Romance
d) Fabliau, Lyric, Dream Allegory and Ballad

Module III (15 hours)

a) Caxton and the Printing Press
b) Renaissance and the Literature: The University Wits, the Elizabethan Prose, the Metaphysical Poetry, etc.
c) Reformation
d) The Elizabethan Theatre

COURSE/LEARNING OUTCOMES

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

CO1: Define the different Periods involved in the Literary and Social History of England from the Medieval to Elizabethan age. (Knowledge)
CO2: Comprehend or interpret the characteristic features, significant changes, development and modes indicating transition from the Medieval life, The Black Death to the Elizabethan theatre. (Comprehension)
CO3: Identify the various socio-political factors responsible for these developments and their influences in the shaping of the Literature of the period. (Application)
CO4: Analyze and differentiate the various genres of literature on the basis of the historical changes and developments from the Medieval life to the Elizabethan age. (Analysis)
CO5: Summarize the various literary and socio-political influences for the literature production at the various stages from the Medieval age to the coming of Elizabethan theatre. (Synthesis)
CO6: Examine and evaluate the contextual background involved in the shaping up of various literary works. (Evaluation)

Suggested Readings

1. Sanders, Andrew. The Short Oxford History of English Literature. Oxford:OUP.
2. Abrams, M.H. A Glossary of Literary Terms. Prism India.
3. Peck, John and Martin Coyle. A Brief History of English Literature. Palgrave.
4. Ashok, Padmaja. The Social History of England. Orient Black Swan.

LSSD0023: SHAKESPEAREAN DRAMA I - COMEDY AND HISTORY PLAYS

(4 Credits: 60 Hours)

Objective: *The aim of this course is to introduce the students to the richness of the Elizabethan Drama through the works of William Shakespeare. The learners are expected to explore the magnanimity of the Shakespearean text and its relevance in the contemporary period, through his representative Comedies and Historical plays.*

Module I: Comedies (30 hours)

a) Shakespeare's The Tempest
b) Shakespeare's The Midsummer Night's Dream

Module II: History Plays (30 hours)

a) Shakespeare's Richard III
b) Shakespeare's Julius Caesar

COURSE/LEARNING OUTCOMES

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

CO1: Define a Shakespearean Drama as a literary genre. (Knowledge)
CO2: Comprehend the significant stages in the texts of Shakespearean Comedy and a Historical play. (Comprehension)
CO3: Identify and differentiate a given text as a work of Shakespearean Comedy or a Historical play. (Application)
CO4: Critically analyze the theme, plot and characterization, use of literary devices and settings in a given Shakespearean text as a work of Comedy or History. (Analysis)
CO5: Summarize and organize the content, style and the literary aspects of the given Shakespearean text as a work of Comedy or History. (Synthesis)
CO6: Examine and evaluate the characteristic features and creative energy of Shakespeare through the study of a Comedy and a Historical play. (Evaluation)

Suggested Readings

1. Texts of Selected Drama prescribed in the Course.
2. Bloom, Harold, Elizabethan Drama. Infobase Publishing, New York.
3. Legatt, Alexander. Shakespeare's Political Drama. Rout ledge, London.
4. Dutton, Richard and Howard, Jean. A Companion to Shakespeare's Works, Vol.II.Blackwell, Oxford.

LSRP0024: RHETORIC AND PROSODY

(2 Credits: 30 Hours)

Objective: *The aim of this course is to enable the students develop a critical awareness of Rhetoric and Prosody and its applications in literature. This course is expected to introduce the learners the key words and concepts, use of figures of speech, grammar, rhyme and metre applied to the language and verse of a given literary text.*

Module I: Introduction to Rhetoric (10 hours)

Rhetoric; Difference between Grammar and Rhetoric; Relation between Rhetoric and Emotion; Rhetoric and Oratory; Prosody; Difference between Poetry and Prose; Syllable, Foot, Accent, Pitch; Primary and Secondary accent; Rules governing Accent; Rhythm, Rhyme, Metre; Scansion

Module II: Figures of Speech (10 hours)

Contribution of Figures of Speech to Literary Expression, Classification of Figures of Speech, Figures based on Similarity or Resemblance, Association, Contrast or Difference, Imagination, Indirectness, Sound, Construction; Miscellaneous Figures of Speech

Module III: Prosody: Different kinds of Metre and Poetry (10 hours)

Types of Metre; Special Metres; Types of Poetry

COURSE/LEARNING OUTCOMES

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

CO1: Define the use of Rhetoric and Prosody in a given literary text. (Knowledge)
CO2: Comprehend and differentiate the figures of speech, meter and patterns of rhythm. (Comprehension)
CO3: Identify and explain the various elements of Rhetoric and prosody in a given literary text. (Application)
CO4: Analyze the textual language in the context of the use of Rhetoric and prosody in it. (Analysis)

CO5: Summarize the use of various devices or tropes in the language of a text and organize the study of meter and rhythm in a given verse. (Synthesis)
CO6: Examine and evaluate the use of various literary devices to make the language memorable and effective and interesting by the meaningful variation of rhythm and metre. (Evaluation)

Suggested Readings

1. Bhattacharya, Arunodoy. Studies in English Rhetoric and Prosody. Books Way.
2. Lanham, Richard A. A Handlist of Rhetorical Terms, University of California Press.
3. Corbett, Edward P.J. and Connors, Robert J. Classical Rhetoric for the Modern Student. OUP.
4. Chakraborti, M.Principles of English Rhetoric and Prosody. Kolkatta: The World Press Pvt. Ltd.

LSTS0025: T.S. ELIOT

(3 Credits: 45 Hours)

Objective: *The objective of this course is to present the nuances of poetry through of the major works of the modernist poet T.S. Eliot. The learner is expected to explore the unique characteristics and the temperamental propensities of the individual poet as well as the age he belonged to.*

Module I: Introduction to T.S. Eliot. (10 hours)

Modern English Poetry. Life and Career of T.S. Eliot. Formative influences on the poet. Characteristics of the poet's mind and art. Themes, Techniques and features found in his poetry. T.S Eliot's Contribution to poetry, society and life.

Module II: Prescribed Texts of T.S. Eliot. (35 hours)

a) The Waste Land
b) The Murder in the Cathedral

COURSE/LEARNING OUTCOMES

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

CO1: Define Modern poetry as a literary genre and T.S. Eliot as a Modernist poet. (Knowledge)
CO2: Students will be able to understand the style and characteristic features of T.S Eliot poetry. (Comprehension)
CO3: Recognize the salient features of Modern poetry through the works of T.S.Eliot. (Application)
CO4: Analyze T.S. Eliot's works in terms of theme, technique, prosody, approach, focus, vision and influences. (Analysis)
CO5: Summarize the various literary and poetic aspects of his works against the individual and socio-political propensities. (Synthesis)
CO6: Examine and evaluate the influences, impact and effectiveness of the works of T.S. Eliot. (Evaluation)

Suggested Readings

1. Moody, David. A. The Cambridge Companion to T.S. Eliot. CUP.
2. Behr, Cardene. T.S. Eliot: A Chronology of His Life and Works. Macmillan.

LSTH0026: THOMAS HARDY

(3 Credits: 45 Hours)

Objective: *The aim of this course is to present a detailed study on the great Victorian novelist Thomas Hardy and his representative works. The learner is expected to explore the transitional element in the novelist from being a late Victorian to an early modernist and the themes of Realism and Universality by way of the critical study of his prescribed texts.*

Module I: Introduction to Thomas Hardy (10 hours)

English Victorian Novel. Life and Career of Thomas Hardy. Formative influences on the writer. Characteristic features of the individual novelist. Themes, setting and Techniques used in his novels. Writer's contribution to the art of Novel writing and society.

Module II: Prescribed Texts of Thomas Hardy (35 hours)

a) Tess of D' Urbervilles
b) Far From the Madding Crowd

COURSE/LEARNING OUTCOMES

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

CO1: Define English Victorian novel and Thomas Hardy as a Victorian novelist. (*Knowledge*)
CO2: Comprehend the characteristic features of Thomas Hardy's fiction. (*Comprehension*)
CO3: Recognize the Victorian elements and modernistic features in the works of Thomas Hardy. (*Application*)
CO4: Analyze critically Hardy's style through the theme, plot, characterization and settings found in the prescribed texts. (*Analysis*)
CO5: Summarize the thematic content, approach, literary aspects, and socio-political background of the period in Hardy's fiction. (*Synthesis*)
CO6: Examine and evaluate Hardy's works in terms of the philosophical content, Historical perspective, literary aspect and language and style. (*Evaluation*)

Suggested Readings

1. Allen, Walter E. The English Novel: A Short Critical History. London: Phoenix.
2. Bayley, J. An Essay on Thomas Hardy. Cambridge.
3. Drabble,M. The Genius of Thomas Hardy. London

LSRR0027: RESTORATION TO ROMANTIC PERIOD – POETRY AND DRAMA

(4 Credits: 60 Hours)

Objective: *The objective of this course is to acquaint the students with representative selected texts from the genres of poetry and drama from Restoration to the Romantic period in English literature. The students are also expected to read the selected texts within this literary period by understanding the circumstances that influenced and shaped literary production during that period.*

Module I: Selected Poetry (25 hours)

a) John Dryden's "Mac Flecknoe"
b) Lord Byron's "Love's Last Adieu"
c) William Wordsworth's "Lines Written a Few Miles above Tintern Abbey"
d) John Keats' "Ode to a Nightingale"
e) P. B. Shelley's "To a Skylark"

Module II: Selected Drama (35 hours)

a) George Etherege's The Man of Mode
b) William Congreve's The Double Dealer
c) John Dryden's All for Love

COURSE/LEARNING OUTCOMES

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

CO1: Define various genres of literature, viz. poetry and drama and they are able to write about the selected writers and their important literary works. (*Knowledge*)
CO2: Interpret the selected literary works and they are able to explain the plot, theme and character of the dramas and the theme and figures of speech in the poems. (*Comprehension*)
CO3: Use the correct form of grammar while using the English language and they are able to identify and solve technical problems related to poetic metre, rhythm and diction. (*Application*)
CO4: Offer critical interpretation or criticism of the literary texts, critically analyse the themes and compare and contrast the different characters of the selected dramas. (*Analysis*)
CO5: Summarize and critically appreciate the selected poems. (*Synthesis*)
CO6: Assess and evaluate the selected dramas and poems vis-à-vis their context and socio-political and cultural background. (*Evaluation*)

Suggested Readings

1. Dryden, John. MacFlecknoe and Other Poems.
2. Appelbaum, Stanley. English Romantic Poetry: An Anthology.
3. Selected Critical Texts (mentioned in the detailed course)
4. Fisk, Deborah Payne. The Cambridge Companion to English Restoration Theatre.
5. Perry, Henry Ten Eyck. The Comic Spirit in Restoration Drama: Studies in the Comedy of Etherege, Wycherley, Congreve, VanBrugh and Farquhar.

LSLC0028: LITERARY CRITICISM: PLATO TO F.R. LEAVIS

(4 Credits: 60 Hours)

Objective: *This paper acquaints the students with important ideas of Western literary criticism from the time of Plato to the Modern period and expects them to examine the implications of those key ideas (on poetry, drama etc.) that have marked the history of Literary Criticism. This course has been designed to present the students with the opportunity to study the key concepts associated with the names of significant literary thinkers and critics in the history of English Literature.*

Module I: Literary Criticism: Key Ideas and Concepts – Plato to Sidney (15 hours)

Plato: Views on Poetry, Theory of Mimesis; Aristotle: Observations on Poetry and Imitation, Concept of Tragedy (plot, catharsis, hamartia, peripetia, anagnorisis, hubris); Horace: Observations on drama; Longinus: Ideas On the Sublime, Sources of Sublimity in Literature; Philip Sidney: Ideas on Apology for Poetry

Module II: Literary Criticism: Key Ideas and Concepts – Johnson to F. R. Leavis (15 hours)

Samuel Johnson: Views on Shakespeare, Concept of the Three Unities; William Wordsworth: Views on Poetry, Poetic Diction; S.T. Coleridge: Difference between Fancy and Imagination, Views on Organic Form; John Keats: Negative Capability; Matthew Arnold: The Touchstone Method, High Seriousness, Grand Style; T.S. Eliot: Views on Poetry (Impersonality), Objective Correlative, Dissociation of Sensibility; I. A. Richards: The Referential and Emotive Uses of Language, Statement and Pseudo-Statement; Tenor and Vehicle, Stock Response; F.R. Leavis: Enactment, Literary Criticism and Philosophy

Module III: Selected Critical Texts (30 hours)

a) 'Poetics' by Aristotle
b) 'Biographia Literaria' (Chapter 13) by Samuel Taylor Coleridge
c) "Tradition and the Individual Talent" by T. S. Eliot

COURSE/LEARNING OUTCOMES

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

CO1: Define important ideas of Western literary criticism from the time of Plato to the Modern period. (*Knowledge*)
CO2: Examine the implications of those key ideas that have marked the history, growth and development of Literary Criticism. (*Comprehension*)
CO3: Study and apply the key concepts associated with the names of significant. (*Application*)
CO4: Analyse the key concepts and the contribution of the literary theorists and critics. (*Analysis*)
CO5: Summarize and critically appreciate the selected texts of literary criticism. (*Synthesis*)
CO6: Assess and evaluate the selected texts of literary criticism. (*Evaluation*)

Suggested Readings

1. Selected Critical Texts (mentioned in the detailed course)
2. Culler, Jonathan. Literary Theory: A Very Short Introduction.
3. Abrams, M.H. A Glossary of Literary Terms.
4. Cuddon, J.A. The Penguin Dictionary of Literary Terms and Literary Theory.
5. Habib, M.A.R. A History of Literary Criticism: From Plato to the Present.

LSSH0029: SHAKESPEAREAN DRAMA II - TRAGEDY AND TRAGI-COMEDY
(4 Credits: 60 Hours)

Objective: *This course introduces students to the literary form of drama, especially Shakespearean tragedy and tragi-comedy. This course aims at developing the critical reading and analytical skill of the learners by teaching them two very distinct forms of Shakespeare's drama. The course will require in-depth study and analysis of the selected texts for a better understanding of the genius of William Shakespeare.*

Module I: Tragedy (30 hours)

a) William Shakespeare's Hamlet
b) William Shakespeare's King Lear

Module II: Tragi-Comedy (30 hours)

a) William Shakespeare's The Merchant of Venice
b) William Shakespeare's The Winter's Tale

COURSE/LEARNING OUTCOMES

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

CO1: Define the literary form of drama, especially tragedy and tragi-comedy. (*Knowledge*)
CO2: Interpret the selected literary works, i.e. the Shakespearean tragedy and tragi-comedy and they are able to explain the plot, theme and character of the dramas. (*Comprehension*)
CO3: Apply critical reading skills to the two very distinct forms of Shakespeare's drama. (*Application*)
CO4: Perform in-depth study and analysis of the selected texts for a better understanding of the genius of William Shakespeare. (*Analysis*)
CO5: Summarize and critically appreciate the selected dramas. (*Synthesis*)
CO6: Assess and evaluate the plot, theme and character of the selected dramas. (*Evaluation*)

Suggested Readings

1. Selected Texts (mentioned in the detailed course)
2. Bradley, A.C. Shakespearean Tragedy: Lectures on Hamlet, Othello, King Lear and Macbeth
3. Wells, Stanley and others. The Oxford Shakespeare: The Complete Works
4. Grazia, Margreta De. The New Cambridge Companion to Shakespeare
5. Hunter, G.K. English Drama 1586 – 1642: The Age of Shakespeare

LSAL0030: APPROACHES TO LANGUAGE AND LITERARY RESEARCH
(3 Credits - 45 Hours)

Objective: *This course introduces students to some basic concepts of research and its methodologies. The course aims at enabling students to identify research topics and select and define appropriate research problem and parameters. The course will provide the students knowledge of research with special focus on research in the field of language and literature so that they can organize and conduct research in an appropriate manner and write better research reports and papers.*

Module I: Introduction (10 hours)

Meaning of Research; Objectives of Research; Motivation in Research; Different types of Research Methods; Research Methods Vs Research Methodology; Difference between Methods and Techniques; Ethics in Research; Review of Literature

Module II: Hypothesis and Data Collection (10 hours)

Formulation of Hypothesis; Types of Hypothesis; Methods of Testing Hypothesis; Determining Sample design; Methods of Sampling; Methods of Collection of Data (Primary Data and Secondary Data); Processing and Analysis of Data; Types of Analysis

Module III: Critical Approaches to Literature (15 hours)

Formalist, Biographical, Historical, Gender, Psychological, Sociological, Mythological, Reader-response and Deconstructionist Criticism

Module IV: Analysis and Report-Writing (10 hours)

Testing of Hypothesis; Interpretation; Different techniques of Interpretation; Citation and Bibliography; Writing and Presentation of Report

COURSE/LEARNING OUTCOMES

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

CO1: Understand basic concepts of research and its methodologies. (*Knowledge*)
CO2: Identify research topics and select and define appropriate research problem and parameters. (*Comprehension*)
CO3: Organize and conduct research in an appropriate manner. (*Application*)
CO4: Research in the field of language and literature by analyzing literary works from various genres by applying various theories and approaches. (*Analysis*)
CO5: Summarize and critically appreciate the various approaches to language and literary research. (*Synthesis*)
CO6: Assess and evaluate the various works of literature to write research reports and papers. (*Evaluation*)

Suggested Readings

1. Altick, Richard D. & Fenstermaker, John J. The Art of Literary Research
2. Correa, Delia Da Souza & Owens, W.R. The Handbook to Literary Research
3. Eagleton, Terry. Literary Theory.
4. Kothari, C. R. & Gaurav Garg. Research Methodology: Methods and Techniques
5. MLA Handbook for Writers of Research Papers

LSTR0031: CLASSICS IN TRANSLATION

(3 Credits: 45 Hours)

Objective: *The objective of this course is to introduce students to the history, theories, methodologies and knowledge to address fundamental questions in Translation Studies. This course is designed to present to students the opportunity to study in a more intensive and sustained fashion the work of some of the major poets of classical literatures of Roman, Greek and Sanskrit. The authors studied have been chosen both for their high intrinsic quality and for their fundamental importance in shaping ancient literary standards and cultural ideals.*

Module I: Introduction to Translation Studies (20 hours)

Introducing Translation; History of Translation Theories; Significance of Translation in a Multi-Linguistic and Multi-Cultural Society/World; Different Types/Modes of Translation (Semantic, Literal, Literary, Functional, Communicative, Technical); Understanding the dynamics and challenges in Translation.

Module II: Selected Texts (25 hours)

a) Horace's ArsPoetica
b) Homer's Odyssey
c) Kalidasa's Abhijnanam Shakuntalam

COURSE/LEARNING OUTCOMES

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

CO1: Define the history, theories, methodologies in Translation Studies. (*Knowledge*)
CO2: Address fundamental questions related to translation of the major poets of classical literatures of Roman, Greek and Sanskrit. (*Comprehension*)
CO3: Perform translation by applying various theories and methods of translation. (*Application*)
CO4: Offer critical interpretation or criticism of the translated literary texts, critically analyse the themes and the style of literary expression in the selected texts. (*Analysis*)
CO5: Summarize and critically appreciate the selected classics in translation. (*Synthesis*)
CO6: Evaluate the high intrinsic quality of the classics and their fundamental importance in shaping ancient literary standards and cultural ideals. (*Evaluation*)

Suggested Readings

1. Selected Texts (mentioned in the detailed course)
2. Bassnett, Susan. Translation Studies.
3. Nida, E. The Theory and Practice of Translation.
4. Munday, Jeremy. Introducing Translation Studies.
5. Jones, Peter V. Classics in Translation: from Homar to Juvenal.

LSIW0032: INDIAN WOMEN WRITERS

(3 Credits: 45 Hours)

Objective: *This course introduces literature by women in India in English to the students. The course covers poetry, drama, short stories and novels produced in different historical periods. The objective of the course is to acquaint students with the contribution of women writers to the Indian English literary tradition and enable students to investigate the nature of this contribution. The course not only helps the students to understand the essence of women's literature but also exposes them to the gamut of women's lives and concerns as represented in literature.*

Module I: Selected Poets (15 hours)

a) Toru Dutt's "Sita"
b) Sarojini Naidu's "The Gift of India"
c) Kamala Das' "The Old Playhouse"

Module II: Selected Playwrights and Short Story Writers (15 hours)

a) Manjula Padmanabhan's Harvest
b) Mahasweta Devi's 'Draupadi'

Module III: Selected Novelists (15 hours)

a) Nayantara Sahgal's Rich Like Us
b) Arundhati Roy's The Inheritance of Loss

COURSE/LEARNING OUTCOMES

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

CO1: Define the literature by women in India in English. (*Knowledge*)
CO2: Critically read and comment on poetry, drama, short stories and novels produced by women of India in different historical periods. (*Comprehension*)
CO3: Apply feminist theories and feminist reading techniques to critically interpret and assess the selected texts. (*Application*)
CO4: Analyse the contribution of women writers to the Indian English literary tradition. (*Analysis*)
CO5: Summarize and critically appreciate the selected literary works and find out the commonalities in terms of themes and issues. (*Synthesis*)
CO6: Judge the essence of women's literature and appreciate the gamut of women's lives and concerns as represented in literature. (*Evaluation*)

Suggested Readings

1. Selected Texts (mentioned in the detailed course)
2. Butler, Judith. Undoing Gender.
3. Goodman, L. Literature and Gender.
4. Mohanty, S.K. Indian Women Writers in English
5. Zaidi, Annie (ed.). Unbound: 2,000 years of Indian Women's Writing.

LSAD0033: ENGLISH ESSAYS - ADDISON TO DICKENS

(4 credits – 60 hours)

Objective: *This paper acquaints the students with the development of English Essays as a literary genre by providing a clear picture of the socio-cultural context of the mentioned period, i.e., from Addison to Dickens in English literature. They are also familiarised with the representative literary essays of this period.*

Module I: Introducing Essays (15 hours)

Definition; Major English Essayists; Development of Essay as a genre; Different types or styles of writing essays; the Socio-Political Context of English Essays.

Module II: Selected English Essays (45 hours)

a. "Women and Liberty" by Joseph Addison
b. "Fashionable Affectations" by Richard Steele
c. "Man in Black" by Oliver Goldsmith
d. "On the Feeling of Immortality of Youth" by William Hazlitt
e. "An Italian Dream" by Charles Dickens

COURSE/LEARNING OUTCOMES

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

CO1: Define Essays as a literary genre (Knowledge)
CO2: Differentiate between narrative and descriptive essays (Comprehension)
CO3: Use expository and persuasive essays in practical real-life situations (Application)
CO4: Analyse a representative English Essay in literature (Analysis)
CO5: Summarise the socio-political context of the time (Synthesis)
CO6: Evaluate the important English Essayists from Addison to Dickens (Evaluation)

Suggested Readings

1. Winchester, C.T. A Group of English Essayists of the Early Nineteenth Century.
2. Dawson, William J. The Great English Essayists: With Introductory Essays and Notes.
3. Davis, William H. EnglishEsssayists: A Reader's Handbook.
4. Walker, Hugh. The English Essay and Essayists.

LSPR0034: POETRY: RESTORATION TO ROMANTIC PERIOD

(3 credits – 45 hours)

Objective:*This Course is an attempt to familiarise the learners with the socio-cultural context of England between the Restoration Period and the Romantic Period in English Literature. The students are also aquainted with the major poetic sub-genres and poetic styles dominant during this period along with few representative poetry pieces between Restoration and Romantic Period.*

Module I: Socio-Cultural Context and Poetic Styles (15 hours)

Socio-Cultural Context of Restoration to Romantic Period ; Major Sub-genres of Poerty in the Restoration and Romantic Period (Mock-heroic Poerty, Satire, English Transitional Poetry, Romantic Poetry); Dominant poetic styles during this period (herioc couplet, ode, elegy, and sonnet)

Module II: Selected Poetry (30 hours)

a. "The Rape of the Lock" (Canto 1 & 2) by Alexander Pope
b. "The Chimney Sweeper" (Songs of Innocence and Songs of Experience) by Wiliam Blake
c. "Lines Wriiten a Few Miles Above Tintern Abbey" by William Wordsworth
d. "Ozymandias" by P. B. Shelley
e. "Ode on a Grecian Urn" by John Keats

COURSE/LEARNING OUTCOMES

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

CO1: Define the different poetic styles, such as, ode,elegy and sonnet (Knowledge)
CO2: Illustrate the different types of poetry written during this period (Comprehension)
CO3: Find out the differences between Satire and Mock-heroic poetry (Application)
CO4: Analyze a poetic piece critically. (Analysis)
CO5: Summarize a representative poetic text. (Synthesis)
CO6: Determine the different poetic styles used during the mentioned period. (Evaluation)

Suggested Readings

1. Carter, K. Duane. New Beginnings: Poetry of Restoration.
2. Nayar, Pramod K. English Poetry From the Elizabethans to the Restoration.
3. Appelbaum, Stanley. English Romantic Poetry: An Anthology
4. Wordsworth, Jonathan. The Penguin Book of Romantic Poetry.
5. Green, David. The Winged Word.

LSCO0035: COMMUNICATION SKILLS

(3 credits – 45 hours)

Objective: *The objective of this Course is to equip the learners across different disciplines with the basic skills of effective communication in English language in all real life contexts, with a reasonable fluency and clarity. This course has been designed in such a manner that it is intensely practice oriented and attempts to enable the learners to communicate in English language confidently.*

Module I: Basic Communication - Part I (20 hours)

Aspects of Effective Communication Skills; Barriers of Effective Communication Skills; Listening, Speaking, Reading and Writing techniques; Telephonic Etiquettes

Module II: Basic Communication - Part II (25 hours)

Non-Verbal Communication; Public Speaking Skills; Compering Skills; Self-Confidence; Personality Development; Group Discussions; Personal Interview; Secrets of Good Communication

COURSE/LEARNING OUTCOMES

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

CO1: State the important objectives of effective communication. (Knowledge)
CO2: Illustrate the different aspects of non-verbal communication. (Comprehension)
CO3: Differentiate between active and passive listening. (Comprehension)
CO4: Apply the tips of effective communication skills in group discussions and personal interviews. (Application)
CO5: Analyse a creative composition. (Analysis)
CO6: Summarise the effective LSRW techniques used in communication. (Synthesis)
CO7: Determine the secrets of good communication. (Evaluation)

Suggested Readings

1. Simon, Peter. Communication Skills.
2. Kumar, Sanjay &PushpaLata. Communication Skills.
3. Taylor, Grand. English Conversation Practice.
4. Sen, Leena. Communication Skills.

LSLW0036: LIFE WRITING: BIOGRAPHIES, MEMOIRS AND LETTERS

(4 credits – 60 hours)

Objective: *The objective of this course is to introduce students to the various forms of life-writing: biographies, memoirs and letters, through a selection of some of the important representative texts in English Literature. The students are expected to acquaint themselves with the emergence of this literary form as a genre as well as the different types and styles of life-writing in literature.*

Module I: Introducing Life-Writing (15 hours)

Life-Writing, emergence of biography as a literary genre, difference between biography, autobiography and memoir, different types of biography; memoirs and letters; fictional autobiographies in English literature.

Module II: Selected Texts (45 hours)

a. Life of Samuel Johnson by James Boswell
b. "Florence Nightingale" from Eminent Victorians by Lytton Strachey
c. Prelude by William Wordsworth
d. Letters to Mr.& Mrs. Samuel Bowles by Emily Dickinson

COURSE/LEARNING OUTCOMES

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

CO1: Define life writing. (Knowledge)
CO2: Illustrate the different types of life writing (Comprehension)
CO3: Find out the differences between memoirs and letters.(Application)
CO4: Analyse the life of an author/writer critically. (Analysis)
CO5: Summarise a representative biographical text. (Synthesis)
CO6: Determine the different styles of writing a biography.(Evaluation)

Suggested Readings

1. Texts of selected Biographies, Memoirs and Letters (mentioned in the course-structure)
2. Batchelor, John. The Art of Literary Biography.
3. Lee, Hermione. Biography: A Very Short Introduction.
4. Strachey, Lytton. Eminent Victorians.

LSLC0037: LITERARY CRITICISM: ARISTOTLE TO I. A. RICHARDS

(3 credits – 45 hours)

Objective: *This paper acquaints the students with important ideas of Western literary criticism from the time of Aristotle to the Modern period and expects them to examine the implications of those key ideas (on poetry, drama, etc.) that have marked the history of Literary Criticism. This course has been designed to present the students with the opportunity to study the key concepts associated with the names of significant literary thinkers and critics in the history of English Literature.*

Module I: Literary Criticism: Key Ideas and Concepts I (10 hours)

Plato: Views on Poetry, Theory of Mimesis; Longinus: Ideas On the Sublime, Sources of Sublimity in Literature; Philip Sidney: Ideas on Apology for Poetry; William Wordsworth: Views on Poetry, Poetic Diction; John Keats: Negative Capability

Module II: Literary Criticism : Key Ideas and Concepts II (10 hours)

Matthew Arnold: The Touchstone Method, Grand Style, High Seriousness; I. A. Richards: The Referential and Emotive Uses of Language, Statement and Pseudo-Statement, Tenor and Vehicle, Stock Response; F.R. Leavis: Enactment, Literary Criticism and Philosophy

Module II: Selected Critical Texts (25 hours)

a. Poetics by Aristotle
b. BiographiaLiteraria (Chapter 13) by Samuel Taylor Coleridge
c. Tradition and the Individual Talent by T. S. Eliot

COURSE/LEARNING OUTCOMES

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

CO1: Define key critical terms and concepts (Knowledge)
CO2: Differentiate between fancy and imagination(Comprehension)
CO3: Find out the different sources of sublimity in literature (Application)
CO4: Analyse a representative critical text in literature(Analysis)
CO5: Summarise the key concepts of a critical text(Synthesis)
CO6: Determine the referential and emotive uses of language (Evaluation)

Suggested Readings

1. Selected Critical Texts (mentioned in the course structure)
2. Culler, Jonathan. Literary Theory: A Very Short Introduction.
3. Abrams, M. H. A Glossary of Literary Terms.
4. Cuddon, J.A. The Penguin Dictionary of Literary Terms and Literary Theory.
5. Wimsatt, W. K. &Cleanth Brooks. Literary Criticism: A Short History.
6. Habib, M. A. R. A History of Literary Criticism: From Plato to the Present.

LSSK0038: SOFT SKILLS

(3 credits – 45 hours)

Objective: *The objective of this Open Elective Course is to train the students of different departments by imparting the various aspects of soft-skills like communication skills, leadership skills, social skills, to name a few, through lecture and training method. The Course aims to make the students realise the importance of soft skills as an integral part of personal and professional success.*

Module I: Soft Skills - Part I (20 hours)

People and Social skills, Communication skills, Telephonic conversation skills,Negotiation skills, Team building, Leadership skills, Social and Emotional Intelligence

Module II: Soft Skills - Part II (25 hours)

Character Traits and Attitudes, Personality Types, Career Attributes, Presentation and Interaction, Time Management, Motivation and Persuasion, Grooming and Etiquette

COURSE/LEARNING OUTCOMES

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

CO1: Define soft-skills (Knowledge)
CO2: Explain the importance of soft-skills in personal and professional life (Comprehension)
CO3: Differentiate between social and emotional intelligence (Comprehension)
CO4: Apply soft-skills at a work-place (Application)
CO5: Identify the different aspects of soft-skills (Analysis)
CO6: Summarise the different character traits and attitudes of an individual (Synthesis)
CO7: Determine the do's and dont's of grooming and etiquette (Evaluation)

Suggested Readings

1. Mitra, Barun. Personality Development and Soft Skills.
2. Sharma, Prashant. Soft Skills: Personality Development for Life Success.
3. Butterfield, Jeff. Soft Skills for Everyone.
4. K., Alex. Soft Skills.
5. Chauhan, Gajendra S. Soft Skills: An Integrated Approach to Maximise Personality.

LSSM6005: SEMINAR AND PRESENTATION I

(1 Credit)

Objective: *As a preliminary stage, the course will engage students in the integrated activities of reading, research, discussion and composition around a particular topic/ theme or subject. At its core, this course is designed to provide students with opportunities for both sustained, rigorous investigation of a topic and close faculty-student interaction. Students will gain a deeper appreciation of the role of writing in scholarly investigation, as they refine, adapt and expand their abilities to absorb, synthesize and construct arguments in close-knit community.*

COURSE/LEARNING OUTCOMES

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

CO1: Recognize the relevant information and define it appropriately. (*Knowledge*)
CO2: Explain the topic by way of discussion. (*Comprehension*)
CO3: Demonstrate the content using suitable illustrations and highlight its relevance to the topic. (*Application*)
CO4: Analyze the topic and respond in a meaningful and critical manner. (*Analysis*)
CO5: Summarize and present well-structured information on the relevant topic with an appropriate language and vocabulary. (*Synthesis*)
CO6: Examine and evaluate the information and use and apply relevant theories. (*Evaluation*)

LSSP6006: SEMINAR AND PRESENTATION II
(1 Credit)

Objective: *The course will engage students in the integrated activities of reading, research, discussion and composition around a particular topic/ theme or subject. At its core, this course is designed to provide students with opportunities for both sustained, rigorous investigation of a topic and close faculty-student interaction. Students will gain a deeper appreciation of the role of writing in scholarly investigation, as they refine, adapt and expand their abilities to absorb, synthesize and construct arguments in close-knit community.*

COURSE/LEARNING OUTCOMES

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

CO1: Explain academic writing, seminar presentation and publication. (*Knowledge*)
CO2: Identify research topics for sustained and rigorous investigation so that original write-ups can be developed. (*Comprehension*)
CO3: Engage in critical reading, research, discussion and composition around a particular topic/ theme or subject. (*Application*)
CO4: Write in scholarly journals by doing analysis of textual evidence. (*Analysis*)
CO5: Investigate and expand their abilities to absorb, synthesize and construct arguments in close-knit community. (*Synthesis*)
CO6: Assess and evaluate the various works of literature to write research reports and papers. (*Evaluation*)

JULY 2018

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AUGUST 2018

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SEPTEMBER 2018

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OCTOBER 2018

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NOVEMBER 2018

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DECEMBER 2018

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JANUARY 2019

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FEBRUARY 2019

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MARCH 2019

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APRIL 2019

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MAY 2019

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JUNE 2019

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JULY 2019

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Our Vision

"To mould intecllectually competent, morally upright, socially committed and spiritually inspired persons at the service of India and the world of today and tomorrow, by imparting holistic and personalized education."

ASSAM DON BOSCO UNIVERSITY

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