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# **The American College**

Re-accredited (2<sup>nd</sup> cycle) by NAAC with Grade “A”, CGPA – 3.46 on a 4 point scale  
(An Autonomous Institution Affiliated to Madurai Kamaraj University)

**Madurai – 625 002**

## **MEETING OF THE ACADEMIC COUNCIL**

**Wednesday 06 June 2018  
4:00 P.M.**

**Venue  
Main Hall**

**APPENDIX – AM  
VOLUME – I & II**

## **AGENDA**

1. Prayer
2. Welcome Address – Dr. M. Davamani Christober, Principal & Secretary
3. Confirmation of the minutes of the meeting of the Academic Council held on Saturday 08 April 2017
4. Special Resolutions
5. Departmental Resolutions: Postgraduate Programmes  
Resolutions 1 to 12
6. Departmental Resolutions: Undergraduate Programmes  
Resolutions 13 to 27
7. Community College Resolutions:  
Resolutions 28 to 33
8. Other Matters, if any
9. Vote of Thanks

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**THE AMERICAN COLLEGE, MADURAI**  
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***MINUTES OF THE ACADEMIC COUNCIL MEETING HELD ON  
SATURDAY 8 APRIL 2017 IN MAIN HALL***

Dr. M. Davamani Christober, Principal & Secretary, was in the chair.

The meeting began with prayer by Chaplain Rev. Dr. S. Joseph Wellington.

The Principal welcomed all the members of the Academic Council on behalf of the college and extended a special word of welcome to the external members who represented the various constituents. They were Dr. K. Kudalingam, Joint Director of Collegiate Education, Madurai Region, Madurai, Mr. I. K. Lenin Tamilkovan, Director-in-charge, Anna Science Centre Planetarium, Trichy, and Prof. Ram Rajasekaran, Director, CFTRI, Mysuru.

He welcomed Vice-Principal, Bursar, Deans, Additional Deans, Controller and Deputy Controller, Heads, Coordinators, and Directors of Academic Departments, Members of the faculty. He specially welcomed the student representatives who helped as student-members in the Boards of Studies to shape the curricula.

He introduced the external members to the House and their contribution to the growth and development of the college. He acknowledged the role played by Prof Ram Rajasekaran in establishing the department of Food Science and by Mr L.K. Lenin Tamilkovan in our attempt to establish a planetarium. He also informed the House that he received apologies from the university nominee Dr. M. Hussain Manavar and the external member Dr Arunai Wilson from Loma Linda University, US for their inability to attend the meeting.

He then drew the attention of the House to the fact that each proposal was vetted at four levels, namely the department, department meetings, Board of Studies, the Senatus, and the Faculty meeting. He therefore requested the faculty members of the House to first offer space for the External members to make observations and suggestions. However, he encouraged all the members of the House to scrutinize the proposals from other departments and offer their valuable suggestions. Since all resolutions and descriptive and descriptive syllabi are shown on the screen, members were requested to refer to course code and title while making suggestions or raising queries.

He read out the items on the agenda before he took up the first item on the agenda, namely confirmation of the minutes.

The Minutes of the previous Academic Council Meeting held on 08.06.2016 was placed before the Academic Council for confirmation. Mr. N. Elango clarified that he never uttered intemperate language in the last meeting and requested the Chairperson to remove the chairperson's warning expression 'mind their language' from the minutes. Dr Prabhakar Manickam also offered a self-explanation. The chairperson ruled that the expression be removed.

**It was passed unanimously.**

### **Departmental Resolutions: Undergraduate Programmes (Aided)**

R.1: RESOLVED to accept the changes in the programme of studies for BA Tamil as presented on page TAM 1 and the syllabi for V and VI Semesters as presented on pages from TAM 2 to TAM 13 with effect from the academic year 2015-2016. Resolutions was moved by Dr. J. Sarujini and seconded by Mrs. Sengol Mary.

*Dr S. Rajkumar Immanuel and Dr R. Anandoraj sought explanation on the expression 'Marx on the environment.' Dr R. Prabhakar Vedzamanickam explained that the item on the unit is related to Marxist view of the environment and not on Marx's view on the environment.*

**Resolution was passed unanimously.**

R.2: RESOLVED to accept the changes the following Self-financed courses code TAS instead of TAM for the V and VI semester with effect from the academic year 2015-2016.

TAM 3621 – ஸ்பீயம் அணியும் - நம்பியவர் மொழிகளும் புறங்கொருள் வெண்பா மாணவரும்

TAM 3209 – சோடபுத் தேர்வில் தமிழ் - சோடபுத் தேர்வு தமிழ்

TAM 3622 - இலக்கியக் கோட்பாடுகள் - ஸ்பீயம் அணியும்

TAM 3626 – தமிழ்த் சமுதாய வரலாறு - இலக்கியக் கோட்பாடுகள்

TAM 3210 - இலக்கிய சமூகமும் படைப்புக் கணவரும் - தமிழ்த் சமுதாய வரலாறு

Resolutions was moved by Dr. J. Sarujini and seconded by Dr. U.

Balasubramanian

**Resolution was passed unanimously.**

R.3: RESOLVED to accept the changes in the following courses codes with effect from the academic year 2017-2018.

TAM 2525 - கவிதை இன்ற தெளி has to be changed into TAM 2533

TAM 2521 - கவிதை அடங்கு has to be changed into TAM 2541

TAM 2522 - தமிழ் இயற்கை has to be changed into TAM 2542

Resolution was moved by Dr. J. Sarojini and seconded by Dr. L.

Balasubramanian

**Resolution was passed unanimously.**

- R.4: RESOLVED to accept the changes in the programme of studies for Part-I Hindi as presented on page HIN 1 and the syllabi for Part-I as presented on pages from HIN 2 to HIN 5 with effect from the academic year 2017-2018.

Resolution was moved by Dr. Mrs. Safframma and seconded by Ms. Kannammal Devi.

**Resolution was passed unanimously.**

- R.5: RESOLVED to accept the changes in the programme of studies for Part-I French as presented on page FRE 1 and the syllabi for Part-I as presented on pages from FRE 2 and FRE 3 with effect from the academic year 2017-2018.

Resolution was moved by Mr. A Chinnadurai Pandian and seconded by Mr. G. Victor Packyuraj.

**Resolution was passed unanimously.**

- R.6: RESOLVED to accept the changes in the programme of studies for BA English as presented on pages from ENG 1 to ENG 4 and the syllabi for V and VI Semesters as presented on pages from ENG 5 to ENG 17 with effect from the academic year 2015-2016.

Resolution was moved by Dr. J. John Sekar and seconded by Dr. J. Rajakumar.

*Dr. M. Rajendra Pandian suggested that the phrase "Excerpts from Shakespeare's Macbeth to explain the concept 'objective correlative' be added in the self study section to ENG 3673 Criticism and Approaches.*

**Resolution was passed unanimously.**

- R.7: RESOLVED to accept the proposal that the course code ENG 2467 (Fiction II) be changed into ENG 2477 (Fiction II) with retrospective effect from 2015-16 since the same number has already been assigned to an existing course.

Resolution was moved by Dr. J. John Sekar and seconded by Dr. J. Rajakumar..

**Resolution was passed unanimously.**

- R.8: RESOLVED to accept the changes in the programme of studies for B.Sc Mathematics as presented on pages from MAT 1 to MAT 2 and the syllabi for V and VI semesters presented on pages from MAT 3 to MAT 15 with effect from the academic year 2015-2016.

Resolution was moved by Mr. P. Jeyakodi Balan and seconded by Mr. M. Jeyakumar.

**Resolution was passed unanimously.**

- R.9: As recommended by the Board of Studies in Mathematics, RESOLVED to effect the changes in the general grid of study for B.Sc Mathematics as in the following table.

Subject Name	Course Code	
	Old	New
Operations Research-II	MAT 3512 5hrs & 5 credits	MAT 3616 6 hrs & 6 credits
Fuzzy Mathematics	MAT 3616 6 hrs & 6 credits	MAT 3512 5hrs & 5 credits

Resolution was moved by Mr. P. Jeyakodi Balan and seconded by Mr. J. Jesupaul Thngaraj.

**Resolution was passed unanimously.**

- R.10: RESOLVED to accept the changes in the programme of studies for B.Sc Physics as presented on page PHY 1 and the syllabi for V and VI semesters as presented on pages from PHY 2 to PHY 13 with effect from the academic year 2015-2016. Resolution was moved by Dr. K. Gnanasekar and seconded by Mr. David Jebaraj.

**Resolution was passed unanimously.**

- R.11: RESOLVED to accept the changes in the programme of studies for B.Sc Chemistry as presented on pages from CHE 1 & CHE 2 and the syllabi for V and VI semesters as presented on pages from CHE 3 to CHE 15 with effect from the academic year 2015-2016.

Resolution was moved by Dr. K. John Adaikalasamy and seconded by Mr. C.A. Pradeep.

**Resolution was passed unanimously.**

- R.12: RESOLVED to accept the new course codes with retrospective effect from the academic year 2015-2016 the present numbers have already been allotted to existing courses.

Current course number	New course number	Title of the course
CHE 1511	CHE 1521	Physical Chemistry I
CHE 1512	CHE 1522	Organic Chemistry I
CHE 2511	CHE 2521	Organic Chemistry II
CHE 2512	CHE 2522	Organic Chemistry III
CHE 2514	CHE 2524	Inorganic Chemistry IV
CHE 2411	CHE 2441	Chemistry for Physicist I

CHE 2412	CHE 2442	Chemistry for Physicist II
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Resolution was moved by Dr. K. Jahn Adaikalasamy and seconded by Dr. C.D. Sheila

**Resolution was passed unanimously.**

- R.13: RESOLVED to accept the changes in the programme of studies for B.Sc Botany as presented on pages from BOT 1 to BOT 2 and the syllabi for the programme for V and VI semesters as presented on pages from BOT 3 to BOT 19 with effect from the academic year 2015-2016.

Resolution was moved by Dr. A.D. Barnabas and seconded by Mr. D. Winfred Thomas.

**Resolution was passed unanimously.**

- R.13A: RESOLVED to change courses numbers and course titles of the following with retrospective effect from 2015-16.

Current course number	New course number	Title of the course
BOT 2532	BOT 2552	Mycology and Pathology
BOT 2534	BOT 2444	Cell Biology
BOT 2336	BOT 2436	Anatomy and Reproductive Biology of Angiosperms (ARBA)
BOT 3241	BOT 3200	Environmental Studies
BOT2439	General Botany I	Botany for Chemists-I
BOT2440	General Botany II	Botany for Chemists-II

Resolution was moved by Dr. A.D. Barnabas and seconded by Dr. S. Rajkumar Immanuel.

**Resolution was passed unanimously.**

- R.14: RESOLVED to accept the changes in the programme of studies for B.A Economics (Tamil and English medium) as presented on page ECO 1 and the syllabi for V and VI semesters as presented on pages from ECO 2 to ECO 22 with effect from the academic year 2015-2016.

Resolution was moved by Dr. A. Gunamalai and seconded by Dr. Joseph Wellington

**Resolution was passed unanimously.**

- R.15: RESOLVED to accept the change in the course number from COM 2532 to COM 2542 for the course titled Corporate Accounting as it comes to effect for the students who have joined from the academic year 2015-2016.



Resolution was moved by Dr. A. Martin David and seconded by Mr. J. Justin Mancher

**Resolution was passed unanimously.**

- R.16: RESOLVED to accept the changes in the programme of studies for Religion, Philosophy, and Sociology for the course VAL 3232, Social Issues and Value Stand as presented on page RPS 1 with retrospective effect from the academic year 2014-2015.

Resolution was moved by Dr. (Mrs.) M.G. Rethan and seconded by Dr. C. Preerkumar Immanuel.

**Resolution was passed unanimously.**

- R.16A: RESOLVED to change courses numbers and course titles of the following with retrospective effect from 2015-16.

1. RPS 2436 Philosophy of Religion changed to RPS 2435 Philosophy of Religion
2. RPS 2510 Social and Political Philosophy changed to RPS 2430 Social and Political Philosophy
3. RPS 2533 Classical Indian Philosophy II modified as RPS 2533 Classical Indian Philosophy
4. RPS 3635 Sociological Theory I modified as RPS 3635 Sociological Theories I
5. RPS 3636 Sociological Theory II modified as RPS 3636 Sociological Theories II.

Resolution was moved by Dr. (Mrs.) M.G. Rethan and seconded by Dr. C. Preerkumar Immanuel.

**Resolution was passed unanimously.**

#### **Departmental Resolutions: Postgraduate Programmes (Aided)**

- R.17: RESOLVED to accept the change in the course code for Literary Criticism and Theories II from PGE 5422 to PGE 5434 with retrospective effect from the academic year 2015-2016.

Resolution was moved by Prof. N. Elango and seconded by Mr. C. Joel Gnanadoss Timothy.

*Mr. S. Stephen pointed out that course code changes need not be brought to the Academic Council since it was approved by the BOS. Dean, Policies and Administration explained that the course codes used to be decided by the erstwhile office of the Dean of Academic Affairs and approved by the BOS. Since it is now*



*decided by the office of COE and approved by the Senatus, it needs approval by the Academic Council*

**Resolution was passed unanimously.**

- R.18: RESOLVED to accept the following project papers as presented on page MPZ 1 and the syllabi for courses as presented on pages MPZ 2 to MPZ 7 retrospectively from the academic year 2015-2016.

Resolution was moved by Dr. K. Navaneethakannan and seconded by Dr. A. Joseph Thatheyus

**Resolution was passed unanimously.**

### **Departmental Resolutions: Undergraduate Programmes (SF)**

- R.19: RESOLVED to accept the changes in the codes of the following courses with new course numbers with effect from the academic year 2017-2018.

ஏற்கனவே உள்ள

மேல் எண்கள் (பழைய எண்கள்)

புது எண்கள்

TAM 1201	வெகுத்தமிழ் - I	TAS1201
TAM 1202	வெகுத்தமிழ் - II	TAS1202
TAM 2201	வெகுத்தமிழ் - III	TAS 2201
TAM 2202	வெகுத்தமிழ் - IV	TAS 2202
TAM 1213	அடிப்படைத் தமிழ் - I	TAS 1213
TAM 1214	அடிப்படைத் தமிழ் - II	TAS 1214
TAM 1225	அடித் தமிழ் - I	TAS 1225
TAM 1226	அடித் தமிழ் - II	TAS 1226

Resolution was moved by Dr. J. Evanjalini Manoharan and seconded by Mr. Stanley.

**Resolution was passed unanimously.**

*Mr. S. Stephen objected to the audio-recording of the speeches made by the members in the House and pleaded that the House should have been told at the start of the meeting. The Chairperson replied that this practice had been followed for the last three years and that the proceedings were even video-recorded once. Audio-recording facilitates to make the minutes accurate.*

- R.20: RESOLVED to accept the changes in the programme of studies for B.A. Hindi as presented on pages from HIS 1 to HIS 4 and the syllabi for I and II Semesters as presented on pages from HIS 5 to HIS 12 with effect from the academic year 2017-2018.

Resolution was moved by Dr. (Mrs.) A. Safframma and seconded by Ms. Kannammal Devi.

**Resolution was passed unanimously.**

- R.21: RESOLVED to accept the changes in the programme of studies for Part-I French as presented on page FRS 1 and the syllabi for Part I as presented on pages from FRS 2 and FRS 3 with effect from the academic year 2017-2018.

Resolution was moved by Mr. A. Chinnadurai Pandian and seconded by Ms. B. Vijaya.

**Resolution was passed unanimously.**

- R.21A: RESOLVED to accept the proposal that the Course code FRS 2408 Cinéma français (French Cinema) be changed into FRS 2410 with retrospective effect from the academic year 2015-2016.

Resolution was moved by Mr. A. Chinnadurai Pandian and seconded by Ms. A. Josephine Dheena.

**Resolution was passed unanimously.**

- R.22: RESOLVED to accept the changes in the programme of studies for BA English as presented on pages from ENS 1 to ENS 4 and the syllabi for V and VI Semesters as presented on pages from ENS 5 to ENS 16 with effect from the academic year 2015-2016.

Resolution was moved by Dr. J. Paul Jayakar and seconded by Mr. J. John Rajkumar

**Resolution was passed unanimously.**

- R.23: RESOLVED to accept the proposal that the course code ENS 2468 (Advanced Grammar) be changed into ENS 2478 with retrospective effective from 2015-2016 since the same number has been assigned to the existing course New Literatures in English (ENS 2468) for the 2014 series.

Resolution was moved by Dr. J. Paul Jayakar and seconded by Mr. J. John Rajkumar

**Resolution was passed unanimously.**

- R.24: RESOLVED to accept the changes in the programme of studies for B.Sc Mathematics as presented on pages from MAS 1 to MAS 3 and the syllabi for V and VI Semesters as presented on pages from MAS 4 to MAS 16 with effect from the academic year 2015-2016.

Resolution was moved by Mr. J. Jesupaul Thangaraj and seconded by Ms. Baby Stella

**Resolution was passed unanimously.**

- R.25: RESOLVED to accept the changes in the general grid of study for B.Sc Mathematics as in the following table.

Subject Name	Course Code	
	Old	New
Operations Research-II	MAS 3512 5hrs & 5 credits	MAS 3616 6 hrs & 6 credits
Fuzzy Mathematics	MAS 3616 6 hrs & 6 credits	MAS 3512 5hrs & 5 credits

Resolution was moved by Mr. J. Jesupaul Thangaraj and seconded by Ms. Victoria.

**Resolution was passed unanimously.**

- R.26: RESOLVED to accept the changes in the course codes for the following courses for B.Sc. Mathematics with effect from 2016-2017

Subject Name	Course Code	
	Old	New
Graph Theory & OR	MAS 2432	MAS 2465
Business Statistics	MAS 2435	MAS 2475
Business Mathematics	MAS 2436	MAS 2466
Bio-Statistics	MAS 2452	MAS 2472

Resolution was moved by Mr. J. Jesupaul Thangaraj and seconded by Mr. Antony George

**Resolution was passed unanimously.**

- R.27: RESOLVED to accept the changes in the programme of studies for B. Sc Physics as presented on pages from PHS 1 to PHS 2 and the syllabi for V and VI Semesters as presented on pages from PHS 3 to PHS 16 with effect from the academic year 2015-2016.

Resolution was moved by Dr. S. Paul Mary Deborah and seconded by Ms. P. Sujana

**Resolution was passed unanimously.**

- R.28: RESOLVED to accept the programme of studies for B. Sc Chemistry as presented on pages from CHS 1 & CHS 2 and the syllabi for V and VI Semesters as presented on pages from CHS 3 to CHS 16 with effect from the academic year 2015-2016.

Resolution was moved by Dr. K. John Adaikalasamy and seconded by Dr. S. Jemimah

**Resolution was passed unanimously.**

- R.29: RESOLVED to interchange of *lab component* in major supportive course CHS 1425 & CHS 1426 for B.Sc. Bio Chemistry, between the ODD and EVEN semesters.

Resolution was moved by Dr. K. John Adaikalasamy and seconded by Ms. M. Vathanaruba

**Resolution was passed unanimously.**

- R.30: RESOLVED to introduce the change in the course number from CMC 2533 to CMC 2543 for the course titled Business Law as it comes to effect for the students who joined from the academic year 2015-2016.

Resolution was moved by Ms. D. Kanakavalli and seconded by Dr. V. Suganya

**Resolution was passed unanimously.**

- R.31: RESOLVED to accept the programme of studies for B.Sc (Information Technology) as presented on pages from BIT 1 to BIT 2 and the syllabi for the programme for V and VI Semesters as presented on pages from BIT 3 to BIT 13 with effect from the academic year 2015-2016.

Resolution was moved by Mr. J. Frank Ruban Jebaraj and seconded by Ms. J. Christy Jeeva Ratna Devi

**Resolution was passed unanimously.**

- R.32: RESOLVED to accept the programme of studies for B.Sc. Physical Education as presented on pages from BPE 1 to BPE 3 and the syllabi for the programme as presented on pages from BPE 4 to BPE 33 with effect from the academic year 2017-2018.

Resolution was moved by Dr. W. Chester Manuel and seconded by Dr. M. Balakrishnan.

**Resolution was passed unanimously.**

- R.33: RESOLVED to accept the programme of studies for B.Sc. Psychology as presented on pages from PSY 1 to PSY 3 and the syllabi for the programme for I and II Semesters as presented on pages from PSY 4 to PSY 14 with effect from the academic year 2017-2018.

Resolution was moved by Dr. T. Augustus Julian Lazmy and seconded by Dr. (Mrs.) Helen Ratna Monica.

*Dr. M.G. Rethan observed that the suggestions made by her at the Senatus were not incorporated. Dr Augustus Julian Lazmy replied that her suggestions would be placed in the next BOS meeting. Mr. S. Stephen suggested that the local experts be included in the BOS wherever possible.*

**Resolution was passed unanimously.**

- R.34: RESOLVED to accept the programme of studies for B.Sc. Food Science and Nutrition as presented on pages from FSN 1 to FSN 3 and the syllabi for the programme for I and II Semesters as presented on pages from FSN 4 to FSN 13 with effect from the academic year 2017-2018.

Resolution was moved by Dr. (Mrs.) Helen Rama Monica and seconded by Ms. Ameena Bevi.

**Resolution was passed unanimously.**

#### **Departmental Resolutions: Postgraduate Programmes (SF)**

- R.35: RESOLVED to replace the Unit I: Sensory Science in the course PFS 4505 Food Science with the new Unit 'Introduction to Food Science' as presented on page PFS 1.

Resolution was moved by Dr. (Mrs.) Helen Rama Monica and seconded by Dr. K. Navaneethakannan.

**Resolution was passed unanimously.**

- R.36: RESOLVED to accept the changes in the programme of studies for M.Sc. Immunology & Microbiology as presented on page on MIM 1 and the syllabi for I and II Semesters as presented on pages from MIM 2 to MIM 15 with effect from the academic year 2017-2018.

Resolution introduced by Dr. K. Navaneetha Kannan and seconded by Mrs. J. Stella Mary.

**Resolution was passed unanimously.**

#### **Departmental Resolutions: Undergraduate Self-Financed Programme in Satellite Campus**

- R.37: RESOLVED to accept the adaption of the syllabi of B.A. English (Self-financed programme) in the Satellite Campus with effect from the academic year 2017-2018.

Resolution introduced by Dr. J. Paul Jayakar and seconded by Mr. J. Jehason Jiresh

**Resolution was passed unanimously.**



*To a query from Dr A. Robson if the college received the sanction to start courses in the Satellite Campus, the Chairperson clarified that the University permitted the administration to offer in the additional campus three years ago and as a result, BBA, B.COM and B.Com (CA) were started three years ago. He also said that the College was awaiting the University Affiliation Commission to visit the campus for the sanction of BA English at the Satellite Campus. He read out the university order permitting the college to start these courses. He also requested the members to verify the records at the offices before raising an issue on the floor so that members may not be given a bad impression about the college.*

### **SPECIAL RESOLUTION**

**R.38: RESOLVED** to accept the recommendations of the Sub-Committee on Examination Reforms as presented in the Addendum with effect from the academic year 2017-2018.

Resolution introduced by Mr. J. Jesupaul Thangaraj and seconded by Dr. A. Martin David.

*Dr M.G. Rethan questioned the very composition of the sub-committee on the ground that there was no representation for women though half of the faculty were women, that the colleges visited were Christian colleges, that it should have been formed with student representatives, and that the heads alone had been included.*

*Dr. M. Rajendra Pandian claimed that the members had no time to go through the recommendations of the sub-committee since they were given only two days. He said that the reform recommendations should be discussed there and there at the faculty level because the concept of autonomy evolved only from the faculty floor in the American college in the 1970s. He observed that while trust was the basis of academic autonomy which provides space for experiments and innovations in terms of curriculum designing, teaching, and testing, some of the recommendations were against the spirit of autonomy. Hence, members required time for reflection and discussion before taking decisions*

*Mr S. Stephen said that as the syllabus was vetted at four different forums, the reforms that were discussed inconclusively should also be discussed at four levels. He claimed that the faculty members were not averse to reforms but they needed more time. Some of the recommendations like scrapping of the June Repeat and fixing minimum internal marks as a condition to sit for EOS were*

quite contentious. It showed the 'matriculation mentality'. He asked for a through overhauling of the examination system and not a piecemeal one.

Dr. S. Rajkumar Immanuel claimed that as the Head of the Criterion II of NAAC he conducted a student feedback but to his shock students across the thirty seven departments had poorly graded on evaluation and testing system in the college.

Dr. A. Guvamalai said that he was for change and claimed that there can be discussion but not argument in the House. While he felt nothing wrong in the composition of the committee, he said the fixing of minimum marks in internal need not be introduced.

Dr. G.C. Abraham claimed that external accrediting agencies like NAAC and regulating authorities like UGC see less role for the external examiners and more role for the internal examiners and that they wanted the externals to play a significant role in maintaining standards of academic autonomy. He said that the resolution before the House did not have the Part I of the recommendations since it was delinked in the Deans' meeting held the previous day.

Dr. A. Rohson Benjamin claimed that there was no need for reform because the system was excellent. He observed that implementation was not uniform and proper. He supported the reforms in the senatus because he thought that reforms meant writing the rules explicitly. He suggested that the formation of Question Paper Scrutiny Board since it was not literally possible for the heads to know the syllabi of different courses and it would dilute secrecy. He also asked for the active role of Evaluation Monitoring Cell and its decisions be brought to the Academic Council for approval.

The Chairperson at this juncture clarified certain issues. The composition of the subcommittee was initiated in the senatus on voluntary basis. He replied to Mr Stephen that four-tier level discussion took place on reforms as well. They were discussed in the sub-committee, deans' meeting, senatus, and the faculty. He informed the House that more than 70% of the faculty supported the reform efforts.

Dr K. Navaneetha Kannan pleaded that women representatives be included in all committees in the future and justified the fixing of minimum in the internal since it is the only way to make students serious about examinations. He observed that the present pass percentage was pathetic.



*Dr. S. Prem Singh asked for a thorough analysis of the drawbacks of the present system which was really good but poor implementation had led to certain problems. He wanted the reforms to be foolproof. He cautioned that reforms should not be poorer than the present system since external's appreciated our system.*

*Dr. R. Prabhar Vedamanickam said that change was most urgent but it was a very serious exercise. He attributed the large classroom, admission policy and faculty recruitment policy to poor performance of students in examinations. He cautioned that the faculty should go slow by taking more time for decision-making on examination-related issues. Reforms required debates and not votes. He said that essence of autonomy was freedom and uniformity was the opposite of autonomy.*

*Dr. J. Paul Jayakar claimed that it was quite natural for human beings to resist change and that there were certain issues that merited discussion. He said he learnt quite a lot from seniors while sharing a course from teaching to setting question papers and to testing. He claimed that the recommendations of the subcommittee were very close to the recommendations of the UGC.*

*Mr. Justin Manohar claimed that it would be better to discuss the recommendations item-wise instead of rejecting them on the ground that they required time for discussion and decision. He shared with the House that the subcommittee revised the report at least ten times in several sittings of the subcommittee.*

*Dr. Aibert Christopher Doss said that he was for reforms but each recommendation should have been discussed first at the department level and then at the senate. In his view, Question Paper Scrutiny Board was a big problem.*

*Mr. M. Rajesh welcomed the proposal to include the external examiner for lab courses.*

*Dr. S. Stalin Kumar said that reforms were good but required clarification. He expressed concern over the scrapping of June Repeat exams, non-availability of blueprint for setting question papers, no provision for students who would represent the college in sports and cultural as far as retest was concerned.*

*Mr. J. John Kamaraj said that he could see a contradiction between reform recommendations, namely reduction of retest to one and fixing minimum in the internals as a condition to sit for EOS. He expressed that such*

recommendations would create psychological problems in students and therefore he pleaded for the retention of the existing system.

Dr. A.D. Bartabas wanted more time for discussion of the recommendations item-wise at the departmental meetings and at the faculty level. He said he was for reforms.

Dr. R. Anadurai justified the selection of colleges for visit on the ground that these colleges had introduced several innovations under autonomy and they were rated higher by accrediting agencies. Moreover, he said that colleges had to learn from one another.

Dr. K. John Adaitkalasamy clarified that the recommendations did not amount to changing the system but to introducing checks and balances. For instance, he referred to the setting of question papers separately with the help of blueprints for each course.

Dr. K. Gnanasekar justified the reform efforts on the ground that recommendations were seen only as amendments to the existing system, as measures to make the system more functional, and the colleges visited had been nationally ranked higher.

Dr. K. Kudalingam, RJDCE reminded the members that autonomy was meant for the development of students' competencies at the micro-level and it could be done with the help of experts. However, we should not deviate from the directions from the university and the UGC. He suggested that brainstorming sessions be conducted on all issues ranging from framing syllabus to teaching techniques, testing and evaluation at the department level first. Teachers should not forget that students were the focal point and they should be made more competence in the competitive world.

Prof. Ram Rajasekaran, Director, CFTRI, Mysuru said that he was happy that all teachers wanted change in the system. He cautioned that there could be mistakes in experiments since we were not sure of outcomes. He suggested to the teachers to refrain from making references to the years of experience but to bringing facts and figures to support their claim. He advised the faculty to quantify the outcome while he appreciated the faculty commitment for change and reforms. He asked the faculty to evolve innovative ways of teaching.

*Mr Lenin Tamilkovan wanted the reforms to be standardized. He reiterated his commitment to help the college to establish a planetarium and an Innovative Centre.*

*Dr. J. John Sekar, Dean for Policies and Administration, summed up the discussions by observing that responsiveness was the American college culture. He informed the House that the principal asked the subcommittee in the Deans' meeting held the previous day to de-link the first section that was on administrative issue from the rest of the report that was on examination reforms. He claimed that there were three contentious issues that the faculty was worried about though they were all for change and reforms. They were scrutiny board, denying students the chances to sit for the June Repeat exam, and fixing minimum in the internals. He suggested to the Chairperson that the resolution could be passed now on the condition that additional suggestions from the faculty could be discussed at the appropriate forums and be incorporated into the reform process.*

*The Chairperson assured the House that additional suggestions would be incorporated before the recommendations were implemented.*

**With this assurance, the resolution was unanimously passed.**

#### **Any other matter**

Mr. S. Stephen of Mathematics Department demanded an explanation why the consolidated internal marks sheets were not displayed on the department notice board as promised for cross-reference and check. He also claimed that there were a number of spelling mistakes in students' names on their marks sheets and wrong entry of marks as well.

He also wanted to know who fixes the examination fees and why an exorbitant amount under 'other charges' fixed.

Dr A. Martin David, Deputy Controller, assured the House that the COE personnel would handover the consolidated internal mark sheets at the end of the meeting. He cited some software problem for the delay.

Dr. J. Helen Ratna Monica replied to Mr Stephen that money was needed for developing software for scrutinizing marks and for employing non-teaching staff for examination duty. She shared with the House that as many 600+ students could not pay the college fees. She suggested that each faculty member could adopt one student for the payment of college fees. She also informed the House

that the NAAC peer team and the Autonomy Review Committee appreciated the fees collection and maintaining of the records at the Bursar's office.

Dr Robson Benjamin said that the CBCS marks should not be taken into account for computing percentage in the majoring discipline. The Chairperson ruled that it could be first discussed at the senatus. The chairperson also requested Dr S. Premisingh and Dr Robson Benjamin to provide more details on complaints regarding marks and hall tickets so that the administration could rectify them.

### Vote of Thanks

Vice-Principal Dr. G.C. Abraham thanked the Principal and all the external members for their presence, support and their valuable suggestions and also placed on record appreciations for Dean Dr. J. John Sekar and Additional Dean Dr. J. Paul Jayakar and the other Deans and Additional Deans for taking up the responsibilities to scrutinize all the proposals presented in the House. He also thanked all the Heads of the Departments, faculty members and student members for their contribution and cooperation. He also thanked the Bursar for the financial sanction to accomplish this mammoth academic exercise.

### Adjournment

After inviting all the members to join for lunch at the Auditorium, the Chairperson adjourned the meeting sine die.



**Dr. J. John Sekar**  
Dean, Policies & Administration

**Dr. J. JOHN SEKAR**

MA, M.Phil., PGDTE(CIEFL), PGCHE(CNOU), PGDCE(UH), Ph.D.  
Head & Associate Professor  
Research Department of English  
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**Dr. M. Davamani Christopher**  
Principal & Secretary  
**Dr. M. DAVAMANI CHRISTOBER**  
Principal & Secretary  
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## RESOLUTIONS

### Special Resolution:

RESOLVED that the aided and self-financed departments that offer additional sections at UG and PG levels follow the common curriculum with appropriate department acronyms preceding the course numbers with effect from the academic year 2018-2019.

### Departmental Resolutions: Postgraduate Programmes

- R.1: As recommended by the Board of Studies in Tamil, RESOLVED to accept the changes in the programme of studies for MA Tamil as presented on page PGT 1 and the syllabi for I to IV Semesters as presented on pages from PGT 2 to PGT 43 with effect from the academic year 2018 – 2019.
- R.2: As recommended by the Board of Studies in English, RESOLVED to accept the changes in the programme of studies for MA English as presented on pages from PGE/PSE 1 and PGE/PSE 2 and the syllabi for I and II Semesters as presented on pages from PGE/PSE 3 to PGE/PSE 18 with effect from the academic year 2018–2019.
- R.3: As recommended by the Board of Studies in Mathematics, RESOLVED to accept the changes in the programme of studies for M.Sc Mathematics as presented on pages from PGM/PSM 1 to PGM/PSM 2 and the syllabi for I to IV semesters presented on pages from PGM/PSM 3 to PGM/PSM 27 with effect from the academic year 2018 – 2019.
- R.4: As recommended by the Board of Studies in Physics, RESOLVED to accept the changes in the programme of studies for M.Sc Physics as presented on page PGP/PSP 1 and the syllabi for I and II semesters as presented on pages from PGP/PSP 2 to PGP/PSP 15 with effect from the academic year 2018 – 2019.
- R.5: As recommended by the Board of Studies in Chemistry, RESOLVED to accept the changes in the programme of studies for M.Sc Chemistry as presented on page PGC 1 and the syllabi for I and II semesters as presented on pages from PGC 2 to PGC 26 with effect from the academic year 2018 – 2019.
- R.6: As recommended by the Board of Studies in Botany, RESOLVED to accept the changes in the programme of studies for M.Sc Botany as presented on page PGB 1 and the syllabi for the programme for I and II semesters as presented on pages from PGB 2 to PGB 21 with effect from the academic year 2018 – 2019.

- R.7: As recommended by the Board of Studies in Zoology, **RESOLVED** to accept the changes in the programme of studies for M.Sc Zoology as presented on page PGZ 1 and the syllabi for the programme for I to IV semesters as presented on pages from PGZ 2 to PGZ 35 with effect from the academic year 2018 – 2019.
- R.8: As recommended by the Board of Studies in Economics, **RESOLVED** to accept the changes in the programme of studies for M.A Economics as presented on page PEC 1 and the syllabi for the programme for I and II semesters as presented on pages from PEC 2 to PEC 21 with effect from the academic year 2018 – 2019.
- R.9: As recommended by the Board of Studies in Commerce, **RESOLVED** to accept the changes in the programme of studies for Master of Commerce as presented on page PCO 1 and the syllabi for the programme for I to IV semesters as presented on pages from PCO 2 to PCO 25 with effect from the academic year 2018 – 2019.
- R.10: As recommended by the Board of Studies in Social Work, **RESOLVED** to accept the changes in the programme of studies for M.A Social Work as presented on pages from MSW 1 and MSW 2 and the syllabi for the programme for I to IV semesters as presented on pages from MSW 3 to MSW 77 with effect from the academic year 2018 – 2019.
- R.11: As recommended by the Board of Studies in Immunology & Microbiology, **RESOLVED** to accept the changes in the programme of studies for M.Sc Immunology & Microbiology as presented on page MIM 1 and the syllabi for the programme for III and IV semesters as presented on pages from MIM 2 to MIM 18 with effect from the academic year 2017 – 2018.
- R.12: As recommended by the Board of Studies in Immunology and Microbiology, **RESOLVED** to accept the change in program nomenclature from M.Sc. Immunology and Microbiology to M.Sc. Microbiology with effect from the academic year 2018-2019.
- R.13: As recommended by the Board of Studies in Immunology & Microbiology, **RESOLVED** to accept the changes in the programme of studies for M.Sc, Microbiology as presented on page MIM 1 and the syllabi for the programme for I to IV semesters as presented on pages from MIM 2 to MIM 28 with effect from the academic year 2018 – 2019.
- R.14: As recommended by the Board of Studies in Food Science, **RESOLVED** to accept the changes in the programme of studies for M.Sc Food Science as presented on pages from PFS 1 and PFS 2 and the syllabi for the programme for I to IV semesters as presented on pages from PFS 3 to PFS 27 with effect from the academic year 2018 – 2019.



**Departmental Resolutions: Undergraduate Programmes**

- R.15: As recommended by the Board of Studies in Hindi, RESOLVED to accept the changes in the programme of studies for B.A.Hindi as presented on pages from HIS 1 to HIS 4 and the syllabi for I to IV Semesters as presented on pages from HIS 5 to HIS 16 with effect from the academic year 2017–2018.
- R.16: As recommended by the Board of Studies in French, RESOLVED to accept the changes in the programme of studies for Part - I French as presented on page FRE 1 and the syllabi for III and IV semesters Part-I as presented on pages from FRE 2 and FRE 3 with effect from the academic year 2018–2019.
- R.17: As recommended by the Board of Studies in French, RESOLVED to accept the changes in the programme of studies for Part - I French as presented on page FRS 1 and the syllabi for III and IV semesters Part-I as presented on pages from FRS 2 and FRE 3 with effect from the academic year 2018–2019.
- R.18: As recommended by the Board of Studies in French RESOLVED to accept the changes in the programme of studies for B.A. French as presented on page FRS 1 and the syllabi for the supportive courses for I and II semesters as presented on pages FRS 4 and FRS 5 with effect from the academic year 2018 – 2019.
- R.19. As recommended by the Board of Studies in Mathematics RESOLVED to accept the changes in the programme of studies for B.Sc Mathematics as presented on pages from MAT/MAS 1 to MAT/MAS 6 and the syllabi for I to VI Semesters as presented on pages from MAT/MAS 7 to MAT/MAS 68 with effect from the academic year 2018 – 2019.
- R.20: As recommended by the Board of Studies in Chemistry, RESOLVED to accept the programme of studies for B. Sc Chemistry as presented on pages from CHE/CHS 1 to CHE/CHS 3 and the syllabi for major and supportive courses for the semesters I to IV as presented on pages from CHE/CHS 4 to CHE/CHS 12 with effect from the academic year 2018 – 2019.
- R.21: As recommended by the Board of Studies in Religion, Philosophy and Sociology RESOLVED to accept the changes in the programme of studies for B.A. Religion, Philosophy and Sociology as presented on pages RPS 1 and RPS 2 and the syllabi for I to VI Semesters as presented on pages from RPS 3 to RPS 21 with effect from the academic year 2018 – 2019.

- R.22: As recommended by the Board of Studies in Computer Applications RESOLVED to accept the changes in the programme of studies for Bachelor of Computer Applications as presented on pages BCA 1 and BCA 2 and the syllabi for I to VI Semesters as presented on pages from BCA 3 to BCA31 with effect from the academic year 2018 – 2019.
- R.23: As recommended by the Board of Studies in Business Administration RESOLVED to accept the changes in the programme of studies for Bachelor of Business Administration as presented on page BBA 1 and the following changes and revisions in MAS 1437 – Business Statistics with swapped with BBA 1426 between I and II with the new courses codes as MAS 1440 and BBA 1423 respectively with effect from the academic year 2018 – 2019.
- R.24: As recommended by the Board of Studies in Business Administration RESOLVED to accept the changes in the programme of studies for Bachelor of Business Administration revisions to the syllabus content and changes to text books for the below courses made with the corresponding changes to their codes and not to their titles with effect from the academic year 2018-2019,
- a) BBA 1221 revised to BBA 1231 – Personality Development
  - b) BBA 1431 revised to BBA 1441 – Principles of Management
  - c) BBA 1544 revised to BBA 1554 – Marketing management
  - d) BBA 2420 revised to BBA 2430 – Total Quality Management
  - e) BBA 2437 revised to BBA 2447 – Organisational Behaviour
  - f) BBA 2441 revised to BBA 2451 – Business Law
  - g) BBA 2527 revised to BBA 2539 – Portfolio Management
  - h) BBA 2542 revised to BBA 2552 – Industrial Relations
  - i) \BBA 3525 revised to BBA 3535 – International Marketing
  - j) BBA 3625 revised to BBA 3635 – Management Information System
  - k) BBA 3628 revised to BBA 3638 – Logistics Management
- R.25: As recommended by the Board of Studies in Food Science and Nutrition RESOLVED to accept the changes in the programme of studies for B.Sc Food Science and Nutrition as presented on pages from FSN 1 to FSN 3 and the syllabi for I to VI Semesters as presented on pages from FSN 4 to FSN 32 with effect from the academic year 2017 – 2018.
- R.26: As recommended by the Board of Studies in Biochemistry RESOLVED to accept the changes in the programme of studies for B.Sc Biochemistry as presented on pages from BCH 1 to BCH 3with effect from the academic year 2018-2019 and the new course for the VI Semester, BCH 3544 – Plant Biochemistry, Protein Chemistry and Hormones Lab as presented on page on BCH 4 with effect from the academic year 2017 – 2018.

- R.27: As recommended by the Board of Studies in Psychology RESOLVED to accept the changes in the programme of studies for B.Sc. Psychology as presented on pages from PSY 1 to PSY 3 and the syllabi for I to VI Semesters as presented on pages from PSY 4 to PSY 32 with effect from the academic year 2017 – 2018.
- R.28: As recommended by the Board of Studies in Commerce RESOLVED to accept the programme of studies for B.Com. Professional Accounting as presented on pages from CPA 1 to CPA 3 and the syllabi for I and II semesters as presented on pages from CPA 4 to CPA 15 with effect from the academic year 2018 – 2019.
- R.29: As recommended by the Board of Studies in Visual Communication RESOLVED to accept the Diploma courses in the programme of studies for B.Sc., Visual Communication as presented on pages DVC 1 and the syllabi for the Diploma courses as presented on pages from DVC 2 to DVC 17 with effect from the academic year 2018 – 2019.

**Resolutions: Community College**

- R.30: As recommended by the Board of Studies in Aquaculture RESOLVED to accept the Diploma courses in the programme of studies for Diploma in Aquaculture as presented on page DAQ 1 and the syllabi for the Diploma courses as presented on pages from DAQ 2 to DAQ 11 with effect from the academic year 2018 – 2019.
- R.31: As recommended by the Board of Studies in Aquaculture RESOLVED to accept the Advanced Diploma courses in the programme of studies for Advanced Diploma in Aquaculture as presented on page AAQ 1 and the syllabi for the Diploma courses as presented on pages from AAQ 2 to AAQ 11 with effect from the academic year 2018 – 2019.
- R.32: As recommended by the Board of Studies in Medical Laboratory Technology RESOLVED to accept the Diploma courses in the programme of studies for Diploma in Medical Laboratory Technology as presented on page DML 1 and the syllabi for the Diploma courses as presented on pages from DML 2 to DML 16 with effect from the academic year 2018 – 2019.
- R.33: As recommended by the Board of Studies in Medical Laboratory Technology RESOLVED to accept the Advanced Diploma courses in the programme of studies for Advanced Diploma in Medical Laboratory Technology as presented on page AML 1 and the syllabi for the Diploma courses as presented on pages from AML 2 to AML 17 with effect from the academic year 2018 – 2019.

- R.34: As recommended by the Board of Studies in Food Processing and Preservation RESOLVED to accept the Diploma courses in the programme of studies for Diploma in Food Processing and Preservation as presented on page DFP 1 and the syllabi for the Diploma courses as presented on pages from DFP 2 to DFP 13 with effect from the academic year 2018 – 2019.
- R.35: As recommended by the Board of Studies in Food Processing and Preservation RESOLVED to accept the Advanced Diploma courses in the programme of studies for Advanced Diploma in Food Processing and Preservation as presented on page AFP 1 and the syllabi for the Diploma courses as presented on pages from AFP 2 to AFP 13 with effect from the academic year 2018 – 2019.

**Proposed Curriculum plan for Post-Graduate Tamil  
from the academic year 2018-19**

Semester	Code	Title	Hours	Credits	Marks
<b>I</b>	PGT 4541	தொல்காப்பியம் - எழுத்ததிகாரம்	7	5	100
	PGT 4443	வாசிப்புக் கோட்பாடுகள் - அறிமுகம்	6	4	80
	PGT 4545	இக்கால இலக்கியம் - தொடக்கம்	7	5	100
	PGT 4447	இக்கால மொழியியல்	6	4	80
	PGT 4349*	காட்சி ஊடகங்களும் சமூக மாற்றங்களும்	4	3	60
				<b>30</b>	<b>21</b>
<b>II</b>	PGT 4542	தொல்காப்பியம் - சொல்லதிகாரம்	7	5	100
	PGT 4544	சிலப்பதிகாரம்	7	5	100
	PGT 4446	சமய இலக்கியம்	6	4	80
	PGT 4448	இக்கால இலக்கியம் - மேதமை	6	4	80
	PGT 4300*	அரங்கக்கலை	4	3	60
				<b>30</b>	<b>21</b>
<b>III</b>	PGT 5541	தொல்காப்பியம் - பொருள் (அகம்)	6	5	100
	PGT 5543	சங்க இலக்கியம் - அகம்	6	5	100
	PGT 5545	சமயக் காப்பியம்	6	5	100
	PGT 5547	நாட்டுப்புறவியல்	6	5	100
	PGT 5449	புலம்பெயர் இலக்கியம்	6	4	80
				<b>30</b>	<b>24</b>
<b>IV</b>	PGT 5452	தொல்காப்பியம் - பொருள் (புறம்)	6	4	80
	PGT 5444	சங்க இலக்கியம் - புறம்	6	4	80
	PGT 5446	அறமும் இலக்கியமும்	4	4	80
	PGT 5448	இக்கால இலக்கியம் - அண்மை போக்குகள்	6	4	80
	PGT 5400	தொல்லியலும் தமிழகமும்	4	4	80
	PGT 5402	ஆய்வு நெறியும் ஆய்வேடும்	4	4	80
				<b>30</b>	<b>24</b>
	PGT 4351	தமிழ்ச் சமூகப் பண்பாட்டு வரலாறு	<b>4</b>	<b>3</b>	<b>60</b>
	PGT 4352	சுற்றுலாவியலும் தமிழகமும்	<b>4</b>	<b>3</b>	<b>60</b>

**நோக்கம்:**

தொல்காப்பிய எழுத்ததிகார நூற்பாக்களை உரையாசிரியர்களின் துணையோடு பொருள் விளங்கிக் கொள்ளும் திறன் பெறுதலும் தொல்காப்பியக் கோட்பாடுகளை நன்னூல் முதலிய இலக்கண நூல்களின் கருத்துக்களோடு ஒப்பிட்டறிதலும் மொழியியல் அறிஞர்களின் கருத்துக்களைத் தொல்காப்பியரின் கருத்துக்களோடு பொருத்திப் பார்த்தலும் இப்பாடத்திட்டத்தின் நோக்கங்களாகும்.

**கூறு 1:** எழுத்தின் வகை - வடிவம் - மாத்திரை - மெய்மயக்கம் - சார்பெழுத்துக்கள் - எழுத்து மொழியாகும் நிலை - அளபெடை- எழுத்துப் போலி - மொழிமுதல், இடை, இறுதி எழுத்துக்கள் - எழுத்துக்களின் பொதுப்பிறப்பு - உயிரெழுத்துக்கள், மெய்யெழுத்துக்களின் பிறப்பு முயற்சியும் இடமும்.

**கூறு 2:** நிலைமொழி வருமொழிகள் - புணர்மொழி இயல்புகள் - திரிபின் வகைகள் - சொற்புணர்ச்சி - அல்வழி, வேற்றுமைப்புணர்ச்சி - உருபு புணர்ச்சி - சாரியைப் புணர்ச்சி - உயிரெழுத்தின் புணர்ச்சி - எழுத்துச்சாரியை.

**கூறு 3:** உயிரீறு மெய்யீறுகளின் பொதுப்புணர்ச்சி - சிறப்புப் புணர்ச்சி - இரண்டாம் வேற்றுமைத்திரிபு - இகர, ஐகார ஈறுகள் - அளவு, நிறை, எண்ணுப்பெயர் புணர்ச்சி - உயிர் ஈறு, புள்ளி ஈறு, குற்றியலுகர ஈற்றுப்பெயர்கள் வேற்றுமை உருபேற்றலும் சாரியை பெறுதலும் .

**கூறு 4:** உயிர் ஈறுகளின் புணர்ச்சி - அல்வழி, வேற்றுமைப் புணர்ச்சியில் - உயிர் ஈறுகள் அடையும் மாற்றங்கள் - மெய்யீறுகளின் புணர்ச்சி - மெல்லொற்று ஈறுகள் - இடையொற்று ஈறுகள் புணர்ச்சியில் அடையும் மாற்றங்கள்.

**கூறு 5:** குற்றியலுகரத்தின் இயல்பு - வகைகள் - குற்றியலுகரப் பொதுப் புணர்ச்சி - சிறப்புப் புணர்ச்சி - குற்றியலுகர ஈற்று எண்ணுப் பெயர்களின் புணர்ச்சியும் அளவுஇ நிறைப் பெயர்களின் புணர்ச்சியும்.

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வாசிப்புக் கோட்பாடுகள்

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**நோக்கம்:**

தமிழின் மரபான திறனாய்வு முறைகளில் மட்டுமல்லாது மேற்கில் நவீன இலக்கிய கோட்பாடுகள் வழியாகவும் தமிழிலக்கியங்களை வாசிப்பதன் மூலம் கூடுதல் புரிதல்களை அடைய முடியும். ஆதன் அடிப்படையில் நவீன இலக்கியன வாசிப்பு னேகாட்பாடுகள் சிலவற்றின் அடிப்படையான அறிமுகங்களைப் பெறுவது இப்பாடத்தின் நோக்கமாகும்.

**கூறு 1: சமூகம் மையமாதல்:** மார்க்சியம் - இலக்கியம் மேல் கட்டுமானம் - பிந்தைய மார்க்சியர்கள் - ஒடுக்குமுறை அதிகாரம் பண்பாடு குறித்த கருத்துகள் (மார்க்ஸ் - டெர்ரி ஈகிள்டன் - அல்தாஸர் - கிராமீ)

**கூறு 2: மொழி மையமாதல்:** குறி - குறிப்பான் - மொழி உருவவாதம் - அமைப்பியல் - பின் அமைப்பியல் (சகூர் - யாக்பசன் - பிராப் - பார்த்).

**கூறு 3: தனிநபர் மையமாதலும் விளிம்பும்:** அறிவுவாதம் - நவீனத்துவம் - உளவியல் - இருத்தலியல் - பின்நவீனத்துவம் - மையம், விளிம்பு - பனுவலில் அதிகாரம் குறித்த கருத்துகள் (பிராய்டு - யூங் - லியோதார்த் - லக்கான் - தெரிதா).



**கூறு 4: வாசகன் மையமாதலும் ஆசிரியன் மரணமும்:** பிரதி ஆசிரியன் வாசிப்பு வாசகன் - வாசகன் மையமாதல் - ஆசிரியன் மரணம் - கட்டமைப்பும் கட்டவிழ்த்தலும் - ஊடிழைப்பிரதி (சஞர் - யாக்கப்பன் - பார்த் - பூக்கோ - தெரிதா - கிறிஸ்தவா).

**கூறு 5: காலனியமும் பின்காலனியமும்:** குாலனியம் - கீழைத்தேயம் என்ற கருத்தாக்கம் - பின்காலனியம் - உள்;ர் அறிதல் முறைகளும் கதையாடல்களும் (எட்வர்ட் செய்த - காயத்ரி ஸ்பீவக் - ஹோமிபாபா).

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**நோக்கம்:**

இக்கால இலக்கிய வகைமைகளை இனங்கண்டு, அவை தோன்றிய அரசியல், சமூக, வரலாற்றுப் பின்புலத்தில் அவற்றை அறிந்து கொள்ளுதல் இப்பாடத்தின் முதன்மை நோக்கங்களாகின்றன. இத்துடன், பிற்காலத்தெழுந்த நவீனத் தமிழிலக்கிய வளத்திற்கு மேற்கூட்டிய காரணிகள் அடிப்படையாக அமைந்த விதங்களையும் போக்குகளையும் ஒன்றிணைத்துப் புரிந்து கொள்ளுவதும் இதன் பிற நோக்கங்களாக அமைவுறுகின்றன.

**பாடத்திட்டம் :**

கூறு 1: இக்கால இலக்கியத் தோற்றப் பின்புலம்: நவீனக் கல்வியின் தொடக்கம் - நடுத்தர வர்க்க உருவாக்கம் - இதழ்களின் தோற்றம் - வாசிப்புப் பழக்கம் உருவாதல்..காலனிய கால இந்திய - தமிழ்க் கல்விச் சூழல் - அச்ச இயந்திர வருகை - பன்னாட்டவர் தாக்கம்.

கூறு 2: காவிய மரபின் தொடர்ச்சியும் முதல் நாவலின் தோற்றமும்: தமிழ்ப் படைப்புச் சூழலில் மீனாட்சிசுந்தரம் பிள்ளையும் வேதநாயகம் பிள்ளையும் (பிரதாப முதலியார் சரித்திரம்), - தொடக்ககால நாவல்களின் இருவேறு போக்குகள் - வைதீக சமய மரபும் கிருத்தவ சீர்திருத்தமும் - ராஜம் அய்யர், அ.மாதவையா (கமலாம்பாள் சரித்திரம்). பத்மாவதி சரித்திரம்).

கூறு 3: இக்கால இலக்கிய முன்னோடி பாரதி: காற்று உள்ளிட்ட வசனகவிதைகள், கதைகள்: (சின்னச்சங்கரன் கதை, ஆறில் ஒரு பங்கு), கட்டுரைகளும் (பெண் விடுதலை-2, இந்தியாவில் விதவைகளின் பரிதாபகரமான நிலைமை, சிட்டுக்குருவி), அவர் காலகட்டப் புத்திலக்கியப் படைப்பு முயற்சிகளும்: வ.வே.சு.ஐயர்-குளத்தங்கரை அரசமரம் முதலிய சிறுகதைகள். புத்திலக்கியம், மறுமலர்ச்சி முதலான கட்டுரைகள்.

கூறு 4: சிறிய கதை சிறுகதையாதல்- சிறுகதை இலக்கியம் தோற்றம் பெறுதல்: செல்வகேசவராய முதலியார்(அபிநவக் கதைகள்), அ.மாதவையா (குசிகர் குட்டிக்கதைகள், வ.வே.சு.ஐயர் (மங்கையர்க்கரசி முதலான கதைகள்), சிறுகதையோட்டத்தில் தேசிய இயக்கத்தின் தாக்கமும் பிரதிபலிப்பும்: (தி.ஜ.ரங்கநாதன்.,ராஜாஜி, சி.சு.செல்லப்பா), நாவல் ஜனரஞ்சகமாதல் (ஆரணி குப்புசாமி முதலியார், வடுவூர் கே.துரைசாமி ஐயங்கார், வை.மு.கோ.), - மிகுபுனைவியலும் வரலாற்றுப் புதினங்களும் - இதழ்களின் பெருக்கமும் நாவல் தொடர்கதையாதலும் (ர.பாலகிருஷ்ணநாயுடு- டணாய்க்கன் கோட்டை, கல்கி-மோகினித்தீவு).

கூறு 5: திராவிட இயக்கத் தோற்றமும் பெரியாரின் புதிய உரைநடையும்: இலக்கியத்தில் பிரச்சாரமும் சமூக சீர்திருத்தமும் - திராவிட இயக்கச் சிறுகதைகள்: அண்ணா

(பேய் ஓடிப்போச்சு, சொர்க்கத்தில் நரகம்), எஸ்.எஸ்.தென்னரசு (பூனைக்குறவன்) ஏ.வீ.பி.ஆசைத்தம்பி (மதுரை மீனாட்சி, நல்ல தங்காள்), கட்டுரைகள்: (பெண் ஏன் அடிமையானாள்), மணிக்கொடிகாலப் பாரதிதாசனும் அவர்தம் திராவிட இயக்கப் பரம்பரையும் - (சுரதா- தலைமை தாங்கும் தமிழ், தமிழில் பெயரிடுங்கள், முடியரசன்- மூடம் என்று மாறுமோ, உலகை மாற்றுவோம், தேனிரா.பாண்டியன்- எது கவிதை?, கலைக்குயிலன்- நீயும் தமிழன் தானா?), பாரதிதாசனுக்குப் பிறகு எழுந்த புதுக்கவிதை மரபினுள் காணப்படும் தொடக்ககாலக் கூறுகள் (மீரா- மனிதனைப் பாடுவேன், முருகுசுந்தரம்- முச்சுக்காற்று).

#### பாடநூல்:

பாடத்திட்டத்துள் குறிக்கப்பட்டுள்ள படைப்பாளிகளின் கதைகள் மற்றும் கவிதைகளின் நகல் தொகுப்பு.

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**PGT-4447**

**இக்கால மொழியியல்**

**6Hr/4Cr**

**நோக்கம் :**

தமிழ் மொழியின் இலக்கணத்தை மரபுவழிக் கற்றலிலிருந்து வேறுபடுத்தி நவீன மொழிக் கோட்பாடுகளைப் பயிலுதல் இப்பாடத்தின் நோக்கமாகும். கிளைமொழியியல், சமுதாய மொழியியல் ஆகியனவும் இப்பாடத்திட்டத்துள் இடம்பெறும்.

**பாடத்திட்டம்**

கூறு 1: மொழியின் தோற்றம் - மொழியியலின் பல்வேறு துறைகள் - ஒலியியல் - ஒலிநெடுங்கணக்கு - ஒலியியலின் மூன்று துறைகள் - ஒலியறுப்புக்கள் - ஒலித்தொழில்கள் - உயிரொலிகள் - மெய்யொலிகள் - ஒலியனியல் - ஒலியன் பற்றிய கொள்கைகள் - கண்டறியும் முறை - ஆக்கமுறை ஒலியனியல்.

கூறு 2: உருபனியல் அறிமுகம் - உருபனிகளைக் கண்டறிவதற்கு நடை கூறும் விதிகள் - உருபனிகளின் வருகையும் வகையும் - உருபனிகளின் இணைப்பு.

கூறு 3: தொடரனியல் தோற்றம் - மூவகைத் தொடரனியற் கொள்கைகள் - ஆக்கமுறைத் தொடரனியல் - அமைப்பு முறைத் தொடரனியல் - அண்மையறுப்பின் வகைகள் - ஆக்கமுறை இலக்கணம்- அடிநிலைக்கூறு - மாற்றல் கூறு - ஆக்கமுறைப் பொருளனியல்.

கூறு 4: கிளைமொழியியல் - கண்டறிதல் - வகைப்படுத்தல் - கிளைமொழிகளை ஒப்பிடுதல் - இருநிலைவழக்கு - தமிழில் கிளைமொழிகள் - வட்டாரக் கிளைமொழிகள் - தொழிற் பேச்சு வழக்குகள் - கிளைமொழி குறித்த ஆய்வுகள்.

கூறு 5: சமுதாய மொழியியல் - மொழியும் சமுதாயமும் - மொழி மாற்றங்கள் - இருமொழி வழக்கு - மொழியின் இருநிலைத் தன்மை - பன்மொழி வழக்கு.

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PGT-4349

காட்சி ஊடகங்களும் சமூகமாற்றமும்

4Hr/3Cr

**நோக்கம்:**

வெகுசனகாட்சி ஊடகங்களான தொலைக்காட்சி, திரைப்படங்களுக்குமாற்றாக 21-ஆம் நூற்றாண்டில் செல்வாக்குப் பெற்றுவரும் காணொலிகள் (Video), குறும்படங்கள் (Short Films), மற்றும் ஆவணப்படங்கள் (Documentaries) ஆகியனவற்றின் இயல்பு, செயல்படும் விதம், ஆக்கபூர்வமான சமூகமாற்றத்தில் அவற்றின் பங்களிப்பு ஆகியனவற்றை அறிமுகம் செய்து, அவ்வூடகங்களைக் கையாள்வதற்கான சாத்திய கூறுகளை அறிமுகப்படுத்துவது இப்பாடத்தின் நோக்கமாகும்.

கூறு 1: இருபதாம் நூற்றாண்டின் பிற்பகுதியில் அறிமுகமாகி செல்வாக்குப் பெற்றவரும் புதிய ஊடகங்கள் (நேற ஆநனயை) அவற்றின் இயங்குதளங்கள், செயல்பாடுகள் - பொதுவெளியிலும் இணைய வெளியிலும் அதன் தாக்கங்கள்- அவற்றின் பொருளியல் சார்ந்த இயங்குமுறைகள் - சட்டவிதிகளும், சுதந்திரமும்.

கூறு 2: காணொளிகளின் (ஏனைநழ) எளிமை - கற்றல் கற்பித்தலில் அதன் பங்கு - கலைமற்றும் சமூக மேம்பாட்டில் அவ்வூடங்களின் குறிப்பிடத்தகுந்தபங்களிப்புகள் - சான்றுகள்.

கூறு 3: குறும்படங்கள் - உலகளாவிய, இந்திய மற்றும் தமிழ்ச்சூழலில் அவற்றின் விச்சு - வாய்ப்புகள் - சான்றுகள்.

கூறு 4: ஆவணப்படங்கள் அறிமுகம் - விழிப்புணர்வு, மேம்பாடு, சமூகமாற்றம் ஆகியன முன்னெடுக்கப்பட்ட சூழல்களும் சாத்தியங்களும் - சான்றுகள்.

கூறு 5: மேற்கண்ட ஊடகங்களைக் கையாள்வதற்கான எளிமையான சாதனங்கள் - அவற்றைக் கையாள்வதற்கான பயிற்சிகள் - வணிக ரீதியானசாத்தியப்பாடுகள் - வேலைவாய்ப்புகள்.

இப்பாடத்தின் அகபுறத்தேர்வு முழுவதும் செய்முறையாக அமையும். தங்களுக்குத் தெரிந்த தலைப்புகளில் காணொளி தயாரித்தல், திரைப்படங்களை விமரிசித்தல், கதைகளை வாசித்தல், குறும்படங்களுக்கு திரைக்கதை எழுதுதல், தயாரித்தல், சிறு ஆவணப்படங்களை உருவாக்குதல் ஆகியவற்றில் தங்களுக்கு உகந்தவற்றில் செய்யும் பங்களிப்பைக்கொண்டு அகமதிப்பீகள் கணிக்கப்பெறும். புறமதிப்பீட்டுத் தேர்வுக்கு 5% நிமிடங்களுக்குள்ளான ஒரு காணொளி/ ஆவணப்படம்/ குறுபடம்/ விளக்கப்படம் ஏதாவதொன்றைக் குழுவாகத் தயாரித்தளிக்கவேண்டும். தயாரிப்பிற்கு 75 மதிப்பெண்களும் நேர்முக உரையாடலுக்கு 25% மதிப்பெண்களும் வழங்கப்பெறும்.

### பாடல நூல்

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

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PGT 4542

தொல் - சொல்லதிகாரம்

7hr/5cr

**நோக்கம்:** தொல்காப்பிய சொல்லதிகார நூற்பாக்களை உரையாசிரியர்களின் துணையோடு படித்துப் பொருள் விளங்கிக் கொள்ளும் திறன் பெறுதலும், அவ்வாறு புரிந்து கொண்டதைப்

பிற்கால இலக்கண நூலார் எதிர் கொள்ளும் விதத்தினைத் தெரிந்து கொள்ளுதலும் இப்பாடத்தின் நோக்கம் ஆகும்.

**பாடத்திட்டம்:**

**கூறு 1:** 'கிளவியாக்கம்': - பெயர்க்காரணம் - இரு திணை ஐம்பாற் சொற்கள் - வழுவும் அமைதியும் - திணை வழுவமைதி; செப்பு வழுவமைதி; வினா வழுவமைதி; மரபு வழுவமைதி ஆகியன குறித்த செய்திகள்

**கூறு 2:** 'வேற்றுமையியல்': - 'வேற்றுமை மயங்கியல்': - 'விளிமரபு'- எண் வகை வேற்றுமைகள் - வேற்றுமை உருபுகளும் அவற்றின் பொருள்களும் - பொருள் மயக்கம் - உருபு மயக்கம்

**கூறு 3:** 'பெயரியல்': - 'வினையியல்': நால்வகைச் சொற்களின் பொது இலக்கணம் - பெயர்ச் சொற்கள் வகை - உயர் திணைப் பெயர்கள் - அ.நிணைப் பெயர்கள் - விரவுப் பெயர்கள் - பாகுபாடு. வினைச்சொல் இலக்கணம் வகை - தெரிநிலை வினைமுற்று - குறிப்பு வினைமுற்று - விரவு வினை - வகை

**கூறு 4:** இடையியல் - உரியியல்: இடைச் சொல் இலக்கணம் - வகை - தத்தம் குறிப்பில் பொருள் செய்பவை - அசைநிலை - இசை நிறை - எண்ணிடைச் சொற்கள், உரிச் சொல் இலக்கணம் - வகை - குறிப்புப் பற்றி வருவன - பண்பு பற்றி வருவன - இசை பற்றி வருவன - உரிச் சொல்லின் பொருள் உணர்தல்

**கூறு 5:** எச்சவியல்: - செய்யுள் ஒழிபு - நால்வகைச் சொற்கள் - செய்யுள் விகாரம் - பொருள் கோள் - கிளை நுதல் பெயர்கள் தொகைச் சொற்கள் - அடுக்கு - எச்சம் - அவையல் கிளவி - இரத்தல் கிளவி - வழக்கு மொழி - குறிப்பு மொழி - முன்னிலைச் சொல்

ஒவ்வொரு கூறிலும் இடம் பெற்ற செய்திகளைப் பிற்கால இலக்கண நூல் செய்திகளுடனும், மொழியியல் அறிஞர்களின் கருத்துக்களுடனும் ஒப்பிடல்

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PGT-4544

சிலப்பதிகாரம்

7Hr/5Cr

**நோக்கம்:**

சிலப்பதிகாரப் பனுவலை மரபு வழி வாசிப்பு முறைமைக்கு உட்படுத்தலும் உரையாசிரியர்களின் துணையோடு விளங்கிக் கொள்ளுதலும் இப்பாடத்தின் நோக்கங்களாகும்.

கூறு 1: காப்பியம் - தோற்றக் காரணிகள் - பெயர் விளக்கம் - தமிழில் இலக்கிய இலக்கணப் பனுவல்களில் காப்பியகத் தொடக்கத்திற்கான வேர்கள் - வாய்மொழி வழக்காறுகள் - வீரயுகப்பாடல்களின் தொடர்ச்சியாக உரையிடையிட்ட பாட்டுடைச் செய்யுள் உருப்பெறுதல் - காப்பியமொழி - காப்பியத்தின் பண்பு - காப்பியத்தின் அமைப்பு.

கூறு 2: புகார்க்காண்டம்: பதிகம் - வாழ்த்து - பாத்திர அறிமுகம் - நாடக அரங்கு, இசை குறித்த செய்திகள்- கானல் வரிப்பாட்டின் சிறப்பு - கண்ணகியின் கனவு - காப்பிய உத்தியாதல்.

கூறு 3: மதுரைக் காண்டம்: வழி குறித்த செய்திகள் - மதுரை நகரின் அமைப்பு - அடைக்கலப் பொருளின் சிறப்பு - கோவலன் கொலைக்களப்படல் - கண்ணகியின் அவலமும் துணிவும் - அற்புதக் கதை புனைவுறுதலைச் சுட்டுதல்.

கூறு 4: வஞ்சிக்காண்டம்: சேரன் செங்குட்டுவனின் ஆட்சிச்சிறப்பு - மலைவளம் - பத்தினிப் பெண்ணிற்குக் கோட்டம் எழுப்பிய பாங்கினை விளக்குதல்.

கூறு 5: சிலப்பதிகாரக் காப்பியத்தைத் திறனாய்தல்: அரும்பதயுரையாசிரியர்,  
அடியார்க்குநல்லார் தொடங்கி ந.மு.வேங்கடசாமி நாட்டார் வரை ‘கானல்வரி’  
பகுதிக்கு எடுத்தாளப்படும்  
உரைகளை ஒப்பிட்டுக் கூறுதல்.

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**பாடத்திட்டம் :**

**கூறு 1:** தமிழரின் தொல் சமயம் (இயற்கையை வணங்குதல், வேலன் வெறியாட்டு, கொற்றவை வழிபாடு) - சமண சமயத்தின் தோற்றம் - சமணத்தின் முன்று பெரும் பிரிவுகள் - சமண சமய தத்துவங்கள் - சமண ஒழுக்கங்கள் - சமணம் வலியுறுத்தும் திறவற .∴ இல்லற ஒழுக்கங்கள் - தமிழகத்தில் சமணம் - சமண சமய வீழ்ச்சிக்கான காரணங்கள் - சமண இலக்கியங்களும் சமயக் கருத்துக்களும் - திருக்குறள் (கடவுள் வாழ்த்து), சிலப்பதிகாரம் (புகார்க் காண்டம் : இயற்கையை வாழ்த்துதல்), (நாடு காண் காதை : அருகதேவன் வழிபாடு) - பௌத்த சமயத்தின் தோற்றம் - பௌத்த பிரிவுகளும் சிந்தனைகளும் - நால்வகை வாய்மைகள் - பன்னிரு சார்புகள் - சீலங்கள் - அட்டாங்க மார்க்கம் - பௌத்தத்தின் அடிப்படைக் கொள்கைகள் - நிருவாணம் - பௌத்தத் திருமுறைகள் - தமிழகத்தில் பௌத்தம் - பௌத்த இலக்கியங்களும் சமயக் கருத்துக்களும் - மணிமேகலை: தவத்திறம் பூண்டு தருமங் கேட்ட காதை - புத்தர் தோத்திரப் பாடல்கள்.

**கூறு 2:** தமிழகத்தில் சைவ, வைணவ சமயங்கள் தழைத்த சூழல் - பக்தி இயக்கமாக உருவானதைச் சுட்டல் - 'பக்திநெறி' (சைவம் .∴ வைணவம்) : விளக்கம் - நாயன்மார்களும் திருமுறைகளும் - நாயன்மார்களின் சமயப்பணி - தலங்கள் தோறும் பண்ணோடுபாடி அன்புநெறியை முதன்மைப்படுத்துதல் - பாடல்களில் சமயக் காழ்ப்புணர்வு இடம்பெற்றதைக் குறிப்பிடல் - (திருஞானசம்பந்தர்: திருமருகல்: 1-11), (திருநாவுக்கரசர்: தனிக்குறுந்தொகை: 1-10) - மக்களோடு நெருங்கியும் அவர்தம் வழக்காறுகளை உள்வாங்கியும் வைணவம் தழைத்ததைச் சுட்டல் - ஆழ்வார்களும் திவ்ய பிரபந்தமும் - வைணவம் முன்னிறுத்தும் இறை வடிவங்கள் - பாகவத தருமம் - முதலாழ்வார்களின் சமயப்பணி (பொய்கையாழ்வார்: முதல் திருவந்தாதி: 2082-2093) – நாயக நாயகி பாவனை சிறப்பிடம் பெறுதல் (நம்மாழ்வார்: 4ஆம் திருவாய்மொழி: தலைமகள் தூதுவிடல்: 2932 – 2942) - பக்தி நெறியில் பெண்கள் தீவிரமாகப் பங்கேற்கும் நிலையைக் காரைக்கால் அம்மையார்: அற்புதத் திருவந்தாதி: 1-10) .∴ ஆண்டாள்: திருப்பாவை: 474-486 பாடல்கள் வழிக் குறிப்பிடல் - சைவ நெறியினின்று வைணவம் மாறுபடுவதை ஏற்புடைய பாடல்கள் வழிக் காட்டுதல்

**கூறு 3:** இஸ்லாமியர்களும் தமிழகமும் - இஸ்லாமும் தமிழும் - தமிழிலக்கியத்தில் 'படைப்போர்' இலக்கிய வகையின் தோற்றம் - கச்சுன் படைப்போர், ஐந்து படைப்போர் - 'கிஸ்ஸா' இலக்கியத்தின் தோற்றம் - யூசுப் நபி கிஸ்ஸா – 'நாமா' இலக்கியத்தின் தோற்றம் - மி.:றாஜ் நாமா - இஸ்லாமிய சதகங்கள் - இறகுல்

சதகம் - சூ.பித்துவம் - சூ.பித்துவத்தின் அடிப்படைகள் - சூ.பிப் பண்புகள் - சூ.பிப் பெண்கள் (ஃபாத்திமா, கதிஜா, உம்மு ஹரம்) - சூ.பிக் கதைகள் - சூபித் தத்துவக் கொள்கை இஸ்லாத்தில் அமைந்திருப்பதைச் சுட்டல்.

**கூறு 4:** தமிழகத்தில் ஐரோப்பியர்களின் வருகை – ஐரோப்பியர்களின் தமிழ்ப்பணி – கிறித்தவத் தமிழ்ப்புலவர்களின் தமிழ்ப்பணி – கிறித்தவத் தமிழ்க்கவிதைகளின் தோற்றம் - கிறித்துவத்தின் கொள்கைகளும் தத்துவங்களும் கிறித்தவ இலக்கியங்களில் அமைந்து கிடப்பதைச் சுட்டல் - கித்தேரியம்மாள் அம்மாணை (பிறப்புக்காதை) – திருக்காவலூர் கலம்பகம் (புய வகுப்பு, ஊசல், தூது) - பெதலகேம் குறவஞ்சி (மலைவளம்: 322-334), (நாட்டுவளம்: 335-344).

**கூறு 5:** சாதி, சமய வேறுபாடுகளைக் களைந்து ஜீவகாருண்ய ஒழுக்கத்தை வள்ளலார் முதன்மைப்படுத்துவதைச் சுட்டல் (திருவருட்பா: மகாதேவமாலை: 1-10) - தாயுமானவர் பாடல்களில் முதன்மைப்படும் ஓர் இறைகொள்கையினைச் சுட்டல் (திருப்பாடற்றிரட்டு: எங்கு நிறைகின்ற பொருள்: 1-11), (திருப்பாடற்றிரட்டு: எந்நாட்கண்ணி: பொருளியல்பு) - பாரதியின் பக்தி பார்வை (சக்தி, வையம் முழுதும், சக்தி விளக்கம்) - பல்சமயத் தத்துவங்களுக்கிடையே உள்ள பொதுமையையும் இணக்கத்தையும் இணக்கமின்மையையும் குறிப்பிடல்.

## பாடநூல்

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

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6Hrs/4 Credits

**நோக்கம்:**

இக்கால இலக்கியப் புனைவுகர்த்தாக்களுள் அதிமுக்கிய மேதமையரை இனங்கண்டு, அவர்களையொட்டிய நவீன இலக்கிய வளர்ச்சிக்குப் போக்குகளை அவதானித்தறிதலும் மதிப்பிடுதலும் இப்பாடத்தின் முதன்மை நோக்கங்களாக அமைகின்றன. இத்துடன், குறிப்பிடத்தக்கப் படைப்புப் பிரதிகளை இரசனை முறையில் அணுகுவதும், பரந்துபட்ட/பன்முக வாசிப்புத்திறனை வளர்த்துக் கொள்வதும் இப்பாடத்தின் பிற நோக்கங்களாக அமைவுறுகின்றன.

**பாடத்திட்டம் :**

**கூறு 1: நவீனகாலச் சிறுகதை மேதைகள்:** புதுமைப்பித்தன் - யதார்த்தவாத மலர்ச்சி: ∴ மரபுமீறல், தொன்ம மறு ஆக்கம் ∴ அதி எதார்த்தச் சித்திரிப்பு(தெருவிளக்கு, கவந்தனும் காமனும்). பொன்னகரம், அகல்யை, சாபம் விமோசனம். காலனும் கிழவியும், கட்டில் பேசுகிறது, காஞ்சனை) , கு.ப.ரா. - வடிவச்செம்மை ∴ பெண்மனப்பதிவு (விடியுமா. ஆற்றாமை, திரை) , கு.அழகிரிசாமி - சிறார் உலகம் (காற்று, ராஜா வந்திருக்கிறார், அன்பளிப்பு), மௌனி - ஆழ்மனவுலகப் பிரதிபலிப்பு (ஏன், அழியாச்சுடர், சாவில் பிறந்த சிரு'டி), சி.சு.செல்லப்பா இனவரைவு முயற்சி (குற்றப் பரம்பரை, முறைமைப்பெண்), க.நா.சு.- ஆத்மவிசாரம் (சாவித்திரி), கி.ரா.- வட்டாரப்பதிவு (கதவு,வேட்டி), லா.ச.ரா. - தத்துவ தரிசனம் (இதழ்கள்-3), சுந்தர ராமசாமி - உருவநேர்த்தி, செறிவு(ஜன்னல், பல்லக்குத் தூக்கிகள்), ஜெயகாந்தன் - புதிய மதிப்பீடுகள்(அக்னிப்பிரவேசம்), கிரு'ணன்நம்பி - நகரவாழ்வின் நெருக்கடி(தங்க ஒரு), சா.கந்தசாமி - தலைமுறை இடைவெளி(பாய்ச்சல், தக்கையின்மீது நான்கு கண்கள்), சுஜாதா - அறிவியல் சிந்தனை(முனுசாமி 1:2:1, ஆயிரம் வருடங்கள் வாழ்வது எப்படி).

**கூறு 2: சமகாலச் சிறுகதை ஆளுமைகள்:** ஆர்.சூடாமணி, அம்பை - பால் பாகுபாடுகள்(அம்மா பிடிவாதக்காரி ∴ புனர்), வீரவேலுச்சாமி, கோணங்கி, நாஞ்சில்நாடன் - வேர்களைத் தேடுதல்(லட்சுமி ஓடிப்போகிறாள், மதினிமார்கள் கதை ∴ உப்புக்கிணறு, வண்ணநிலவன்,பிரபஞ்சன் - இருத்தல் ∴ சுயம் சார்ந்த பிரச்சினைகளைக் கதையாக்கல்(திருடன், ∴ மரி என்கிற ஆட்டுக்குட்டி), ச.தமிழ்ச்செல்வன்,- ஆசைகளும் நிராசைகளும் மையமாதல்(பாவனை, மீடியம், வெயிலோடு போய்), வேலராமமூர்த்தி, சோ.தர்மன் - சாதிய முரண்கள் (எருதுகட்டு ∴ மனிதம்), பெருமாள் முருகன்- மானுட நசிவு(கடைசி இருக்கை), - ஆதவன், பிரேம் ரமே' - மனப்பிறழ்வு நிலை (அப்பாப்பொத் ∴ மனவெளி நாடகம்), கண்மணி குணசேகரன் - நாட்டார் வழக்காற்றியலைக் கதையாக்கும் திறன் (மானுடர்களும் அமானுடர்களும்), தமிழவன், எஸ்.ரா., காலபைரவன் - அதிபுனைவு அழகியலில் மேன்மை (சொற்பொழிவுகள்.∴ பாதம்.∴ காக்கா கதை).

**கூறு 3: நவீனகாலப் புதினப் படைப்பாளுமைகள்:** சுந்தர ராமசாமி - மரபை நவீனம் எதிர்கொள்ளல் (ஒரு புளியமரத்தின் கதை), ஹெப்சிபா ஜேசுதாசன் - வாழ்வியல் முரண்கள்(புத்தம் வீடு)இ நீலபத்மநாபன் - வாழ்வின் நசிவும் உறவுகளின் தகர்வும் (பள்ளிகொண்டபுரம்), ஜெயகாந்தன் - வாழ்நிலையில் பற்றும் இன்மையும் (ஒரு மனிதன் ஒரு வீடு ஒரு உலகம்), அசோகமித்திரன் - குறியீட்டுத்தன்மையும் இருண்மையும் (தண்ணீர்), தி.ஜானகிராமன்- பாலியல்சித்திரிப்பும் மனித மேன்மையும் (மரப்பசு), ஜி.நாகராஜன் - தனிமனித நெருக்கடி (நாளை மற்றுமொரு நாளே), பூமணி - வட்டார வாழ்வின் பதிவும் சாதியக் கருத்துநிலைகளைப் புதினமாக்குதலும் (பிறகு).

**கூறு 4: தொடக்க காலத்தைய கவிதை மேதமையர்:** நவீன கவிதையின் தொடக்கமும் முன்னோடிகளும்: பிச்சமுர்த்தி உள்ளிட்ட 'மணிக்கொடி'க் காலகட்டக் கவிஞர்கள்- ந.பி.

இயற்கையும் வாழ்வுசார் அனுபவங்களும் கவிதையாதல் (காதல்,பூக்காரி,வழித்துணை), கு.ப.ரா., கருவளையும் கையும்), நவீன கவிதையின் பல்வேறு போக்குகள்: தருமுசிவராம் உள்ளிட்ட 'எழுத்து'க் காலகட்ட கவிஞர்கள்: பிரமிள் - படிமச்சிறப்பு (விடிவு), பசுவையா-குறியீட்டுத்தன்மை(கதவைத்திற,உபயம்), டி.கே.துரைஸ்வாமி - சுய அனுபவப் பதிவுகள்(ஸ்டேசன்,சுருதி), நவீனக் கவிதைகளில் முற்போக்குச் சிந்தனைகள்: வானம்பாடிக் கவிஞர்களின் கவிமுயற்சி: - உள்ளத்துணர்வு கவிதை வடிவம்பெறல் கங்கைகொண்டான் (கொசுக்கள், சில நைலான் கனவுகள் எரிகின்றன), சமுதாய அவலங்கள்: புயியரசு(ஏலி ஏலி லாமா சபக்தானி) , தமிழ்நாடன் (காந்தியஞ்சலி), மீரா (செத்தாலும் மேன்மக்கள் மேன்மக்களே), இருத்தல்சார் நெருக்கடிகள்: 'கசடதற'க் காலகட்டக் கவிஞர்கள்: ஞானக்கூத்தன் (மஹ்ஹான் காந்தீ மஹ்ஹான், யெதிரெதிர் உலகங்கள், அம்மாவின் பொய்கள்), காலப்பிரியா(ஒரு வீடு ஒரு மனிதன் ஒரு உலகம், சினேகிதனின் தாழ்வான வீடு), கல்யாணஜி (இவனைப் போன்ற கவிதை, நசுங்கிப்போனவை),

**கூறு 5: நவீனகாலக் கவிதையாளுமைகள்:** நவீனக் கவிதைகளில் தன்னனுபவப் பதிவுகள்: சமயவேல் (பரிணாமப் பயன்பாடுகள், ஏதேனும் ஒரு அழகிய கனவு, எங்களுக்கு ஒரு அறை இருந்தது), மண் சார்ந்த வாழ்வின் இழப்பைப் பதிவு செய்தல் - சுயம்புலிங்கம்(சாலை அதிகாரி, என் பூர்வீக வீடு திரும்புகிறேன்), நவீனக் கவிதைகளில் சமகாலச் சிக்கல்கள்: அன்பாதவன் (தேர், காக்கைகளின் காலம்), ஆதவன் தீட்சண்யா(ரியல் எஸ்டேட் பிரச்சனை), சல்மா (விலகிப்போகும் வாழ்க்கை, இரண்டாம் ஜாமத்துக்கதை), சமகாலக் கவிதைகளில் புதிய உள்ளீடுகள்: மனு'யபுத்திரன் (தோழர் ஹிட்லர்), யவனிகா ஸ்ரீராம்(காய்க்காத தாவரங்கள், அவசர முந்துதல்) பிரான்ஸிஸ் கிருபா (சாலையோரம், கனவு).

#### பாடநூல்:

பாடத்திட்டத்துள் குறிக்கப்பட்டுள்ள படைப்பாளிகளின் கதைகள் மற்றும் கவிதைகளின் நகல் தொகுப்பு

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PGT-4300

அரங்கக்கலை

4 Hr/3Cr

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### நோக்கம்

அரங்கக்கலையை செயல்முறையாக அணுகுவதன் மூலம் நாடக்கலையின் நுட்பங்களை அறிமுகப்படுத்தி, குறிப்பாக நடிகனுக்கான பயிற்சிகள் மூலம் மாணவர்தம் ஆளுமைத்திறன்களை மேம்படுத்துதல் இப்பாடத்தின் நோக்கமாக அமையும்.

**கூறு 1:** அரங்கக்கலை பற்றிய அறிமுகம் - அரங்கத்தில் நடிகள் - நடிகனுக்கான அடிப்படைத்திறன்கள் - உற்றுநோக்குதல் (Observation) – போலச்செய்தல் (Imitation) கற்பனையாற்றல் (Imagination) – ஒருமுகப்படுத்துதல் (Concentration) – உணர்வெழுச்சி (Emotion) – நம்புதல் (Beliving) – பாத்திரமாதல் (Characterization)



**கூறு 2:** குரலியக்கம் (Voice Culture) – உடலியக்கம் (body movements) – உள உடல் இயங்கியல் (psycho-physical action) – புதிதளித்தல் (improvisation)

**கூறு 3:** அன்றாட வாழ்வியல் இருந்து பாத்திரங்களை உருவாக்குதல் - நிகழ்வுகளைக் காட்சிகளாக்குதல் - குழுவாக நாடகப் பிரதிகளை உருவாக்குதல் - பல்வகை அரங்குகள் - சூழலை அரங்கா மாற்றுதல் - சிறுபிரதிகளை பரிட்சித்துப்பார்த்தல்.

**கூறு 4:** நாடகப்பிரதியைத் தேர்வுசெய்தல் - வாசித்தல் - பாத்திரத் தேர்வு – ஒத்திகைக்கு முந்தைய, பிந்தையபணிகள் - மேடையேற்றம்.

**கூறு 5:** அரங்க வடிவமைப்பு – உடை&ஒப்பனை – ஒலி&இசை – அரங்கப்பொருட்கள் - அரங்கும் பின்னரங்கும்.

இப்பாடத்தின் அகபுறமதிப்பீடுகள் அனைத்தும் செய்முறைத் தேர்வுகளாக அமையும். தனியாகவும் குழுவாகவும் சிறு செயல்பாடுகள் மூலம் மதிப்பெண்கள் வழங்கப்பெறும். குழுவாக 10-15 நிமிடங்களுக்குள்ளாக நிகழ்த்தப்படும் நாடகங்களை மதிப்பீடுவதன் மூலம் புறமதிப்பீட்டு மதிப்பெண் வழங்கப்பெறும். நாடக நிகழ்வுக்கு 75% மும்வாய்மொழித்தேர்வுக்கு 25% வழங்கப்பெறும்.

#### பாடல நூல்

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

#### பார்வை நூல்கள்:

1. கான்ஸ்தந்தீன்ஸ்தானிஸ்லாவ்ஸ்கி – ஒரு நடிக்கன் உருவாகிறார், கண்ணதாசன் பதிப்பகம்,2011.
2. Dr. Ambika Kameshwar – Theater Art for Holistic Deveopment, Rasa Publication, 2006.
3. Kathleen Gallagher & David Booth –How Theatre Educates: Convergences & Counterpoints, University of Toronto Press, 2003.
4. Helen Nicholson – Theatre Education, Palgrave Macmillan, 2009.
5. மு.இராமசுவாமி – நடிப்புகூடு விட்டு கூடுபாயும் ஒரு பண்படுவம், நியூசெஞ்சுரி புக் ஹவுஸ்,2015.
6. சுரேஷ்வரன் - நடிப்பு: அகம்புறம், நிழல்,2013.
7. அஸ்வகோஷ் - அரங்கஆட்டம் இயக்குதல் கோட்பாடு, மங்கைபதிப்பகம்,1993.
8. முனைவர் தா.ஏ.ஞானமூர்த்தி – நடிப்புக்கலை, தமிழ்ப் பல்கலைக் கழக வெளியீடு,2006.
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10. முனைவர் சக்திப்பெருமாள், – அரங்கவியல், காவியா, 1998.
11. முனைவர்வே. சரோஜா முனைவர் இரா.இராசு – நாடகத்தொழில் நுணுக்கம்  
காட்சியமைப்பு, தமிழ்ப் பல்கலைக் கழக வெளியீடு,2005.

**நோக்கம்:**

தொல்காப்பிய பொருளதிகார நூற்பாக்களை மரபுவழி வாசித்தலும் உரையாசிரியர்களின் உரைகளின் துணையோடு அகம் சார்ந்த நிகழ்வுகளையும் அவற்றின் வெளிப்பாடுகளையும் அறிந்து கொள்ளுதல் இப்பாடத்தின் நோக்கமாகும். மேலும், நம்பியகப்பொருள் வாயிலாகப் பிற்காலப் பார்வையைப் புரிந்து கொள்ளுதலும் இப்பாடத்தில் அடங்கும்.

**பாடத்திட்டம்:**

கூறு 1: அகத்திணை : திணை – துறை – முதல், கரு, உரிப்பொருள் - அன்பின் ஐந்திணை – நானிலப் பாகுபாடு – பாலையின் தனித்தன்மை – கைக்கிணை பெருந்திணை.: இவற்றை நம்பியகப்பொருளோடு பொருத்திக் காட்டுதல்.

கூறு 2: களவு - கற்பு எனும் பாகுபாடு – களவியல் மாந்தர்கள் - தலைவன் -தலைவிப் பாத்திரச் சித்திரிப்பு – உளவியல் அடிப்படையிலான நோக்கு – களவியற் துறைகள் : இயற்கைப் புணர்ச்சி - இடந்தலைப்பாடு – பாங்கர், பாங்கியர் கூட்டம் - அறத்தொடு நிறறல் - உடன்போக்கு – வரைவு – பிரிவு – செலவு – செலவுமுங்குதல் - வாயில் நேர்தல் - வாயில் மறுத்தல் - கிழவோள் மாண்புகள் - பரத்தமை : இவற்றை நம்பியகப்பொருளோடு பொருத்திக் காட்டுதல்

கூறு 3: கற்பியல் மாந்தர்கள் - கற்பியலுக்கும் களவியலுக்கும் துணை நிற்கும் பிறமாந்தர்களின் செயல்கள் - அகத்திணையில் தோழி பெறுமிடம் - இவற்றை நம்பியகப்பொருளோடு பொருத்திக் காட்டுதல்.

கூறு 4: மெய்ப்பாடு : விளக்கம் - எண்வகை மெய்ப்பாடு – தோன்றுவதற்கான சூழல் அகத்திணைக்குரிய மெய்ப்பாடு.

கூறு 5: உவமை – நிலைகளன்கள் - உவமப் போலி - உள்ளுறை - இறைச்சி

**பாட நூல்:**

கு.சுந்தரமூர்த்தி - தொல்காப்பியம் பொருளதிகாரம், (பேராசிரியர் உரை), அண்ணாமலைப் பல்கலைக்கழகம், சிதம்பரம், 1995.

**பார்வை நூல்கள்:**

1. க.ப.அறவாணன் - அற்றை நாட் காதலும் வீரமும், மணிவாசகர் பதிப்பகம், 2000.

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3. வ.சுப.மாணிக்கம் - தமிழ்க் காதல், மெய்யப்பன் தமிழாய்வகம்,சென்னை,2005.
4. தமிழண்ணல் - தொல்காப்பியரின் இலக்கியக் கொள்கைகள், பாகம் - ஐ, மீனாட்சி புத்தக நிலையம், மதுரை,2004.
5. தொல்காப்பியரின் இலக்கியக் கொள்கைகள், பாகம் -II, செல்லப்பா பதிப்பகம், மதுரை,2004.
6. அம்மன் கிளி முருகதாஸ், சங்கக் கவிதையாக்கமும் - மரபும் மாற்றமும், குமரன் புத்தக நிலையம், சென்னை, 1971.
7. ந.சுப்பு ரெட்டியார் ,தொல்காப்பியம் காட்டும் வாழ்க்கை, சந்தியா பதிப்பகம், சென்னை,2007.

**நோக்கம்:** சங்கப் பாடல்களில் அகவுணர்வுகளை வெவ்வேறு நிலைகளில் தெரிந்து கொள்ளுதலும் இலக்கியத்தின் வடிவத்தையும், உள்ளடக்கத்தையும் அறியும் படிச் செய்தலும் தமிழரின் தொன்மைக் கால பண்பாட்டு அக மரபினை ஐந்திணைக் கோட்பாட்டின் அடிப்படையில் அறிந்து கொள்ளும்படிச் செய்தலும் இப்பாடத்தின் நோக்கமாகும்

கூறு:1 தொல்காப்பிய அகத்திணை மரபுகளுக்கேற்ப குறுந்தொகை, நற்றிணைப் பாடல்கள் அமைந்துள்ள பான்மையை எடுத்துக் கூறல் - முதல், கரு, உரி அமைந்துள்ள பாங்கு - இலக்கிய நயம் - பொருட்சிறப்புக்குப் பாடல்களின் அமைப்பு காரணமாக அமைதல்.

குறுந்தொகை 25 பாடல்கள்: 8,18,25,36,38,41,46,49,54,58,60,61, 67,70,92,312,328, 342,373,394,107,126,139,167,176.

நற்றிணை 25 பாடல்கள் : 1,14,31,260,284,155,29,13, 30,35,355,391,395, 269,45, 96,172,116,60,110,100,15,42,75,166.

கூறு:2 புறச் செய்திகள் அகத்தில் இடம்பெறும் அழகு - தொனி - வருணனை நீட்சி - நூல் அமைப்பு - அகமாந்தர்கள் அறிமுகம் - கிரேக்க இலக்கியத்துடன் ஒப்பிடல். அகநானூறு 10 பாடல்கள்: 16, 82, 99, 122, 128, 145, 27, 34, 97, 70.

கூறு:3 இறைச்சி, உள்ளுறை - நூல் அமைப்பு - இயற்கைப் பின்னணியில் மனித உணர்வு - காட்சிப்படுத்தல். - வாய்மொழிக் கூறுகள்.

**ஐங்குறுநூறு - திணைக்குப் பத்துப் பாடல்கள்**

1. எருமைப் பத்து.
2. வெள்ளாங்குருகுப் பத்து.

3. அம்ம வாழிப் பத்து.
4. மகட்போக்கிய வழித் தாய் இரங்குப் பத்து.
5. பருவம் கண்டு கிழத்தி உரைத்த பத்து.

கூறு:4 நூல் அமைப்பு – எடுத்துரைக்கும் பாங்கு - இருத்தல் உணர்வு – அகமும் புறமும் இணைந்துள்ள பாங்கு - தொன்மச் செய்திகள் - பண்டைத் தமிழரின் நம்பிக்கை. **முல்லைப் பாட்டு (முழுவதும்).**

கூறு:5 நாடகப்பாங்கு – நூல் அமைப்பு – அகமாந்தர்களின் உரையாடல் - புராணக் கதைகள் இடம் பெறல். **கலித்தொகை – பாலைக்கலி**

### பாடநூல்

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்) **பார்வை நூல்கள்.**

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2. தனிநாயக அடிகள், நில அமைப்பும் தமிழ்க் கவிதையும், (மொ.பெ) க.பூரணச்சந்திரன், நியூ செஞ்சரி புக் ஹவுஸ், சென்னை, 2014.
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**PGT 5545**

**சமயக்காப்பியம்**

**6Hr /5Cr**

### நோக்கம் :

காப்பியங்கள் சமயங்களின் பின்புலத்தில் உருப்பெற்றமையை இனங்காணுதலும் காப்பியங்களை அதனதன் போக்கில் புரிந்து கொள்ளுதலும் இப்பாடத்தின் நோக்கங்களாகும். தற்காலத்தில் சமயங்கள் முன்னெடுக்கும் இலக்கிய வடிவங்களைப் பயிலுதலும் இப்பாடத்திட்டத்துள் அடங்கும்.

**பாடத்திட்டம்**

கூறு 1: பௌத்த மதக் கொள்கைகள் - மணிமேகலை - “பவத்திறம் அறுகென பாவை நோற்ற காதை” - சமண சமயத்தின் அடிப்படைத் தத்துவம் - சீவக சிந்தாமணி - “முக்தி இலம்பகம்”.

கூறு 2: வைணவம் - பன்மொழி இராமாயணம் - கம்பராமாயணம் - கம்பனின் வைணவக் கொள்கை - ‘விராதன் வதைப்படலம்’ - புராணம் , காப்பியம் வேறுபாடு - ஒற்றுமையும் வேற்றுமையும் - சைவம் - சாதிய வேறுபாட்டைக் களைய முற்படல் - பெரிய புராணம் - ‘கண்ணப்ப நாயனார் புராணம்’.

கூறு 3: தர்க்க நிலையில் அமைந்த காவியங்களின் தோற்றம் - சமயத்தில் தர்க்கம் இடம்பெற்றமை தமிழில் தர்க்கக் காப்பியங்கள் - நீலகேசி - ”தரும உரைச் சருக்கம்”.

கூறு 4: கிறித்தவ இலக்கியம் தோற்றம் பெற்ற சூழல் - கிறித்தவக் காப்பியங்கள் - தேம்பாவணி - ‘வளன் சனித்த படலம்’ - இஸ்லாமிய மதக் கொள்கைகள் - இஸ்லாமியக் காப்பியங்கள் - சீறாப்புராணம் - ‘உடும்பு பேசிய படலம்”.

கூறு 5: தற்காலத்தெழுந்த சமயக் காப்பிய முயற்சிகள் - சைவ, வைணவக் காப்பியங்களை அடியொற்றி உருவான மான்மியங்களும் தலபுராணங்களும் - கிறித்தவம் - புனிதர் எனும் கருத்தாக்கம் உருப்பெற்றமை -அதன்வழி கதைகள் , கதைப்பாடல்கள் , நாடகங்கள் உருவாதல் - இஸ்லாமியத்தில் எழுந்துள்ள புதுவகை இலக்கியங்கள் - இருபதாம் நூற்றாண்டு காப்பிய முயற்சிகள்.

**பாடநூல்:**

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

**பார்வை நூல்கள் :**

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PGT 5547

நாட்டுப்புறவியல்

6Hrs/5credits

**நோக்கம்** : நாட்டுப்புற இலக்கியங்களை அறிமுகம் செய்தலும் களஆய்வின் வழியாக வழக்காறுகளைச் சேகரிக்கும் பயிற்சியினை மாணவர்களுக்கு கற்றுத்தருவதும் இப்பாடத்தின் நோக்கமாகும்.

**பாடத்திட்டம்** :

கூறு 1 : நாட்டுப்புறவியல் குறித்தான கருத்தாக்கங்கள் - நாட்டுப்புறவியல் நாட்டார் வழக்காற்றியல் சொற்கள் தொடர்பான விவாதங்கள் - வாய்மொழி வழக்காறுகள் - நாட்டுப்புறக்கதைகள் - நாட்டுப்புறப்பாடல்கள் - கதைப்பாடல்கள் - இயல்புகள் - பாடுபொருள் - வகைப்படுத்தலில் ஏற்படும் சிக்கல்கள் - கதை அடைவுகள் - பழமொழிகள்- விடுகதைகள் - நம்பிக்கைகள் - விளையாட்டுக்கள் - குழந்தை வழக்காறுகள் - அறிமுகம் செய்தல், சமூகத் தேவைகளை விளக்குதல்

கூறு 2 : நாட்டுப்புற நிகழ்கலைகள் - வில்லுப்பாட்டு - தெருக்கூத்து - தோற்பாவைக்கூத்து - நிகழ்த்து மரபும் - பார்வையாளர்கள் இடம்பெறும் முறை (பிளாக்பர்ன்) - இசையும் கூத்தும் (பிராஸ்கா, பிரண்டா பெக்) - வாழ்வும் புழங்கு பொருள் பண்பாடும் - கைவினைக் கலைகள் - கலைப் படைப்புகள் - மண்பாண்டக்கலை - உருவாரங்கள் செய்யும் முறை - நாட்டுப்புற உணவு

கூறு 3 : சமயத்தின் தோற்றமும் வழிபாடு தொடர்பான கருத்தாக்கங்களும் - ஆவியுலகக்கோட்பாடு - உயிரியக் கோட்பாடு - போலிப்பொருள் வழிபாடு - குலக்குறி வழிபாடு - மந்திரம், சமயம், சடங்குகள் இவற்றிற்கிடையிலான உறவுகள் - சமயத்தின் உட்கூறுகள்

கூறு 4 : நாட்டுப்புற களஆய்வு நெறிமுறைகள் - பங்கேற்பு - உற்றுநோக்கல் - வினாநிரல் - சேகரிப்பாளன் தகவலாளி உறவு - களஆய்வில் தரவுகளைச் சேகரித்தலும் ஆவணப்படுத்தலும்

கூறு 5 : நாட்டுப்புறவியலும் பிற துறைகளும் - மானிடவியல் - இலக்கியம் - சமூகவியல் - மொழியியல் - வரலாறு

**பாடநூல்கள்:**

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நாட்டார் வழக்காற்றியல் ஆய்வு மையம்,  
தூய சவேரியார் (தன்னாட்சி) கல்லூரி, பாளையங்கோட்டை.
2. தேலூர்து 2003 'களஆய்வு நெறிமுறைகள்',  
நாட்டார் வழக்காற்றியல் ஆய்வு மையம்,  
தூய சவேரியார் (தன்னாட்சி) கல்லூரி, பாளையங்கோட்டை
3. ஆறு.இராமநாதன் 1982 'நாட்டுப்புறப்பாடல்கள் காட்டும் தமிழர் வாழ்வியல்'  
மணிவாசகர் பதிப்பகம், சிதம்பரம்.
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**பார்வை நூல்கள்:**

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மணிவாசகர் பதிப்பகம், சிதம்பரம்.
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நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிமிடெட், சென்னை.
5. அ.அறிவுநம்பி 1986 'தமிழகத்தில் தெருக்கூத்து',  
அமுதன் நூலகம், காரைக்குடி.
6. பக்தவத்சலபாரதி 1990 'பண்பாட்டு மானிடவியல்',  
மணிவாசகர் பதிப்பகம், சிதம்பரம்.
7. வ.ஜெயா 2004 'தமிழக நாட்டுப்புறக்கலைகள்'  
அகரம் வெளியீடு, தஞ்சாவூர்.
8. ஏ.என்.பெருமாள் 2003 'தமிழக நாட்டுப்புறக்கலைகள்',  
உலகத் தமிழராய்ச்சி நிறுவனம். சென்னை.
9. ஆறு.இராமநாதன் 2007 'தமிழர் கலை இலக்கிய மரபுகள்' (நாட்டுப்புறவியல்  
கட்டுரைகள்),  
மெய்யப்பன் பதிப்பகம், சிதம்பரம்.
10. கே.ஏ.குணசேகரன் 1993 'நாட்டுப்புற நிகழ்கலைகள்',  
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிமிடெட், சென்னை
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நாயகம்  
தமிழ்ப்பதிப்பகம், சென்னை.



- |     |                                      |      |   |
|-----|--------------------------------------|------|---|
| 12  | சரஸ்வதி<br>வேணுகோபால்<br>மு.இராமசாமி | 1976 | ‘களஆய்வில் சில அனுபவங்கள்’,<br>தாமரை வெளியீடு, மதுரை.                   |
| 13  | இ.முத்தையா                           | 1986 | ‘நாட்டுப்புற மருத்துவ மந்திரச் சடங்குகள்’,<br>அன்னம் பி.லிட், சிவகங்கை. |
| 14. | கி.வா.ஐகந்நாதன்                      | 1975 | ‘மலையருவி’இ<br>தஞ்சை சரசுவதி மகால் வெளியீடு, தஞ்சாவூர்.                 |

PGT-5449

புலம்பெயர் இலக்கியம்

6Hrs/4Cr

**நோக்கம்**

சொந்த நிலத்திலிருந்து பல்வேறு சமூக, பொருளாதார, அரசியல் காரணங்களால் புலம்பெயர்ந்து வாழ்கிற அயலகத் தமிழர்களின் வாழ்வியலை, அவர்தம் படைப்புகளின் வாயிலாக விளங்கிக் கொள்ளுதல் இப்பாடத்தின் நோக்கமாகும்.

**கூறு: 1**

புலம்பெயர்வு – புகலிடம்: சொல்குறித்த விளக்கம் மற்றும் வேறுபாடு – தமிழிலக்கியத்தில் இடம் பெயர்வு குறித்த கருத்துக்கள் - தமிழகத்திலிருந்து அயல் மாநிலங்களுக்கு நாடுகளுக்குச் சென்று மக்களின் வாழ்க்கைப்பின்புலம் - காலத்தைய தமிழர்களின் இடம் பெயர்வு – தாது வருஷப் பஞ்சம் - 1980-களில் ஈழ அரசியல் - அரசியல் மாற்றம் - உலகம் முழுவதும் ஈழத் தமிழர்கள் இடம் பெயர்ந்த வரலாற்றுப் பின்புலம் - புலம்பெயர்தல் கோட்பாட்டு உருவாக்க முயற்சி.

**கூறு: 2**

புலம்பெயர் வாழ்வைக் காட்சிப்படுத்திடும் நவீன கவிதைகள் - படைப்பாளிகள்: உறவுகள் பிரிவு/ நிலம் பறிப்பு/ சொந்த ஊர் நினைவுகள்/ ஆதிவாசிகளின் போராட்டம்/ மொழி இழப்பு/ மொழிப் பிரச்சினை/ நிறவேறுபாடு / வறுமை/ முலிய பாடுபொருள்களை முன்வைக்கும் படைப்புகள்.

**வ.ஐ.ச.ஜெயபாலன்-1.** ‘இலையுதிர் கால நினைவுகள்’, 2. ‘நெடுந்தீவு ஆச்சிக்கு’

**சேரன்-1.** ‘இருகாலைகளும் ஒரு பின்னிரவும்’. 2. ‘எல்லாவற்றையும் மறந்து விடலாம்’

**மு.புஷ்பராஜன்** - ‘தனிமை’ திருமாவளவன் -1 ‘தேடுகை’, 2. ‘மனிதர் காட்சி சாலை’,

**சு.வில்வரத்தினம்** - ‘இயற்கையால் எழுதியது’/ **சுகன்-** ‘நிர்மூலமாக்கப்பட்ட பின்னானவை’/

**துஷ்யந்தன்** - ‘விழு’/ **செல்வம்-1.** ‘விசாரணை’, 2. கடிதங்களில் வாழும் மனிதர்கள்’/

**செழியன்** - ‘நிலவும் நானும்’/ **பிரிய தர்சினி** – ‘பெண்ணா ஒரு அகதி’/ **தமயந்தி-** நீ நான்

நமது கனவு’/ **அர்ச்சுனா** -1. ‘ஒரு அகதி விண்ணப்பம்’, 2. ‘பனித்துளி வாழ்வு’/ **தர்மினி** –

‘ஆயுதம் வைத்திருப்பவன் நாசமாய்ப் போகட்டும்’/ மதினி – ‘புதுங்கும் பரம்பரை தொலைக்கப்பட்ட தரவுகள்’.

**கூறு: 3**

புலம் பெயர் வாழ்வைச் சித்திரிக்கும் சிறுகதைப் படைப்புகள் படைப்பாளிகள்: அகதி படும்பாடு/ அகத்தனிமை/ புலம்பெயர்ந்த நிலத்தில் பெண்களின் நிலை மொழிப்பிரச்சினை முதலான பாடுபொருள்கள்..

**அ.முத்துலிங்கம்** - கொழுத்தாடு பிடிப்பேன், ஓ அமெரிக்க காரி **பிரேம் ரமேஷ்**- பேசப்படாத பூக்களுக்கு இனி மௌனங்களும் இல்லை, **ஷோபாசக்தி** 1.எழுச்சி, 2. **லைலாபொ.கருணாகரமூர்த்தி**- ஒரு அகதி உருவாகும் நேரம், **சை.பீரமுகமது** வெடித்த துப்பாக்கிகள், **நா.கோவிந்தசாமி** மதிப்பீடுகள் **சயந்தன்** -தமிழ் டைகர் பிளீடம் பைட்டர்ஸ், **விவேக்** -சிறை மீட்பு.

**கூறு: 4**

புலம் பெயர் வாழ்வைச் சித்திரித்திடும் நாவல் இலக்கியமும்-படைப்பாளிகளும்: தேயிலைத் தோட்டமும், தமிழர்களும்/தலைமுறை இடைவெளி/அயலகத்தில் தமிழர்களும் அவர்களின் அந்நியமாதல் நிலைமையும்/ அலைக்கழிக்கப்படும் அகதி வழவு/ முதலான பாடுபொருள்கள்.

**அன்பர் பாலசிங்கம்**- செந்நீர்/ **குணா கவியழகன்**- கர்ப்ப நிலம் / **சுப்ர பாரதிமணியன்** - சுடுமணல் / **சயந்தன்** - ஆறாவடு-/ **வி.ஜீவகுமாரன்** -கடவுச்சீட்டு/ சண்முகம் -சாயம் மரண ரயில்.

**கூறு: 5**

புலம் பெயர் வாழ்வும் புனைவற்ற எழுத்துக்களும்: கட்டுரைகள் - பத்திகள் - ஆவணங்கள் **பொ.கருணாகரமூர்த்தி** 1. அப்ப நீ பூ விக்கலையா? 2. அந்த சைத்தான் இப்போ இதுக்குள்ள நிக்ருது. **இரத்தின் வெங்கடேசன்** - தமிழர் புலம்பெயர்வும் வாழ்வியலும்/ வரலாறும்/ **ஆ.சந்திரசேகரன்** - மலேசியத் தமிழர்களின் வாழ்வியல் நிலை/ **அல்பிரட் வேந்தர்கோன்** - ஐக்கிய இராச்சியத்தில் தமிழரின் வாழ்வியல்/ **பாமல்லன்** - பிரான்சுத் தமிழர் வரலாறும் வாழ்வியலும் **எழில் வசந்தன்** -புதுச்சேரித் தமிழர்கள் புலம்பெயர்ந்த வரலாறு/ **எம்.ஐ.எம்.ஹனிபா** -கனடத் தமிழர்களின் வாழ்வியல்/ **செ.யோகராசா** - நார்வேத் தமிழர் வரலாறும் வாழ்வியலும்/ **ஏ.காருண்யாள்** - மொரிசியசு தீவில் தமிழர் வாழ்வியல்/ **இளைய அப்துல்லாஹா** 1. அண்ணை நான் தற்கொலை செய்யப்போகிறேன். 2.இங்க ஒவ்வொரு நாளும் நடக்கிறத பாத்தா ஊரோட போயிரலாம் போல இருக்கு. 3.அகதிகளின் அல்லாட்டம்/ **எச்.பீரமுஹமது** 1.கீழைநாடுகளும் புலம்பெயர்வும் 2.புலம்பெயர்தலின் வலிகள் டயஸ்போரா சமூகங்கள் குறித்து **தொ.பத்தினாதன்** -தமிழகத்தின் ஈழ அகதிகள்

**ஆவணப்படம்:** சாயாம் மரண இரயில் / **திரைப்படம்:** பரதேசி

**பாடநூல்**

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

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**PGT 5452****தொல். பொருள் (புறம்)****6Hrs/4Cr**

நோக்கம் : தொல்காப்பியப் பொருளதிகார நூற்பாக்களை மரபு வழி வாசித்தலும், உரையாசிரியர் தம் உரைகளின் துணையோடு புறம் சார்ந்த நிகழ்வு நிலைகளை அறிந்து கொள்ளுதலும், செய்யுளின் உறுப்புக்களையும் வடிவத்தையும் அறிந்து கொள்ளுதலும்,

யாப்பருங்கலக்காரிகை வாயிலாகப் பிற்கால வளர்ச்சியை அறிந்து கொள்ளுதலும் இப்பாடத்தின் நோக்கங்கள் ஆகும்.

சுறு 1 : புறத்திணை – விளக்கம் - வகைகள் - ஏழாக இருந்து பன்னிரெண்டாக வளர்ந்த நிலை – புறத்திணைகளின் உள்ளடக்கம் - வீரயுகக் காலம் - பண்புகள் - கொடை, அறம், நிலையாமை – பிற்கால இலக்கண நூலான புறப்பொருள் வெண்பா மாலையில் தொல்காப்பியத்தின் தாக்கம் அறிதல் (புறம்) – வெட்சி, கரந்தை, வஞ்சி, யோல்வன.

சுறு 2: பொருளியல் - அறத்தொடு நிறறல் - வரைவு கடாதல் - கூற்று பற்றிய சில பொது மரபுகள்

சுறு 3: செய்யுளில் - செய்யுள் உறுப்புக்கள் - செய்யுள் அமைப்பு – வகைகள் - திணை – கைகோள் - கூற்றிற்கு உரியர் - கேட்போர் - இடம் - காலம் - பயன் - யாப்பருங்கலக் காரிகைச் செய்திகளோடு ஒப்பிடல்

சுறு 4: மரபியல் - இளமை – ஆண்பால், பெண்பால் பெயர்கள் - உயிர்ப் பாகுபாடு – நால்வகை வருணமரபு – நூல் மரபு – உரை மரபு – முப்பத்திரண்டு வகை உத்திகள்

சு; 5: பிற்கால இலக்கண நூல்கள் காட்டும் பொதுவியல் திணை – போந்தை – வேம்பு – ஆர் - கழல்நிலை – கல் காண்டல் - கல் நடுதல் போன்றவை. பெருந்திணை – வென்றிப் பெருந்திணை – வாணிக வென்றி – மல்ல வென்றி – உழவன் நிலை – உழு வென்றி – ஏற வென்றி – கோழி வென்றி – தகர் வென்றி போன்றவை

#### பாடநூல்கள்

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3. தே.ஆண்டியப்பன், தொல்காப்பியம் - பொருளதிகாரம், பரணி வெளியீடு, மதுரை, 2000.

**நோக்கம்:** சங்க இலக்கியப் பாடல்களில் புறத்திணைக் கோட்பாட்டின் அடிப்படையிலான புறக்கூறுகளை அறிமுகம் செய்வதும், பண்டைத் தமிழர்களின் வீரயுகப் பாடல்களின் தன்மைகளைத் தெரிந்து கொள்ளும்படி விளக்குவதும் இப்பாடத்தின் நோக்கமாகும்.

**கூறு:1** பாணன், புலவர், குறுநிலமன்னன் (வள்ளல்) உறவு முறை - ஆளுமைத்தன்மை - கவிநயம் - கொடை - அரசியல் - வீரம் - இரவலர்களைப் புரத்தல் - படை - தனிநிலைக் கவிதையின் சிறப்பு.

**ஔவையார் 32 பாடல்கள் (புறநானூறு)**

தும்பை - 87, 88, 89, 90 ,295, 311, 315.

பாடாண் - 91, 92 95, 96, 97, 101, 102, 103, 206, 140, 206, 367, 390, 392.

கரந்தை - 286, 290.

வாகை - 94, 98, 99, 100, 93, 104.

பொதுவியல் - 187, 231, 232, 235.

வெட்சி - 269.

**கபிலர் 28 பாடல்கள் (புறநானூறு)**

நட்பு - 105, 106, 107, 108, 109, 110, 111.

கையறுநிலை - 113, 114, 115, 116, 117, 118, 119, 120, 236.

பிறர் - 143, 121, 122, 124, 201, 202, 200, 8, 14, 337, 347.

**கூறு:2** பாணர், புலவர் மரபு - தொல்.விளக்கம் - ஆற்றுப்படை இலக்கணம் - எடுத்துரைக்கும் பாங்கு - நூலின் அமைப்பு - வேந்தனுக்கு நிகராக உயர்த்துதல். **சிறுபாணற்றுப்படை (முழுவதும்)**

**கூறு:3** அமைப்பு - ஒரே இலக்கியத்தில் அகம், புறம் சார்ந்த பண்புகள் வருதல்.

**நெடுநல்வாடை (முழுவதும்)**

**கூறு:4** சேரர்களின் வரலாறு - புறப் பொருளான போர், போர்நிலைப்பட்ட நடவடிக்கைகள் - அரசியல் அமைப்பு - நூலின் அமைப்பு முறை - வீரயுகப் பாடல்களுடன் ஒப்பிடல்.

**பதிற்றுப்பத்து 4ஆம் பத்து**

**கூறு:5** பா வகை - காலம் - பிற்காலப் புராணக் கூறுகளுக்கான வித்து - இசை நூல்.

**பரிபாடல் - 5ஆம் பாடல் - செவ்வேள்**

**பாடநூல்**

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

**பார்வை நூல்கள்**

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8. இராகவய்யங்கார், மு., வேளிர் வரலாறு, வள்ளுவர் பண்ணை, சென்னை.

நோக்கம்:

சங்க இலக்கியம் தொடங்கிப் பதினெண் கீழ்க்கணக்கு நூல்கள், சித்தர் பாடல்கள், சிற்றிலக்கியங்கள் ஆகியவை அறம் குறித்து கூறுவனவற்றை இனம் கண்டு கற்றல் இப்பாடத்தின் நோக்கமாகும். இதன் தொடர்ச்சியாகத் தமிழ்ச் சமூகத்தில் காலந்தோறும் அறம் மாற்றமடைந்து வந்திருப்பது, அறக் கருத்துக்கள் கேள்விக்குட்படுத்தப்பட்டு எதிர்வினைகள் உருவானது ஆகியவை பற்றி அறிதலும் இப்பாடத்தில் அடங்கும்.

பாடப்பகுப்பு:

கூறு:1

சங்க இலக்கியங்கள் கூறும் அறக் கருத்துக்கள். இலக்கியங்கள் கூறும் அறங்களில் பல சமயங்களின் தாக்கம். போரில் உயிர்களைக் கொல்லுதல் வீரம் என்ற நம்பிக்கை. வெட்சி மற்றும் கரந்தை கூறும் துறைகள். கொல்லாமை மற்றும் நிலையாமை ஆகிய இரண்டும் அழுத்தம் பெறுதல். காஞ்சித் திணைக்கான துறைகள்

வாசிப்புப் பகுதிகள்: புறநானூறு (திணை: வெட்சி/துறை: உண்டாட்டு - பாடல் எண்கள்: 257,258,262. திணை: கரந்தை/துறை: குடிநிலை உரைத்தல் - பாடல் எண்: 296, திணை: தும்பை/துறை: எருமை மறம் - பாடல் எண்கள்: 80,27. திணை: நொச்சி/துறை: செருவிடை வீழ்தல் - பாடல் எண்கள்: 271,272/தொல்காப்பியம்: காஞ்சித் திணையும் துறைகளும் (முழுவதும்)

கூறு:2

சமண சமயத்தின் வரவு. சமண இலக்கியங்கள் கூறும் அறங்கள். பௌத்த சமயத்தின் வரவு. பௌத்த இலக்கியங்கள் கூறும் அறங்கள். வைதீக சமயங்களின் வேதம், வேள்வி, ஸமிருதிகள் போன்றவை எடுத்துரைக்கும் அறங்கள். சைவம் மற்றும் வைணவம் எடுத்துரைக்கும் வினைமறுப்புக் கோட்பாடும் மாற்று அறங்களும். அறங்கள் சமயங்கள் வழியாக நிறுவனமயப்படுதல்.

வாசிப்புப் பகுதிகள்: திருக்குறள் (அறத்துப்பால்: இல்லறவியல் - அன்பு உடைமை, இனியவைக் கூறல், செய்நன்றி அறிதல், புறம் கூறாமை, ஈகை ஆகிய அதிகாரங்கள் முழுவதும்/ துறவறவியல் - புலால் உண்ணாமை, தவம், வாய்மை, இன்னா செய்யாமை ஆகிய அதிகாரங்கள் முழுவதும்/பொருட்பால்: அரசு இயல் - கல்வி, பெரியாரைத் துணைக்கோடல், செங்கோண்மை ஆகிய அதிகாரங்கள் முழுவதும்/அங்கவியல் - நட்பு ஆராய்தல், பெரியாரைப் பிழையாமை, பெண்வழிச் சேறல் ஆகிய அதிகாரங்கள் முழுவதும்/நாலடியார் (அறத்துப்பால்: தூய்த்தன்மை அதிகாரம் முழுவதும், பொருட்பால்: குடிப்பிறப்பு, மேன்மக்கள், நல்லினம் சேர்தல் ஆகிய அதிகாரங்கள் முழுவதும்)/ ஆசாரக்கோவை (பாடல் எண்கள்: 15,37,38,52,53,54,74,75,84,93,94,97,98,99)/மணிமேகலை - பவத்திறம் அறுகெனப் பாவை நோற்ற காதை முழுவதும்/நன்னூல் பொதுப்பாயிரம்: சூத்திரங்கள்: 26-46)

கூறு:3

நிறுவன மயப்பட்ட சமயங்களுக்கு எதிரான போக்கு கால் கொண்டமையைக் கூறுதல். சித்தர்களின் வரவு. சித்தர் இலக்கியம் காட்டும் நிறுவனமயப்பட்ட அற எதிர்ப்பு - வேள்வி, கோவில், உருவ வழிபாடு, சாத்திரம், சடங்கு, பூசை, சாதி அமைப்பு, வேதம், ஆகமம் ஆகியன பதிவாகியுள்ள விதம். கிறித்தவம், இஸ்லாம் ஆகிய மதங்களின் வருகை. அவை முன்னிறுத்தும் அறங்கள்.

வாசிப்புப் பகுதிகள்: பட்டினத்தார் - தேர்ந்தெடுத்த பாடல்கள்/சிவவாக்கியர் - (பாடல் எண்கள்: 10,12,28, 32,38,39,62,90,120,122) /இயேசு காவியம் - (மழைச் சொற்பொழிவு பகுதி) /சீறாப் புராணம் - ஓநாய் பேசிய படலம் முழுவதும்.

கூறு:4

புதிய அறங்களைக் கூறல். கோயில், மடம், தலயாத்திரை போன்றவற்றை எதிர்த்து அகவழிபாட்டை எடுத்துரைத்தல். யோகம், தியானம் ஆகியவை வலியுறுத்தப்

பெறுதல். உடல் மீது ஏற்பட்ட கவனம். உடலே கோயிலாகவும் மனமே இறைவனாகவும் மாறிய நிலை.

வாசிப்புப் பகுதிகள்: திருமந்திரம் (மூன்றாம் தந்திரம்: காய சித்தி உபாயம் (பாடல் எண்கள்: 1-2,7), நான்காம் தந்திரம்: ஞானம் (பாடல் எண்கள்: 1,5), ஆறாம் தந்திரம்: தவம் (பாடல் எண்கள்: 1-9), அவவேடம் (பாடல் எண்கள்: 1-6), தவவேடம் (பாடல் எண்கள்: (1-4))/தாயுமானவர் (யாக்கையைப் பழித்தல் (1-11 கண்ணிகள்)/ மாதரைப் பழித்தல் (1-15 கண்ணிகள்) /வள்ளலார் (தெய்வ மணிமாலை (பாடல் எண்கள்: 6,8,30), பிள்ளைச் சிறு விண்ணப்பம் (பாடல் எண்கள்: 1-10), பிள்ளைப் பெரு விண்ணப்பம் (பாடல் எண்கள்: 1-15) பாரதியார் (அறிவே தெய்வம் முழுவதும், கண்ணன் பாட்டு: கண்ணன் என் சற்குரு (முழுவதும் - 12 பாடல்கள்), கண்ணன் என் ஆண்டான் (முழுவதும் - 10 பாடல்கள்)).

கூறு:5

மையம் - விளிம்பு என்ற இரண்டு எதிர்வுகள் உருவாகுதல். விளம்புநிலை மாந்தர்கள் இலக்கியங்களில் இடம்பெறுதல். அவர்களுக்கான அறங்கள் பேசப்படுதல். மேலோர் அறங்கள் கேலிக்குள்ளாக்கப்படுதல். சமத்துவம், சன்மார்க்கம் ஆகியன முன்னிலைப்படுதல்.

வாசிப்புப் பகுதிகள்: நந்தனார் சரித்திரக் கீர்த்தனை (நந்தனார் சிவனை நினைந்து பக்தி புரிந்து பாடும் பகுதி)/பாய்ச்சலூர் பதிகம் (முழுவதும்)/கபிலர் அகவல் (பாடல் வரிகள்: 15-60)/அகலிகை வெண்பா (பாடல் எண்கள்: 250-254/271-279).

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துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

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இக்கால இலக்கிய அண்மைப்போக்குகள்

6Hr/4Cr

### நோக்கம்

தமிழில் பின்னை நவீனத்துவ இலக்கியங்களை அறிமுகம் செய்வதன் மூலம் 1990-களுக்குப் பிந்தைய இலக்கியப் போக்குகளை அறிந்துகொள்வது இப்பாடத்தின் நோக்கமாக அமையும்.

### கூறு: 1

தமிழகத்தில் பின்னை நவீனத்துவக்கருத்தியல்கள் அறிமுகமான பின்புலம் - அதன் பின்னணியிலுள்ள உலகமயம், திறந்த பொருளாதாரம், சிறுபான்மையினருக்கான நெருக்கடிகள், எழுச்சிகள் - நவீனத்துவத்தின் மீதான எதிர் வினைகளும் பன்முகப்

பார்வைகளுக்கான புதிய வெளி உருவாதலும் - சிறுபான்மையினர் - தலித்துகள் - அடித்தளமக்கள் - விளிம்பு நிலைமக்கள் - உதிரிகள்.... பற்றிய கருத்தியல்களும் தேவைகளும்.

**கூறு: 2**

தலித் இலக்கியம்: அமெரிக்காக்கருப்பு இலக்கியமும் அதன் தாக்கமும்- இந்தியாவில் தலித் இலக்கிய தோற்றப்பின்புலம் -தமிழ்ச் சூழலில் அதற்கான முன்னெடுப்புகள் - தலித் இலக்கியம் (Dalit Litature) கருக்கு - பாமா, தலித் சுயசரிதை (Dalit Autobiography) (வடு-கே.ஏ.குணசேகரன்), தலித் பெண்ணியம் (Dalit Feminism) (செடல் -இமையம்) ஆகியவற்றுக்கான இலக்கியப் பிரதிகள் (பிளாக்டிக்கெட் -ஜெ.பி.ஜாணக்கியா)

**கூறு: 3**

பெண்ணிய இலக்கியம்: மேற்கத்தியச் சூழலில் உருவான பெண்ணியக் கோட்பாடுகள், வகைகள் பற்றிய சுருக்கமான அறிமுகம் - பெண்ணிய, தலித்பெண்ணிய இலக்கியப் பிரதிகள் (வீட்டின் மூலையில் ஒரு சமையலறை, அந்தேரிமேம்பாலத்தில் - அம்பை, குட்டி ரேவதி, மாலதிமைத்திரியின் தேர்ந்தெடுக்கப்பட்ட கட்டுரைகள், சல்மா, சுகிர்தராணி (தேர்ந்தெடுக்கப்பட்ட கவிதைகள்) வெண்ணிலா, தேன்மொழி (தேர்ந்தெடுக்கப்பட்ட கதைகள்)

**கூறு: 4**

மூன்றாம்பாலின/பால்புதுமையினர் விளிம்புநிலைமாந்தர் இலக்கியம் (Third Gender / Gender Queer&Sablturn Litature) மூன்றாம் பாலினம், பால்புதுமையினர் பற்றிய புரலாணிக, அறிவியல் மற்றும் பொதுப்புத்திசார்ந்த கருத்தியல்கள் - இலக்கியப்பதிவுகள் (வெள்ளை மொழி- சரவணன் வித்யா) லிவிங்ஸ்மைல் வித்யா தொகுத்த சிறுகதைகள் - (மறைக்கப்பட்ட பக்கங்கள்- கோபிஷங்கர்) சமூகத்தின் விளிம்புகளில் வாழ்பவர்களான பிச்சைக்காரர்கள், தொழுநோயாளிகள், பாலியல் தொழிலாளர்கள், திருடர்கள் போன்றோரின் வாழ்பவனுபங்கள், பதிவாவதன் சூழலும் தேவையும் - இலக்கியப்பிரதிகள் (ஏழாம் உலகம்- ஜெயமோகன், திருடன் மணியம்பிள்ளை சுயசரிதையில் தேர்ந்தெடுக்கப்பட்ட பகுதிகள், நளினி ஜமீலா)

**கூறு: 5**

2000த்திற்குப் பிந்தைய புதிய வகையான எழுத்துமுறைகள்:

பெருநகர உதிரிகளின் வாழ்வியலைப் பிரதிநிதித்துவப்படுத்தும் இலக்கியங்கள் (சரவணன் சந்திரன், விநாயகமுருகன்) பழைய ஆவணங்களிலிருந்து புனைவுகளை உருவாக்கும் போக்குகள் (ஜெயமோகனின் வெள்ளையானை, சு.வெங்கடேசனின் காவல்கோட்டம்) சிறுபான்மையினரின் பண்பாட்டுக் கூறுகளைப் பிரதிபலிக்கும் புனைவுகள் (ஆழிசூழ உலகு, சோளகர் தொட்டி இன்னபிறபடைப்புகள்), சூழலியல் கூறுகளை முதன்மைப்படுத்தும் புனைகதைப் போக்கு (நக்கீரனின் காதோடி)



**பாடநூல்**

துறை வெளியீடு (தேர்ந்தெடுக்கப்பட்ட நூல்களிலிருந்து பாடப்பகுதிகளுக்கான நகல்கள்)

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PGT 5400

தொல்லியலும் தமிழகமும்

4Hrs/4Cr

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**நோக்கம்:** தமிழக வரலாற்றின் அடித்தளமான தொல்லியலை மாணவர்களுக்கு அறிமுகப்படுத்தி தமிழகத் தொல்லியல் களங்களைப் பார்வையிட்டுப் பயிலுதலும், தொல்லியல் கூறுகளுக்கும் தமிழ் இலக்கியங்களுக்கும் இடையே உள்ள பொருத்தப்பாடுகளை இனங்காணுதலும் இப்பாடத்தின் நோக்கமாகும்.

கூறு 1: தொல்லியல் விளக்கம், தொல்லியலும் பிறதுறைகளும், இந்தியாவில் தொல்லியல் துறை உருவாக்கம், வளர்ச்சி, தொல்லியல் கள ஆராய்ச்சி நெறிமுறைகள், வகைகள் அகழ்வாய்வுக்களத்திற்குத் தேவையான கருவிகள், அகழ்வாய்வு நிபுணர் கடமைகள், ஆழ்கடல் அகழ்வாய்வு முறை, கரிமம் 14 காலக்கணிப்பு முறை, கல்வெட்டுக்களைப் படியெடுக்கும் முறையைப் பயிலுதல்.

கூறு 2: மட்பாண்டங்கள், பாறை ஓவியங்கள், தமிழ்நாட்டில் தொல்லியல் அகழாய்வுகள் வரலாற்றுக்கு முற்பட்டகாலம் (அத்திரம்பாக்கம், பொருந்தல், குடியம் திருத்தங்கல், டி.கல்லுப்பட்டி, பையம்பள்ளி, பல்லாவரம், ஆதிச்சநல்லூர்), வரலாற்றுத் தொடக்க காலம்

(அரிக்கமேடு, காவிப்பூம்பட்டினம், அழகன்குளம், உறையூர், கொற்கை, கொடுமணல், கீழடி) ஆகியனவற்றைத் தொல்லியல் அறிக்கைகளுடன் விளக்குதல்.

கூறு 3: தமிழ்ப்பிராமி கல்வெட்டுகள் (யானைமலை, அரிட்டாபட்டி, மாங்குளம், புகளூர், அறச்சலூர், ஜம்பை, பூலாங்குறிச்சி), அதியமானின் கற்பொரிப்புகள், நடுகல் (புலிமான் கோம்பை, தாத்தப்பட்டி), நினைவுக்கற்கள் (கோழிக்கு, ஜல்லிக்கட்டு வீரனுக்கு), நீர்நிலைக் கல்வெட்டு, உத்திரமேரூர் கல்வெட்டு, ஓலைச்சுவடிகள் (தஞ்சை சரஸ்வதி மகால்), செப்பேடுகள் (கூரம் செப்பேடு, லெய்டன் செப்பேடு, வேள்விக்குடி செப்பேடு), கோயில் கலை (தஞ்சை பெரிய கோயில், கங்கை கொண்ட, சோழபுரம், மதுரை மீனாட்சியம்மன் கோயில், காஞ்சி கைலசநாதர் ஆலயம்) ஆகியனவற்றைப் பார்வையிட்டுப் பயிலுதல்.

கூறு 4: சங்ககால காசுகள் (சேர, சோழ, பாண்டியர்), கிரேக்க ரோமானிய காசுகள், பல்லவர் காசுகள், பிற்கால சோழர் காசுகள், சங்ககால வாணிகம், வாணிகப் பொருட்கள் முசுநி, அலெக்சாண்டிரியா வியாபார ஓப்பந்தம், ஆகியனவற்றைத் தொல்லியல் சான்றுகளுடன் விளங்கிக் கொள்ளல்.

கூறு 5: வெளிநாட்டார் பயணக்குறிப்பு குறிப்புகள் (எரித்தரியக் கடலின் பெரிப்புளஸ், பிளைனி தாலமி, யுவான்சுவாங், பாஹியான் பிற்காலப்பயணி மார்க்கோ போலோ குறிப்புகளில் தமிழகம், தொல்லியல் களச் சுற்றுலா செல்லுதல்.

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PGT 5402

ஆய்வுநெறியும் ஆய்வேடும்

4 Hrs/4Cr

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நோக்கம்:

ஆய்வு குறித்த நெறிமுறைகளைத் தெரிந்துகொள்வதுடன் ஆய்வுப்பொருள் பற்றிய தெளிவைப் பெறுதல் இப்பாடத்தின் முதன்மை நோக்கங்களாகும். இவற்றைத் தொடர்ந்து முதுகலைப் பாடப்பிரிவில் பயிலுகிற ஏனைய பாடங்களையொட்டி ஆய்வுத்தலைப்பினைத் தெரிவு செய்து, ஆய்வேட்டினை உருவாக்குதல் இப்பாடத்தில் அடங்கும்.

பாடப்பகுப்பு:

கூறு:1

ஆய்வு குறித்த அடிப்படைத் தகவல்கள், ஆய்வுக் களங்கள் பற்றிய விளக்கங்கள், ஆய்வாளர்க்குரிய தகுதிகள்.

கூறு:2

ஆய்வுத் தலைப்பைத் தேர்ந்தெடுத்தல், கருதுகோளை அறிதலும் வரையறுத்தலும். ஆய்வுச் சிக்கல்களை இனங்காணுதல். சிக்கல்களை வரையறுத்தல், சிக்கல்களின் மூலங்களைக் கண்டறிதல், ஆய்வுச் சிக்கல்களின் அடிப்படையில் ஆய்வை மேற்கொள்ளும் முறைகள்

கூறு:3

ஆராய்ச்சி முறைகள்: ஒப்பீட்டுமுறை, வரலாற்றுமுறை, சோதனை ஆய்வுமுறை, உய்த்துணர் ஆய்வுமுறை, செலுத்துநிலை ஆய்வுமுறை, மாதிரி ஆய்வுமுறை, புள்ளி விவர ஆய்வுமுறை, விளக்கவியல் ஆய்வுமுறை, தாக்கக் கோட்பாட்டு ஆய்வுமுறை, நாட்டுப்புறவியல் ஆய்வு முறை, நடையியல் ஆய்வுமுறை ஆகியன குறித்த விளக்கங்கள்.

கூறு:4

கோட்பாட்டு ஆய்வு. மொழியியல் ஆய்வு முறை, மார்க்சிய ஆய்வுக் கோட்பாடுகள், அமைப்பியல் மற்றும் பின்னை அமைப்பியல் கோட்பாடுகள். பெண்ணிய ஆய்வுக் கோட்பாடுகள். காலனியம் மற்றும் பின்னைக் காலனியக் கோட்பாடுகள், நவீனத்துவ மற்றும் பின்னை நவீனத்துவக் கோட்பாடுகள். விளிம்புநிலை கோட்பாடுகள்.

கூறு:5

ஆய்வேட்டைத் தயார் செய்தல்: ஆய்வேட்டின் கட்டமைப்பு, முன்னுரை தொடங்கி முடிவுரை வரை ஆய்வேடு அமையும் முறை. இயல் பிரித்தல், பின்னிணைப்பு அமைக்கும் முறை. சுருக்கக் குறியீட்டு விளக்கங்கள், மேற்கோள் காட்டுதல், அடிக்குறிப்புக் கொடுத்தல் ஆகியவை குறித்த தெளிவை உருவாக்குதல். முதன்மை ஆதாரங்கள் மற்றும் துணைமை ஆதாரங்கள் பற்றிய விளக்கங்கள். துணைநூற்பட்டியல் அமைக்கும் முறை. ஆய்வேடு எழுதுதல்.

ஆய்வேடு உருவாக்கம் மற்றும் ஒப்படைப்புக் குறித்த வழிகாட்டுதல் குறிப்புகள்

1. ஆய்வேடு ஐம்பது பக்கங்களுக்குக் குறையாமல் இருத்தல் வேண்டும்.
2. மூன்றாம் பருவ முடிவில் தலைப்பினை முடிவு செய்து கொள்ளுதல் வேண்டும்.
3. கல்லூரி வேலை நாளின் இறுதி நாளுக்குள் ஆய்வேடு தரப்படவேண்டும்
4. ஆய்வேட்டினைத் துறையாசிரியர்கள் குழுவாக அமர்ந்து மதிப்பிடுவர். புறத்தேர்வாளரின் முன்னிலையில் 'வாய்மொழித்தேர்வு' நடைபெறும்.
5. மதிப்பெண்கள்: அகமதிப்பீடு – 100/ புறமதிப்பீடு – (பருவத்தேர்வு – 50+ஆய்வேடு – 50) – 100. ஆய்வேடு மதிப்பெண்கள் – 50 (ஆய்வேடு சமர்ப்பித்தல் - 30 + வாய்மொழித் தேர்வு – 20) எனப் பிரிக்கப்படும்.

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### நோக்கம்

தமிழ்ச் சமூகத்தின் சமூக அரசியல் பண்பாட்டு வரலாற்றை இலக்கியம், தொல்லியல், வழக்காற்றியல், மானுடவியல், சமூகவியல், வரலாற்றியல் ஆகியவற்றின் பின்னணியில் அறிந்துகொள்வது இப்பாடத்தின் நோக்கமாகும்.

**கூறு: 1 வரலாற்றுக்கு முந்தைய காலமும் வரலாற்று காலமும் :** ஆதிச்சமூகம் - உணவு சேகரித்தல் வேட்டை போன்ற இனக்குழு வாழ்வு - ஓசை, பேச்சு, எழுத்து, இலக்கியம். வீரன், தலைவன், அரசன் என்னும் படிநிலை மாற்றங்கள் - அச்சம், ஆவி, நடுகல், திருவிழா போன்ற வழிபாட்டு வளர்ச்சி - இலக்கியம் காட்டும் திணை வாழ்வு-பெருங்கற்கால தடயங்கள் - ஆதிச்சநல்லூர், பொருந்தல், கீழடி, அழகன்குளம் அகழ்வாய்வுகள் - பிராமி கல்வெட்டுகள்



**கூறு: 2 களப்பிரர் பல்லவர் காலம் :** அறத்தின் தேவையும் சமூகம் நிலைபெறலும் - பௌத்தம் சமணம் தாக்கம் - வழிபாடு சமய நிறுவனமாக மாறுவதில் அறம் என்ற கருத்தாக்கத்திற்கான தொடர்பு - குறள் உள்ளிட்ட அற நூல்கள் - களப்பிரர் காலம் பற்றிய விவாதங்கள் - பல்லவர் ஆட்சி - கட்டடக்கலை - காப்பியமரபு - வடபுல கதைகளும் உள்;ர் கதைகளும் கலத்தல்.

**கூறு: 3 சோழர் காலம் :** சைவத்தின் எழுச்சி - பண் கலந்த பாடல்கள் - தலங்களை மையப்படுத்துதல் - வைணவ இலக்கியம் - சைவ வைணவ மரபுகள், பௌத்த சமண மரபுகளோடு கொண்ட முரணும் தாக்கங்களும் - பிற்கால சோழர் எழுச்சியில் கோயில், மதம், இலக்கியம் ஆகியவற்றில் நடந்த மாற்றங்கள் - நிலம் சார்ந்த உறவும், சாதியம் அமைப்பதாலும் - கல்வெட்டுகள் - சைவ தத்துவங்கள் உருவாக்கம் - மடங்கள் - வலங்கை இடங்கை பிரிவுகள்.

**கூறு: 4 நாயக்கர் காலம் :** இசுலாமியர், விஜய நகரம், நாயக்கர்கள் வருகை -நில அமைப்பிலும் கிராம அமைப்பிலும் நடந்த மாற்றங்கள் - பாளையப்பட்டுகள் - வழிபாடுகள் விழாக்கள் - சிற்றிலக்கிய வகைப்பாடும் உள்;ர் மக்கள் பாத்திரங்களாகுதலும் - கதைப்பாடல்கள் - சித்தர்கள் மரபு - பிற்கால பாண்டியர்கள்.

**கூறு:5 காலனியமும் அதற்குப்பின்னரும்:** ஐரோப்பியர்களின் வருகையும், அதில் பிரிட்டிர் நிலைபெறுதலும் - கிறித்தவத்தின் பங்களிப்புகள் - நவீனஅரசும் சட்டங்களும் - கல்விமுறை, அச்சுஇயந்திரம், ஏடுகள் அச்சாதல், 'வரலாறு' என்னும் ஓர்மை உருவாதல் -சனநாயகம், மக்களாட்சி, பொதுநீதி போன்ற கருத்தாக்கங்கள் - சீர்த்திருத்த பார்வைகள், அமைப்புகள், இதழ்கள் - தேசிய விடுதலையும் சமூக விடுதலையும் .∴ இட ஒதுக்கீடு:தமிழ் என்னும் அடையாளங்கள் - வெகுஜன ஊடகங்கள்.

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நோக்கம்

சுற்றுலாவியல் பற்றிய அடிப்படைக் கூறுகளை விளக்கி, சுற்றுலா குறித்த விழிப்புணர்வை ஏற்படுத்துதலும், அதனைத் தொழிலாக மேற்கொள்வதற்குமான வாய்ப்புகளைச் சுட்டுதலும் இப்பாடத்தின் நோக்கமாகும்.

பாடத்திட்டம்:

கூறு 1: சுற்றுலா விளக்கம் - சுற்றுலா வகைகள்: இன்பச் சுற்றுலா, கல்விச் சுற்றுலா, பண்பாட்டுச் சுற்றுலா, ஆன்மீகச் சுற்றுலா, வரலாற்றுச் சுற்றுலா, பசுமைச் சுற்றுலா முதலியன.

கூறு 2: சுற்றுலா நடைமுறைகள்: சுற்றுலா தொடர்பான ஆவணங்கள் - நாணயம் மாற்றுதல் உணவு மற்றும் தங்குமிட வசதிகள் - சுற்றுலா தகவல் மையங்கள் - போக்குவரத்து வசதி - முன்பதிவு - மொழி அறிவு - இடவிளக்கப் படங்களைப் பயன்படுத்துதல் - சுற்றுலா வழிகாட்டி - சுற்றுலா ஏற்பாட்டு நிறுவனங்கள் முதலியவற்றை அறிதல்.

கூறு 3: சுற்றுலாவும் இயற்கையும் இயற்கைச் சூழல் - காடுகள், மலைகள், துருவப் பகுதிகள் போன்றவற்றின் தன்மையை அறிதல் - பாடம் தொடர்புடைய முறையில் சுற்றுலா சென்று வருதல்.

கூறு 4: சுற்றுலாவும் கோயில்களும்: தமிழகக் கோயில்கள் - கோயில்களின் சமய முக்கியத்துவங்கள் - பண்பாட்டு நிலைக்களன்கள் - சைவ, வைணவ, கிறித்துவ இஸ்லாமிய பிற சமய வழிபாட்டுத் தலங்கள் - சமய ஒருங்கிணைப்புக் கதைகள் - வழிபாட்டுச் சிறப்புகள் முதலியவற்றை அறிதல்.

கூறு 5: சுற்றுலாவும் கலைகளும்: கலைகள், கலைகளுக்கான சிறப்பிடங்களை அறிதல், கலாச்சார நகரமான மதுரையின் சுற்று வட்டார இடங்கள், கலைக்கூடங்கள், அருங்காட்சியகங்கள், சிற்பக்கூடங்கள் - நாயக்கர் மகால், சித்தன்னவாசல், மனாரா, மகாபலிபுரம் - இசைத்தூண்கள் பற்றிய செய்திகள்.

#### பாடநூல்கள்

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**Postgraduate Department of English, The American College, Madurai – 2  
Programme for Choice Based Credit System – 2018 – 2019, With effect from  
June 2018 onwards**

**Semester I**

Course Code	Course Title	No. of Hours	No. Of Credits	Total Marks
PGE / PSE 4341	ACADEMIC WRITING	5 Hr.	3 Cr.	60
PGE / PSE 4343	PROSE	5 Hr.	3 Cr.	60
PGE / PSE 4445	POETRY I: CHAUCER TO HOPKINS	5 Hr.	4 Cr.	80
PGE / PSE 4447	BRITISH FICTION I: VICTORIAN TO EARLY MODERN	5 Hr.	4 Cr.	80
PGE / PSE 4449	BRITISH DRAMA-I: ELIZABETHAN TO VICTORIAN	6 Hr.	4 Cr.	80
PGE / PSE 4351	ENGLISH FOR CAREER	4 Hr.	3 Cr.	60
Total		30 Hrs	21 Cr.	420

**Semester II**

Course Code	Course Title	No. of Hours	No. of Credits	Total Marks
PGE / PSE 4342	STRUCTURE OF MODERN ENGLISH	5 Hr.	3 Cr.	60
PGE / PSE 4444	BRITISH POETRY II: YEATS TO THE PRESENT TIMES	5 Hrs.	4 Cr.	80
PGE / PSE 4446	BRITISH FICTION II: LATE MODERN TO POST-MODERN	5 Hrs.	4 Cr.	80
PGE / PSE 4448	AMERICAN AND AFRICAN-AMERICAN LITERATURE	6 Hrs.	4 Cr.	80
PGE / PSE 4350	SHAKESPEARE	5 Hrs.	3 Cr.	60
PGE / PSE 4352	FILM STUDIES	4 Hrs.	3 Cr.	60
Total		30 Hrs	21 Cr.	420

**Semester III**

Course Code	Course Title	No. of Hours	No. of Credits	Total Marks
PGE / PSE 5453	LITERARY CRITICISM AND THEORY I	6 Hrs.	4 Cr.	80
PGE / PSE 5455	BRITISH DRAMA II: MODERN & POSTMODERN	5 Hrs.	4 Cr.	80
PGE / PSE 5457	INDIAN LITERATURE IN ENGLISH	5 Hrs.	4 Cr.	80
PGE / PSE 5459	ASIAN LITERATURES IN ENGLISH	5 Hrs.	4 Cr.	80
PGE / PSE 5461	TRANSLATION STUDIES	4 Hrs.	4 Cr.	80
PGE / PSE 5463	HISTORY OF ENGLISH	5 Hrs.	4 Cr.	80
Total		30 Hrs.	24 Cr.	480

**Semester IV**

Course Code	Course Title	No. of Hours	No. of Credits	Total Marks
PGE / PSE 5454	LITERARY CRITICISM AND THEORY II	6 Hrs.	4	80
PGE / PSE 5456	NEW LITERATURES IN ENGLISH	5 Hrs.	4	80
PGE / PSE 5458	REGIONAL LITERATURES IN TRANSLATION	5 Hrs.	4	80
PGE / PSE 5460	EUROPEAN LITERATURE IN TRANSLATION	5 Hrs.	4	80
PGE / PSE 5462	TEACHING ENGLISH AS SECOND LANGUAGE	5 Hrs.	4	80
PGE / PSE 5464	PROJECT	4 Hrs.	4	80
Total		30 Hrs.	24 Cr.	480
		120 Hrs.	90 Cr.	1800

PGE / PSE 4341

Academic Writing

5 Hr. /3 Cr.

Ability to express in writing one's grasp of the subject and ability to demonstrate in writing higher order thinking skills are an integral component of higher education curriculum. The Course aims at helping students fine-tune their academic writing skills since academic writing helps students to convey their understanding and to think critically and objectively.

**Objectives**

The primary objective of the Course is to facilitate students to

- review the process writing
- fine-tune sentence skills
- structure and develop paragraphs through techniques
- structure and develop essays
- content editing and substantive editing

**Units**

1. **Writing as a Process:** pre-writing strategies, while-writing strategies, post-writing strategies; developing writing through extended practices; developing reflective abilities & meta-awareness about writing
2. **Sentence Skills:** Sentence structure; S-V agreement; modifiers; sentence fragments; comma splice; coordination; subordination; parallelism; making complete, logical comparisons; avoiding wordy phrasing; V-T sequence;
3. **Structuring Paragraphs:** Topic sentence; supporting details; unity & coherence; Methods of development (Examples, comparison & contrast, process, definition, cause & effect, division & classification)
4. **Structuring Essays:** Introduction; development of body; conclusion; description, narration, exposition; argumentation;
5. **Content editing and substantive editing:** Proof reading, copy-editing (involves an intensive check of word choice, style & sentence structure, comprehension and terminologies) & substantive editing (to resolve content ambiguity, to eliminate language errors, to improve structure, and to enhance the overall comprehension of the paper); features of written English

**Reference**

- Zemach, Dorothy E. & Rumisek, Lisa A. *Academic Writing from Paragraph to Essay*. London: Macmillan
- Langan, John. 2001. *Sentence Skills with Readings*. Boston: McGrawHill.
- Hartley, James. 2008. *Academic Writing and Publishing: A Practical Handbook*. London: Routledge.
- Bailey, Stephen. 2003. *Academic Writing: A Practical Guide for Students*. London: RoutledgeFalmer.

The course aims at introducing students to the various aspects of prose, different style, and devices employed by prose writers. Students will be trained to appreciate and analyse the style of select pieces of non-fiction prose. Prose pieces representing the essentials of good prose writing will be used as illustrations for discussion.

The course aims at enabling the students to

- acquire knowledge on aspects of prose
- make a study of diction, sentences and paragraphs and chapters
- identify different prose style and other devices used by the writers
- enhance their reading skill and inculcate the practice of reading and appreciating prose
- develop rhetorical ability

**Unit I: Aspects of Prose**

Types of prose : narrative, argumentative, expository, descriptive

Elements of prose : diction, sentence, paragraph, form and rhythm

Different devices : Objective, subjective, abstract, concrete, point of view, tone and mood, figures of speech, using text to interpret meaning

Style of prose : simplicity, ornamentation, common, individual, cheap, and civil Service style

**Unit II: British Prose Writers I**

1. Francis Bacon - Of Studies
2. Joseph Addison - Sunday in the Country
3. Oliver Goldsmith - The Man in Black
4. Charles Lamb - Dream Children: A Reverie

**Unit III: British Prose Writers II**

5. Abraham Cowley - On Avarice
6. Robert Lynd - Sweets
7. G.K. Chesterton - Worship of the Wealthy
8. J.B. Priestly - On Doing Nothing

**Unit IV: Indian Prose Writers**

9. Jawaharlal Nehru - A Glory has Departed
10. Nirad C. Chaudhuri - Indian Crowd
11. R.K. Narayan - Advantages of Anonymity
12. Khushwant Singh - Communalism –An Old Problem

**Unit V: American Prose Writers**

13. Martin Luther King Jr. - I have a Dream
14. John Updike - The Bankrupt Man
15. Amy Tan - Mother Tongue
16. Wendell Berry - In Distrust of Movements

**Text Books:**

Boulton, Marjorie. *The Anatomy of Prose*. New Delhi: Kalyani Publishers, 1996.

A Collection of Essays compiled by the Department

**Reference:**

- Knott, William C. *The Craft of Non-Fiction*. Reston: Reston Publishing Company, 1974.  
 Lewin, Gerald. *Prose Models*. New York: Harcourt Brace Jovanovich Inc., 1964.  
 Mayne, Andrew and John Shuttleworth. *Considering Prose*. London: Hodder and Stongton, 1988.  
 Minto, William. *A Manual of English Prose Literature*. New Delhi: Atlantic Publishers and Distributors, 1995.

**PGE / PSE 4445****British Poetry I: Chaucer to Hopkins****5 Hrs. /4Cr.**

This course aims to introduce the aspects, sub-genres, origin, and movements of British Poetry. It helps students to trace the development of British poetry chronologically from Geoffrey Chaucer to Gerard Manley Hopkins. Poems in the reading list have been selected on the basis of literary movements and trends they represent in literary history.

After the successful completion of the subject the students will be able to:

- Understand the various aspects and Sub-genres of poetry
- Trace the evolution of various literary movements
- approach British Poetry with a scholarly view
- critically evaluate various poets
- understand British Poetry as an aesthetic record of British social and political histories

**Unit 1: Aspects of Poetry:**

Devices of sound: rhyme, rhythm, foot and meter; Onomatopoeia, Euphony, Alliteration, Consonance and Assonance, Anaphora, Anadiplosis, Antanaclasis, Antimetabole Epistrophe, Parison, Epizeuxis and Stichomythia

Devices of Comparison: Simile, Metaphor, Personification, Pathetic Fallacy, Transferred Epithet, Conceit, Metonymy, Synecdoche, symbol, imagery, Oxymoron, Hyperbole

Subgenres of poetry: Epic, Ballad, Dramatic Monologue, Dramatic Narratives, Lyric, Sonnet, Ode and Elegy

**Unit 2: Middle English, Elizabethan and Metaphysical Poetry**

Chaucer	Lines 1-100 from "The General Prologue" <i>The Canterbury Tales</i>
Spenser	"Prothalamion"
Shakespeare	"Shall I compare Thee to a Summer's Day?" "My Mistress Eyes are Nothing Like the Sun"
John Donne	"A Valediction: Forbidding Mourning"
George Herbert	"The Pulley"
Andrew Marvell	"To His Coy Mistress"
Henry Vaughan	"The Retreat"
Richard Lovelace	"To Althea from Prison"



**Unit 3 Renaissance Poetry:**

John Milton Lines 192-393 from Paradise Lost Book IX

**Unit 4 Neoclassical & Romantic Poetry:**

John Dryden "Mac Flecknoe"  
Alexander Pope "Canto First" *The Rape of the Lock* (145Lines)  
Thomas Gray "Elegy Written in a Country Churchyard"  
William Blake "The Tyger"  
William Wordsworth "Lines Composed a Few Miles above Tintern Abbey"  
S. T. Coleridge "Kubla Khan"  
P. B. Shelley "Ode to West Wind"  
John Keats "Ode on a Grecian Urn"

**Unit 5 Victorian Poetry:**

Alfred Tennyson "Ulysses"  
Robert Browning "My Last Duchess"  
Mathew Arnold "Dover Beach"  
Dante Rossetti "The Blessed Damozel"  
G. M. Hopkins "The Windhover"

**Reference**

Bennett, Joan. *Five Metaphysical Poets*. Oxford: CUP, 1964.  
Behrendt, Stephen C. *History and Myth*. Michigan: Wayne State University Press, 1990.  
Brewer, D.S. *Chaucer*. London: Longman, 1973.  
Brooks, Cleanth and Robert Penn Warren. *Understanding Poetry*. New York: Holt, Rinehart and Winston, 1976.  
Hobsbourn, Philip. *Tradition and Experiment in English Poetry*. Norfolk: Macmillan, 1979.  
Parfitt, George. *English Poetry of the Seventeenth Century*. New York: Longman, 1985.  
Perrine, Laurence. *Sound and Sense*. New York: Harcourt Brace Jovanovich, Inc., 1976.  
Richards, Bernard. *English Poetry of the Victorian Period 1830-1890*. New York: Longman, 1988.  
Waston, J.R. *English Poetry of the Romantic Period 1789- 1830*. New York: Longman, 1985.

**PGE / PSE 4447      British Fiction I: Victorian to Early Modern      5 Hr. /4 Cr.**

This course aims at an in-depth understanding of the British novel from the 19<sup>th</sup> to the early 20<sup>th</sup> century. Students will learn different elements of fiction and narrative techniques that were developed during this period. This course will enable students to comprehend the reciprocal relationship between social, political, scientific developments of the period and imaginative writings. The students will also learn the influence of Marxism, Darwinism, Freudian psychoanalysis, print culture and changes in readership through the prescribed texts.

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

- understand the various elements of fiction and narrative techniques.
- describe the conventions of novel during this period.
- identify major forms of novel such as realist fiction, Bildungsroman, gothic, social, domestic novel and mystery/crime fiction.
- analyse texts in terms of class, gender, sexuality, industrialisation and imperialism.
- read novels closely

**Unit I: Aspects of Fiction**

Narrative and Narratology; Story and plot, Foreshadow and flashback, surprise and suspense, point of view and focalization, character and characterisation; Mimesis/verisimilitude and Diegesis; Typology of Narrators; Diegetic levels: Autodiegetic, Extradiegetic, Homodiegetic and Heterodiegetic; frame narrative, Realism, Naturalism, imperialism, colonialism

**Unit II: Provincial life, Religion and Gender**

Charlotte Bronte   - *Jane Eyre*(1847)

George Eliot   - *Silas Marner*(1861)

**Unit III: Class and Industrialisation, Gothic, Science and Psychology,**

Charles Dickens   - *Hard Times* (1854)

Bram Stoker   - *Dracula* (1897)

**Unit IV: Aestheticism and Anti-Victorian realities**

Oscar Wilde   - *The Picture of Dorian Gray* (1890)

Thomas Hardy   - *Tess of d'Urbervilles* (1892)

**Unit V: Empire, Imperialism and early modernism**

Joseph Conrad   - *Heart of Darkness* (1901)

D. H. Lawrence   - *The Rainbow* (1915)

**Reference**

David, Herman. *The Cambridge Companion to Narrative*. Cambridge: Cambridge University Press, 2007.

Forster, E. M. *Aspects of the Novel*. Middlesex: Penguin, 1974.

Hoffman, Michael and Patrick Murphy. *Essentials of the Theory of Fiction*. USA: Duke University Press, 1988.

James, Louis. *The Victorian Novel*. Malden: Blackwell Publishing, 2006. (pdf)

Jeremy, Hawthorn(ed.). *The Nineteenth-Century British Novel*. London: Edward ArnoldLtd., 1986.

- King, Jeannette. *Tragedy in the Victorian Novel: Theory and Practice in the novels of George Eliot, Thomas Hardy and Henry James*. Cambridge: Cambridge University Press, 1978.
- Milligan, Ian. *The Novel in English: An Introduction*. Hong Kong: Macmillan, 1983.
- Prince, Gerald. *A Dictionary of Narratology (Revised Edition)*. University of Nebraska Press: Nebraska, 2003.
- Tomlison, T. B. *The English Middle-Class Novel*. Hong Kong: Macmillan, m1970.
- Shilomith, Kennan Raymon. *Narrative Fiction*. New York: Methuen & Co., 1984.
- Sutherland, John. *Victorian Fiction: Writers, Publishers, Readers*. London: Macmillan Press Ltd., 1995.
- Wheeler Michael. *English Fiction of the Victorian Period 1830-1890*. London and New York: Longman, 1985.

**PGE / PSE 4449      British Drama-I: Elizabethan to Early Modern      6 Hr. /4 Cr.**

The course aims to introduce students to drama during Elizabethan, Restoration and Victorian periods. It aims to trace the origin and history of British Drama back to Classical Greek Theatre and to understand the various aspects of drama such as Plot-structure, Characterization and Dialogue as different from those of other literary genres. It will train students to view drama primarily as a product of its space and time by choosing plays from Elizabethan age -except those of Shakespeare -, Restoration, Victorian, and Early Modern ages

At the end of the course, students shall be able to

- appreciate various aspects of drama and theatre
- understand drama and performance as a cultural process and an artistic discourse
- critically evaluate plot structure, characterization and dialogue
- deconstruct drama texts as aesthetic records of their times viz., Elizabethan, Restoration, Victorian and Early Modern ages
- understand and appreciate the sequential course dealing with Modern and Postmodern British Drama

**Unit I: Aspects of Drama**

- Etymology/ Etiology of the terms: Drama, Tragedy and Comedy
- Aristotelian concept of Tragedy with reference to *Poetics* and the later Renaissance Tragedy, focusing on the five elements of tragedy, Tragic Flaw, Catharsis, Peripeteia and Anagnorisis
- Various types of Comedy such as Satyr plays, Aristophanean Comedies, Restoration Comedies and Anti-Sentimental Comedies
- Plot Structure: Gustav Freytag's Pyramid
- Characterization: various dimensions and types of characters
- Dialogue: semiotic functions and rhetorical devices of theatrical language

**Unit II: Elizabethan Drama**

- Christopher Marlowe - *Edward, the Second* (1594)
- Ben Jonson - *Volpone* (1606)

**Unit III: Jacobean Drama**

- John Webster - *The Duchess of Malfi* (1612-1613)
- Thomas Dekker - *The Shoemaker's Holiday* (1600)

**Unit IV: Anti-Sentimental Comedy**

- Oliver Goldsmith - *She Stoops to Conquer* (1771)
- R. B. Sheridan - *The Rivals* (1775)

**Unit V: Farce / Drama of Idea**

- Oscar Wilde - *The Importance of Being Earnest* (1898)
- Bernard Shaw - *Arms and the Man* (1898)

**Reference**

- Bentley, Eric. *What is Theatre? Incorporating the Dramatic Event*. New York: Limelight Editions, 1968.
- Brockett, Oscar. G. *The Theatre: An Introduction*. New York: Holt, Rinehard and Winston Inc., 1964.
- Esslin, Martin. *The Field of Drama*. London: Methuen, 1987.
- Griffiths, Trevork. *Practical Theatre: How to Stage Your Own Production*. Chartwell Books, 1982.

**PGE / PSE 4351****English for Career****4 Hr. / 3 Cr.**

English serves as a vital and efficient tool in the development of one's career. An understanding of the nuances of English usage and practice helps in professional growth of an individual. This course focuses on equipping students with an overall development of communication skills. The course also presents students a wider range of English usage for their career. Further, it also enables students to express their opinion, participate in group discussions, conversations, and interviews.

At the end of this course students shall be able to

- Understand the nuances of communication
- effectively and critically approach Reading Passages.
- write paragraphs, essays and various types of business letters
- use English for Media such as News Reportage, Interviews, Columns and features and Reviews
- use English for presentation, documentation, group discussion and Negotiation

**Unit 1: Speaking**

Short conversations –details, idiomatic expressions, suggestions, assumptions, predictions, implications, problems, topics - longer conversations – informal conversations, academic conversations - talks – lectures – discussions.

**Unit 2: Reading**

Identifying the main idea and supporting details of a text – scan and skim the texts to find specific information – guess unknown words in a text through the use of a contextual clues and decoding strategies – think critically in response to a text - understand a wide range of content words and idiomatic expressions in a text.

**Unit 3: Writing**

Develop and understand sentence structures and paragraphs. Understand and use the key concepts of paragraphs. Interpreting information from charts and graphs; Turning ideas into sentences / paragraphs / essays / articles.

**Unit 4: English for specific purposes**

Journalism, reporting, feature writing, technical writing

**Unit 5: English at workplace**

Presentation skills, negotiation skills, interview skills, group discussion, using the telephones.

**References**

- Kalkar, Anjali et al. *Textbook of Business Communication*. Hyderabad, OrientBlackswan, 2010
- Thorpe, Edgar and Showick Thorpe. *Objective English*, New Delhi: Pearson, 2012
- Sharpe, Pamela J. *Barron's TOEFL iBT 15<sup>th</sup> ed.* New Delhi: Galgottia, 2017
- Swan, Michael. *Practical English Usage*. International Student's Edition. Oxford: OUP, 2000.
- Simon, Peter. *Communication Skills: the stepladders to success with effective communication*. Delhi. Ramesh publishing House, 2013

**PGE / PSE 4342**

**Structure of Modern English**

**5 Hr. /3 Cr.**

Students at the Masters level are expected to familiarize themselves with a proper synchronic perspective of the organization of Modern English in order to become better users/teachers of English as a language. The course focuses on the phonological, morphological, and syntactical aspects of Modern English, and alternative grammars like Phrase Structure Grammar, and TGG.

At the end of the course, students shall be able to

- scientifically understand language from traditional, structural and post-structural points of view
- equip themselves with pronunciation skills
- demonstrate their morphological knowledge
- be familiar with alternative theories of English such as IC Analysis and PS Grammar
- apply Transformational and Generative Grammars pedagogically

**Unit 1: Grammar and Grammars:** Why study grammar? What is grammar? Correct vs. incorrect; speech vs. writing; form vs. meaning

**Unit 2: English Phonetics and Phonology:** Organs of speech, classifications of English consonants and vowels, English phonology, IPA, phone, phoneme, and allophone, syllable and syllabification, word accent and sentence accent, rhythm and intonation, and supra-segmental features, such as assimilation, elision, and liaison



Ted Hughes:	“Hawk Roosting”
	“View of a Pig”
Seamus Heaney:	“Digging”
	“Bog land”
Philip Larkin:	“Church Going”

**Unit 5: Ethnic British poetry**

James Fenton:	“God, a Poem”
	“In Paris with You”
Paul Muldoon:	“Hedgehog”
	“A Mayfly”
Carol Ann Duffy:	“Talent”
	“Valentine”
	“Anne Hathaway”

**Reference**

- Corcoran, Neil. *English Poetry Since 1940*. Harlow: Longman, 1993.
- Emig, Rainer. *Modernism in Poetry: Motivations, Structures, and Limits*. New York: Longman, 1995.
- Kermode, Frank. *Romantic Image*. London: Routledge, 1957.
- Larrisy, Edward. *Reading Twentieth Century Poetry*. Massachusetts: Basil Blackwell, 1990.

**PGE / PSE 4446      British Fiction II: Late Modern to Post-modern      5Hrs / Cr.4**

This course will be a survey of the British fiction that emerged in the 20<sup>th</sup> century. The aim of the course is to understand the rapid changes in social life and the significance of the literary style reflective of that change. The modern and postmodern fiction challenges conventional norms of fiction writing and pre-modern notions of authority and order. Students will learn about the major thematic concerns and literary styles of this period.

At the end of the course students shall be able to

- understand the concepts of modernity, modernism and postmodernism.
- analyse modern and postmodern narrative techniques
- understand major theoretical and critical arguments regarding postmodernism
- interpret and explain individual texts in the context of a range of socio-political and historical possibilities.
- critically evaluate texts for their major themes.

**Unit I: Terms and Techniques**

Stream of consciousness, Time, Modernity, Modernism, Postmodernity and Postmodernism, irony, paradox, fragmented narrative, metafiction, intertextuality, pastiche, magical realism, minimalism, maximalism, and self-reflexivity

**Unit II: High Modernism**

- James Joyce            - *A Portrait of the Artist as a Youngman* (1916)
- Virginia Woolf        - *To the Lighthouse* (1927)

**Unit III: Dystopian / Modern Gothic**

George Orwell - *1984* (1949)

Iris Murdoch - *An Italian Girl* (1964)

**Unit IV: History / Metafiction / Anti-war**

John Fowles - *The French Lieutenant's Woman* (1969)

Pat Barker - *Regeneration* (1991)

**Unit V: Multicultural / Transcultural Fiction**

Kazuo Ishiguro - *The Remains of the Day* (1989)

Zadie Smith - *White Teeth*

**Reference**

Daiches, David. *The Novel and the Modern World*. London: The University of Chicago Press, 1960.

English, F. James (ed.). *A Concise Companion to Contemporary British Fiction*. Blackwell Publishing: Malden, 2006. Pdf.

Head, Dominic. *Modern British Fiction, 1950-2000*. Cambridge: CUP, 2002. Pdf.

Hewit, Douglas. *English Fiction of the Early Modern Period 1890-1940*. London and New York: Longman Group, 1988.

Nicol, Brian. *The Cambridge Introduction to Postmodern Fiction*. Cambridge: CUP, 2009. Pdf.

Stevenson, Randall. *The British Novel Since the Thirties: An Introduction*. Georgia: University of Georgia Press, 1986.

**PGE / PSE 4448 American and African-American Literature 6 Hrs. /4Cr.**

This course will focus on the significant contribution made by American writers to Literature. The focus will be on distinct aspects of American Literature like the American Dream, the American Intellectual Independence and the Broadway theatre. In addition, the course will briefly survey African-American Literature with texts representing different literary genres.

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

- understand the multiple origins of histories and cultures of the United States
- appreciate the diverse voices of America
- analyse the relation between Black Aesthetics and racism
- recognize form and pattern in texts as means of understanding their meanings
- critically evaluate the texts from different socio-political, cultural and racial and gender perspectives

**Unit 1:**

Introduction to American and African-American history and literature



**Unit 2: Poetry**

- |                            |   |   |
|----------------------------|---|---|
| 1. Edgar Allan Poe         | : | “The Raven”   |
| 2. Walt Whitman            | : | “When Lilacs Last in the Dooryard Bloomed”                    |
| 3. Emily Dickinson         | : | “A Bird Came Down the Walk”<br>“I Felt a Funeral in My Brain” |
| 4. e.e. Cummings           | : | “Buffalo Bills”   |
| 5. Wallace Stevens         | : | “Anecdote of the Jar”   |
| 6. William Carlos Williams | : | “Red Wheel Barrow”  |
| 7. Ezra Pound:             | : | “Pact”<br>“Papyrus”   |
| 8. Paul Laurence Dunbar    | : | “ We Wear the Mask”   |
| 9. Claude Mckay            | : | “If We Must Die”  |
| 10. Langston Hughes        | : | “ A Dream Deferred”   |
| 11. Countee Cullen         | : | “Heritage”  |
| 12. Gwendolyn Brooks       | : | “We Real Cool”  |
| 13. Maya Angelou           | : | “ Still I Rise”   |
| 14. Adrienne Riche         | : | “A Valediction Forbidding Mourning”                           |
| 15. Rita Dove              | : | ”Heart to Heart”  |

**Unit 3: Prose**

- |                     |   |  |
|---------------------|---|--|
| 1. Marcus Garvey    | : | “Speech Delivered at Madison Square, March 1924” |
| 2. W.E.B. Dubois    | : | “ Of the Dawn of Freedom”                        |
| 3. Thoreau          | : | “Where I lived and What I Lived for”             |
| 4. William Faulkner | : | “Nobel Prize Acceptance Speech”                  |

**Unit 4: Fiction**

- |                     |   |                                |
|---------------------|---|--------------------------------|
| 1. Ernest Hemingway | : | <i>The Old Man and the Sea</i> |
| 2. Toni Morrison    | : | <i>The Beloved</i>             |
| 3. Ralph Ellison    | : | <i>Invisible Man</i>           |

**Unit 5: Drama**

- |                         |   |                            |
|-------------------------|---|----------------------------|
| 1. Eugene O’Neill       | : | <i>Emperor Jones</i>       |
| 2. Arthur Miller        | : | <i>Death of a Salesman</i> |
| 3. Lorraine Hansberry’s | : | <i>A Raisin in the Sun</i> |

**References**

- Barksdale, Richard and Keneth Kinnamon. *Black Writer of America: A Comprehensive Anthology*. New York: Macmillan, 1972.
- Cohen, Hennig (ed.). *Landmarks of American Writing*. Washington: Voice of America Forum Series, 1982.
- Cunliffe, Marcus. *The Literature of the United States*. Suffolk: Penguin, 1970.
- Feidelon Jr., Charles and Paul Brodtkorb Jr. *Interpretations of American Literature*. New York: OUP, 1971.
- Fender, Stephen. *American Literature in Context I to IV*. New York: Methuen & Co. 1983.
- Massa, Ann and Scott Donaldson. *American Literature*. London: David and Charles, 1978.
- Spiller, E. Robert. *The Cycle of American Literature*. New York: The Free Press, 1967.

PGE / PSE 4350

Shakespeare Studies

5 Hrs. /3 Cr.

Reading Literature in the light of auteurist theory is as important as its generic, chronological and geographical approach. This course chooses one of the best English dramatists, Shakespeare, for study. The course will train the students in traditional approaches to Shakespearean drama as well as the re-readings of them. Further, this course will also focus on versatility and universality of Shakespearean texts by analysing the narrative and filmic adaptations of Shakespearean drama.

At the end of the course the students shall be able to

- recognise the different features of Shakespearean tragedy, comedy and history plays.
- comprehend Shakespearean Theatre and Shakespearean Language
- analyse the Elizabethan view on Cosmic Universe, Man, History, Nature and Supernatural Elements through the prescribed plays
- understand how a classic work of art provides space for re-reading
- transform verbal text into visual text

### Unit 1: Shakespearean Tragedy

*Hamlet*

### Unit 2: Shakespearean Comedy

*As You Like It*

Unit 3: Shakespearean History-Play Proper

*Henry V*

### Unit 4: Changing Perspectives of Shakespearean Drama

- Postcolonial and Eco-feminist readings of Shakespeare

Reading List: *The Tempest, A Midsummer Night's Dream*

### Unit 5: Verbal and Visual Adaptation of Shakespeare

- "Macbeth" from *Tales from Shakespeare* – Charles Lamb and Mary Lamb
- Akira Kurosawa's *Throne of Blood*
- Roman Polanski's *Macbeth*

### Reference

Peck, John and Martin Coyle. *How to Study a Shakespearean Play*. 2<sup>nd</sup> edn. London: Macmillan, 1985.

Davidson, Peter. *Text and Performance*. Hamlet. Wessels: Macmillan, 1983.

Dollimore, Jonathan & Alan Sinfield (Eds.). *Political Shakespeare: Essays in Cultural Materialism*. Cornell: Cornell University Press, 1994

Schoenbaum, Samuel. *Shakespeare, The Globe and the World*: OUP, 1979

Gurr, Andrew. *The Shakespearean Stage, 1574 – 1642*: CUP, 1970

Brown, John Russel. *Discovering Shakespeare, A new Guide to the plays*: Macmillan, 1981

Web Source:

Throne of Blood- Macmillan International Higher Education –  
<https://www.macmillanihe.com/resources>

The course aims to train the students to decode the visual messages imparted by movies and amplify their impacts. It also aims to train the students to read the films they watch, both as an aesthetic work and as politically motivated. The course aims at enabling the learners to use a touchstone method in evaluating contemporary Indian main stream cinema with World Cinema as well as Indian Classics.

At the end of the course the students shall be able to

- understand the aspects of Cinema
- analyse the aesthetics as well as the politics in films
- read and review films
- gain an understanding of contemporary aesthetic trends in political, social, cultural and philosophical contexts
- write film scripts and reviews

**Unit 1** –Introduction to Filmic Visual: Mise-en-Scene

**Unit 2-** Screenwriting: One–Line, Plot, Characterization, One –line Scene Order & Treatment

**Unit 3-** Film history and film genres

**Unit 4-** Critical understanding of films: Auteurist, Formalist, Marxist, Feminist and Post-colonial Perspectives

**Unit 5 -** Writing film reviews and criticisms

**Recommended Viewing:**

**Origins:**

• **One minuters:**

Lumiere Brothers -*The Arrival of Train* and *Workers Leaving the Factory*

• **Twelve Minuters:** - *The Waterer Watered*

• **Earliest Features: Auteurism**

Porter -*The Great Train Robbery*

Milieus - *Voyage to the Moon*

• **Early Full-Length Feature Films in Silent Era:**

**Film & Politics: Marxism**

Sergei Eisenstein - *The Battleship Potemkin*

Charlie Chaplin -*Modern Times*

- **Flash back , phenomenology & Multiple Narratives**

- **Film & Truth: Formalism**

- Akira Kurosowa - *Rashomon* (Japan)
- Orson Wells - *Citizen Kane* ( English)
- S. Balachandar - *Andha Naal* (Tamil)
- Kamal Hasan - *Virumandi* (Tamil)

- **Film & Society: Neo- Realism:**

- Vittoria De Sica - *Bicycle Thieves*

- **Film and Psychology: Psychoanalysis**

- Alfred Hitchcock - *Psycho*
- Christopher Nolan - *Prestige*

- **Film and Gender: Feminist Approach**

- Rudhraiya - *Aval Apdithaan* ( Tamil)
- K. Balachandar - *Kalyana Agadhikal* ( Tamil)
- Ram - *Tharamani* (Tamil)

- **Film and Collective Dream: Spaghatti Western & the Cowboy Myth**

- Sergio Leone - *The Good, the Bad, the Ugly*
- Ronald Emmerich - *Independence Day*

- **Film and Epic**

- Cecil de Mille - *The Ten Commandments*

- **Film and History : New Historicism**

- Steven Spielberg - *Saving Private Ryan*
- Oliver Stone - *Born on the Fourth of July*

- **Film and Literature**

- Roman Polanski - *Oliver Twist*

- **Film & Justice**

- Sidney Lumet - *Twelve Angry Men*

- **Film and the Underworld**

- Francis Ford Coppola - *The God Father*

- **Film and Children**

- Majit Majidhi - *The Colour of Paradise*

Janaki Viswanathan - *The Children of Heaven*  
- *Kutti (Tamil)*

• **Film & Documentation: Non-Fictions**

Flaherty - *Nanook of the North*  
Micheal Moore - *Farenheit 9/11*  
Barathi Krishna Kumar - *Enru Thanियum*  
B. R Amuthan - *Pee*

• **Indian Panorama**

Sathyajit Ray - *Charulatha*  
Adoor Gopalakrishnan - *Madhilukal*  
Blessy - *Pranayam*  
S.K Sasidharan - *Oru Thivasathande Kazhi*  
K. Balachander - *Avargal*  
Mahendran - *Udhiri-p-pookal*  
Balu Mahendra - *Veedu*  
Barathiraja - *Mudhal mariyadhai*  
Bala - *Pidhamakan*  
Balaji Sakthivel - *Vazhaku En 18/9*  
Manikandan - *Kaakaa Muttai*  
Sundar, C - *Anbe Sivam*  
Bhramma - *Kutram Kadidhal*  
Santhana Bharathi - *Mahanadhi*

**Reference**

Monaco, James *How to Read a Film* 5th ed. OUP, 2005

Bordwell, David and Thompson, Kristin, *Film Art: an Introduction*, 7th ed. New York: McGraw-Hill Co., 2004.

Kawin, Bruce, *How Movies Work*. Berkeley and Los Angeles: University of California Press, 1992.

Cook, David A., *A History of Narrative Film*, 4th ed. New York: W.W. Norton & Co., 2004.

Nelken, Jill, *Introduction to Film Studies*, 5th ed. Oxford: Routledge., 2011

Feild, Syd, *Screenplay: The Foundations of Screenwriting*, New York :RHUS., 2005

**Proposed Curriculum plan for Post-Graduate Mathematics  
from the academic year 2018-19**

First year Program**Semester I**

Course No.	Course Title	Hours	Credits	Marks
PGM 4541	Algebra I	6	5	100
PGM 4543	Real Analysis I	6	5	100
PGM 4345	Fuzzy Mathematics	5	3	60
PGM 4347	Number Theory	5	3	60
PGM 4249	Ordinary Differential Equations (ODE)	4	2	40
PGM 43xx	CBCS (NME)*	4	3	60
		30	21	420

**Semester II**

Course No.	Course Title	Hours	Credits	Marks
PGM 4542	Algebra II	6	5	100
PGM 4544	Real Analysis II	6	5	100
PGM 4446	Graph Theory	6	4	80
PGM 4248	Combinatorics	4	2	40
PGM 4250	Partial Differential Equations (PDE)	4	2	40
PGM 43xx	CBCS (NME)*	4	3	60
		30	21	420

Second Year Program**Semester III**

Course No.	Course Title	Hours	Credits	Marks
PGM 5541	Topology	6	5	100
PGM 5543	Complex Analysis	6	5	100
PGM 5545	Statistics	6	5	100
PGM 5547	Measure Theory	6	5	100
PGM 5349	Programming in C++ with OOPS	4	3	60
PGM 5101	Programming in C++ with OOPS Lab.	2	1	20
		30	24	480

**Semester IV**

Course No.	Course Title	Hours	Credits	Marks
PGM 5542	Functional Analysis	6	5	100
PGM 5544	Classical Mechanics	6	5	100
PGM 5546	Statistical Inference & Stochastic Processes	6	5	100
PGM 5548	Operations Research	6	5	100
PGM 5450	Project	6	4	80
		30	24	480

\*CBCS courses: PGM 4301 Programming in C(2T+2L); PGM4303 Astronomy through ages  
PGM4302 Mathematics for Career Prospects; PGM 4304 Introduction to Statistical tools

**Proposed Curriculum plan for Post-Graduate Mathematics (SF)  
from the academic year 2018-19**

First year Program**Semester I**

Course No.	Course Title	Hours	Credits	Marks
PSM 4541	Algebra I	6	5	100
PSM 4543	Real Analysis I	6	5	100
PSM 4345	Fuzzy Mathematics	5	3	60
PSM 4347	Number Theory	5	3	60
PSM 4249	Ordinary Differential Equations (ODE)	4	2	40
PSM 43xx	CBCS (NME)*	4	3	60
		30	21	420

**Semester II**

Course No.	Course Title	Hours	Credits	Marks
PSM 4542	Algebra II	6	5	100
PSM 4544	Real Analysis II	6	5	100
PSM 4446	Graph Theory	6	4	80
PSM 4248	Combinatorics	4	2	40
PSM 4250	Partial Differential Equations (PDE)	4	2	40
PSM 43xx	CBCS (NME)*	4	3	60
		30	21	420

Second Year Program**Semester III**

Course No.	Course Title	Hours	Credits	Marks
PSM 5541	Topology	6	5	100
PSM 5543	Complex Analysis	6	5	100
PSM 5545	Statistics	6	5	100
PSM 5547	Measure Theory	6	5	100
PSM 5349	Programming in C++ with OOPS	4	3	60
PSM 5101	Programming in C++ with OOPS Lab.	2	1	20
		30	24	480

**Semester IV**

Course No.	Course Title	Hours	Credits	Marks
PSM 5542	Functional Analysis	6	5	100
PSM 5544	Classical Mechanics	6	5	100
PSM 5546	Statistical Inference & Stochastic Processes	6	5	100
PSM 5548	Operations Research	6	5	100
PSM 5450	Project	6	4	80
		30	24	480

\*CBCS courses: PSM 4301 Programming in C(2T+2L); PSM4303 Astronomy through ages  
PSM4302 Mathematics for Career Prospects; PSM 4304 Introduction to Statistical tools

PGM 4541 / PSM 4541

Algebra I

6hrs / 5 cr

**Objective:** The aim of the course is to introduce the fundamental areas of Algebra namely group theory and Ring theory to the students. This course will provide a strong foundation in the abstract approach for the budding Mathematician. The course deals with the group Theory, Ring Theory and various standard results in these areas.

One of the amazing features of twentieth century Mathematics has been its recognition of the power of abstract approach. Modern algebra has evolved with this abstract approach and is one of the important current research area of Mathematics, and also serves as the unifying thread which interfaces all of Mathematics – geometry, number theory, analysis, topology and even applied Mathematics. The basic ideas in algebra are used in Functional Analysis, Complex Analysis, Operations Research, Computer Science, Physics and Chemistry.

**Unit I:** Group theory: Introduction to groups, homomorphism and Automorphism, Cayley theorem and Cauchy theorem

**Unit II:** Permutation groups, Class equation, Sylow theorem, Direct products, finite abelian groups.

**Unit III:** Solvable groups, Schreier refinement theorem, Jordan Holder theorem.

**Unit IV:** Ring theory: Introduction to rings, ideals and quotient rings, Field of quotients of an integral domain

**Unit V:** Euclidean rings, Principal ideal and unique factorization domain, Gaussian integers, Polynomial rings, Polynomials over the rational field, Polynomials over a commutative ring, Noetherian ring, Hilbert basis theorem.

**Text Books:**

1.I.N.Herstein, Topics in Algebra, Vikas Publishing house, 2002.

**Unit I:** Chapter 2.1 to 2.9

**Unit II:** Chapter 2.10 to 2.14

2.Surjeet Singh and Quazi Zameeruddin, Modern algebra, Vikas publishing house, 2006.

**Unit III:** Chapter 6

3.D.M.Burton, A first course in rings and ideals, Addison Wesley Publishing house, 1970.

**Unit IV:** Chapter 2, 5

**Unit V:** Chapter 6, 7.1- 7.7(upto example 7.7), Chapter 11(upto Hilbert basis theorem)

**Reference Books:**

1. M.Artin, Algebra, Prentice Hall of India, 1994.
2. B.Balumsla and B.Chandler, Theory and problems of group theory, Schuam outline series, Mcgraw Hill, 1980.
3. J.B.Fraleigh, A first course in Modern algebra, Addison Wesley Publishing house, 1970.



**Objective:** The aim of the course is to provide every Postgraduate student a comprehensive idea about the principles of Real Analysis. This course will provide such treatment. This course deals with a thorough understanding of convergence, continuity and differentiation. Algebra and Analysis are like the two eyes of a man in the realm of Mathematics. Analysis takes a man into the highlands of Mathematics itself, where these concepts are inseparable in all of pure Mathematics as it is today. This course is the seed, which is primitive in appearance but has the capacity for vast and intricate development for an able mathematician.

Real Analysis is the foundation of pure Mathematics and the ideas of Real Analysis are used in Topology, Functional Analysis, Complex Analysis and Measure Theory. The students can apply the concepts studied in this course in Topology, Functional Analysis, Complex Analysis and Measure Theory.

**Unit I:** Ordered field, real field, properties of real line, Extended Real number system.

**Unit II:** Metric spaces, compact sets, connected sets, perfect sets, cantor set.

**Unit III:** Numerical sequences and series. Convergent sequences, Cauchy sequences, complete metric spaces, series, tests of convergence, conditional and absolute convergence, power series, summation by parts, rearrangement of series.

**Unit IV:** Continuity, limit of a function, continuity and convergence, continuity and compactness, continuity and connectedness, discontinuity, monotonic functions.

**Unit V:** Differentiation, derivative of a real function, mean value theorems, the continuity of derivatives, L'Hospital rule, Taylor's theorem, differentiation of vector-valued functions.

**Text Book:**

W.Rudin-Principles of Real Analysis, McGraw Hill, 2004.

**Unit I:** Chapter 1

**Unit II:** Chapter 2

**Unit III:** Chapter 3

**Unit IV:** Chapter 4

**Unit V:** Chapter 5

**Reference Books:**

1. M. Apostol-Mathematical Analysis, Addison Wesley Publishing house, 2010.
2. V.Ganapathy Iyer-Mathematical Analysis, Tata McGraw Hill, 1985.
3. R.R.Goldberg-Methods of Real Analysis, Oxford and IBH publishing house, 1975.

PGM 4345 / PSM 4345

Fuzzy Mathematics

5hrs/ 3cr

**Objective:** The objective of this course is to introduce to the students all the basic ideas of fuzzy mathematics. The course deals with types of fuzzy sets, operations on fuzzy sets, fuzzy number, fuzzy interval, fuzzy logic, fuzzy relations and various connectives in fuzzy sets.

The learner will be able to appreciate the insufficiency of the Aristotelian logic when we think of artificial intelligence and machine language. The learner would appreciate the complexity of the fuzzy logic. The content of the course will enable him to realize the inherent fuzziness in every human language and find a way out to express in best possible mathematical expression.

**Unit I:** Introduction – Crisp sets – Fuzzy sets – Basic concepts – Properties of  $\alpha$ -cuts – Representations of fuzzy sets – Decomposition theorems – Extension Principle for fuzzy sets.

**Unit II:** Fuzzy complements – First Characterization Theorem of Fuzzy complements – Second Characterization Theorem of Fuzzy complements – Fuzzy intersections ( $t$  – Norms) – Fuzzy union ( $t$ -conorms) – Characterization theorem of  $t$ -norms,  $t$ -conorms – combinations of operations – Aggregation operations.

**Unit III:** Fuzzy numbers – Linguistic variables – Arithmetic operations on intervals – Arithmetic operations on Fuzzy numbers – Lattice of fuzzy numbers – Fuzzy equations.

**Unit IV:** Crisp and fuzzy relations – Projections and Cylindrical extensions – Binary fuzzy relations – Binary relations on a single set – Fuzzy equivalence relations –  $\sup$ - $i$  compositions of fuzzy relations –  $\inf$  $\omega_i$  compositions of fuzzy relations.

**Unit V:** Fuzzy relation equations – Partitioning – Solution method

#### Text Book:

George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy logic, Theory and Applications, Prentice Hall of India, 2005.

**Unit I :** Chapter 1,2(Sec 1.1 – 1.5 & 2.1 – 2.3)

**Unit II :** Chapter 3(Sec 3.1 – 3.6)

**Unit III:** Chapter 4(Sec 4.1 – 4.6)

**Unit IV :** Chapter 5(Sec 5.1 – 5.5 & 5.9 – 5.10 theorem 5.3 only)

**Unit V :** Chapter 6,7(Sec 6.1 – 6.3 )

#### Reference Books:

1. G.J. Klir and T.A. Folger, Fuzzy Sets, Uncertainty and Information, Prentice Hall of India, 2001
2. H.T. Nguyen and E.T. Walker, A first course in fuzzy logic, Chapman and Hall, 1999
3. H.J. Zimmermann, Fuzzy Set Theory and its Applications, Allied publishers, 1996.

**Objective:** The study of number theory inevitably includes knowledge of the problems and techniques of elementary number theory, however the tools which have evolved to address such problems and their generalizations are both analytic and algebraic, and often intertwined in surprising ways. This course covers topics from classical number theory including discussions of mathematical induction, prime numbers, division algorithms, congruences, and quadratic reciprocity.

On successful completion of the course the student will be able to

- prove number theory results rigorously
- understand prime numbers and modular arithmetic
- solve linear Diophantine equations and linear congruences
- describe properties of arithmetical functions, including the Euler phi function
- apply methods and techniques of number theory to a range of applications
- hone the ability to do reality checks on calculations.

**Unit I:** Divisibility – properties – division algorithm – G.C.D- related theorems - Euclid’s lemma – Euclidean algorithm – primes – fundamental theorem of arithmetic- infinitude of primes.

**Unit II:** Congruences – properties – Euler’s phi function – Fermat’s theorem – Euler’s theorem – Wilson’s theorem- Albert Girard theorem – Fermat theorem on two squares.

**Unit III:** Solution of congruences - polynomial congruence equation - Chinese remainder theorem – applications – public key cryptography.

**Unit IV:** Quadratic residues- Euler’s criterion- Legendre symbol – properties - Gauss lemma – Gaussian reciprocity law- Jacobi symbol.

**Unit V:** Greatest integer function – properties – de poligrac’s formula – day of the week from the date- arithmetic functions:  $d(n)$ ,  $\sigma(n)$ ,  $\sigma_k(n)$ ,  $\omega(n)$ ,  $\Omega(n)$  - properties- Mobius inversion formula-Linear Diophantine equation:  $ax+by=c$ .

**Text Book:**

Ivan Niven, H. Zuckerman, and H. Momtgomery, An introduction to the theory of numbers, 5<sup>th</sup> edition, John wiley and sons, 2013.

**Unit I:** Chapter 1(sec 1.2- 1.3 )

**Unit II:** Chapter 2(sec 2.1-2.2)

**Unit III:** Chapter 2( sec 2.3-2.5)

**Unit IV:** Chapter 3( sec 3.1-3.3)

**Unit V:** Chapter 4(sec 4.1-4.3), Chapter 5(sec 5.1)

**Reference Books:**

1.David M. Burton, Elementary Number theory, 7<sup>th</sup> edition Tata McGraw- Hilleducation private limited, New Delhi, 2012.

2.Tom. M. Apostol, Introduction to analytic number theory, springer international student Edition, 1998.

3. G.H. Hardy and E.M. Wright, An introduction to the theory of Numbers, 6<sup>th</sup> edition, London oxford university press, 1975.

PGM 4249 / PSM 4249

Ordinary Differential Equations

4hrs/2cr

**Objective:** This course deals with the basic concepts of Ordinary Differential Equations and apply them to various physical problems.

This course will motivate the students in higher studies and research in applications of ordinary differential equations.

**Unit I:** Linear equations with variable coefficients, initial value problems for the homogenous equation, Solutions of the homogenous equation, The Wronskian and linear independence, reduction of the order of a homogenous equation.

**Unit II:** The Non-homogenous equations, Homogenous equations with analytic Coefficients, The Legendre equation, Chebychev's equation, Hermite equation and Justification of the power series method.

**Unit III:** Linear equations with regular singular points, The Euler equation, Second order equations with regular singular points.

**Unit IV:** A convergence proof, the exceptional cases, The Bessel equation.

**Unit V:** Existence and uniqueness of solutions to first order equations: Equations with variables separated, Exact equations, The methods of successive approximations, The Lipschitz condition, Convergence of the successive approximations.

**Text book:**

E.A.Coddington, An introduction to ordinary differential equations, Prentice Hall of India, 2004.

**Unit I:** Chapter III: Sections 1, 2,3,4,5 and related problems

**Unit II:** Chapter III: Sections 6, 7, 8 and related problems

**Unit III:** Chapter IV: Sections 1, 2, 3 and related problems

**Unit IV:** Chapter V: Sections 5, 6, 7, 8 and related problems

**Unit V:** Chapter VI: Sections 1, 2, 3, 4, 5, 6 and related problems

**Reference books:**

1. G.F.Simmons, Differential equations with applications and historical notes, Tata McGraw Hill, 1995
- 2.S.G.Deo and V.Raghavendra, Ordinary differential equations and stability theory, 1996.
- 3.A.Chakravarty, Elements of ordinary differential equations and special function, Wiley Eastern, 2001
4. S.G.Deo, V. Lakshmikantham and V.Raghavendra, Text Book of Ordinary differential equations, Tata McGraw Hill Publishing Company Limited,1997.

**Objective:** The course will aim to provide a strong foundation in the abstract approach for the budding Mathematician. In this course the students will be introduced to the third algebraic model, a vector space, field theory, algebra of linear transformation and various types of operators.

One of the amazing features of twentieth century Mathematics has been its recognition of the power of abstract approach. Modern algebra has evolved with this abstract approach and is one of the important current research areas of Mathematics, and also serves as the unifying thread which interfaces all of Mathematics – geometry, number theory, analysis, topology and even applied Mathematics. These are potent and effective tools in all branches of Mathematics. These ideas trace its origin to topics in geometry and physics. The basic ideas in algebra are used in Functional Analysis, Complex Analysis, Operations Research, Computer Science, Physics and Chemistry.

**Unit I:** Field theory: extension fields, Roots of a polynomial, splitting field of a polynomial.

**Unit II:** Elements of Galois Theory, solvability by radicals.

**Unit III:** Introduction to vector spaces, linear transformation, the algebra of a linear transformation, Isomorphism, representation of transformation by matrices, linear functional, double dual spaces, and transpose of Linear transformation.

**Unit IV:** Introduction, Characteristic roots and Characteristic vectors, annihilating polynomials, invariant subspaces, simultaneous triangulation and diagonalization, direct-sum decompositions, invariant direct sums and primary decomposition theorem.

**Unit V:** Inner product spaces, linear functional and adjoints, unitary operators and normal operators.

**Text Books:**

1. I.N.Herstein, Topics in Algebra, Vikas Publishing house, 2002.  
**Unit I:** Chapter 5.1 to 5.5  
**Unit II:** Chapter 5.6 to 5.8
2. K.Hoffman and R.kunze-Linear algebra, Prentice Hall, 2000.  
**Unit III:** Chapter 3.1 to 3.7  
**Unit IV:** Chapter 6.1 to 6.8  
**Unit V:** Chapter 8.2 to 8.5

**Reference Books:**

1. M.Artin-Algebra, Prentice Hall of India, 1994.
2. J.B.Fraleigh- A first course in Modern algebra, Addison Wesley Publishing house, 1990.
3. Surjeet Singh and Quazi Zameeruddin-Modern algebra, Vikas publishing house, 1991.

PGM 4544 / PSM 4544

Real Analysis II

6hrs/ 5 cr

**Objective:** The aim of this course is to provide every Postgraduate student a comprehensive idea about the principles of real analysis. This course will provide such treatment. This course will give a comprehensive treatment of integration, uniform convergence and end up with the three important results of any fundamental course in analysis namely inverse function theorem, implicit function theorem and rank theorem. Algebra and Analysis are the two eyes of a man in the realm of Mathematics. Analysis takes a man into the highlands of mathematics itself, where these concepts are inseparable in all of pure mathematics as it is today. This course is a sea, which is primitive in appearance but has the capacity for vast and intricate development for an able mathematician. If analysis is one of the eyes of a man in the realm of mathematics, differentiation and integration are the two eyes of a man in the realm of analysis.

Real analysis is the foundation of pure mathematics and the ideas of real analysis are used in topology, functional analysis, complex analysis and measure theory. The students can apply the concepts studied in this course in Topology, Functional Analysis, Complex Analysis, Differentiation, Integration, Differential Equations and Measure Theory.

**Unit I:** The Riemann-Stieltjes integral, definition and properties of integral, integration and differentiation, rectifiable curves.

**Unit II:** Sequences and series of functions, Uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation.

**Unit III:** Equi continuous families of function, Arzelo Ascoli theorem, Stone-Weierstrass theorem.

**Unit IV:** Some special functions, power series, exponential and logarithmic functions, trigonometric functions, Algebraic completeness of the complex field, Fourier series, gamma function.

**Unit V:** Functions of several variable, linear transformations, differentiation, contraction principle, inverse function theorem, implicit function theorem, rank theorem.

**Text Book:**

W.Rudin-Principles of Real Analysis, McGraw Hill, 2004.

**Unit I:** Chapter 6

**Unit II:** Chapter 7 (Sec 7.1 –Sec 7.5)

**Unit III:** Chapter 7 (Sec 7.6- Sec 7.7)

**Unit IV:** Chapter 8

**Unit V:** Chapter 9 (Sec 9.1 –Sec 9.6)

**Reference Books:**

1. M. Apostol-Mathematical Analysis, Addison Wesley Publishing house, 2010.
2. V.Ganapathy Iyer-Mathematical Analysis, Tata Mcgraw Hill, 1985.
3. R.R.Goldberg-Methods of Real Analysis, Oxford and IBH publishing house, 1975.

**Objective:** Graph Theory is an important branch of Mathematics which has plenty of applications in almost all other fields such as Physics, Chemistry, Operations Research, Management, Sociology, Linguistics, Computer Engineering, Electrical Engineering, etc. This course covers all the basic concepts in Graph Theory namely trees, Eulerian and Hamiltonian graphs, Matching, vertex and edge coloring, Planar graphs and Applications of Graph theory in various fields.

The objective of the course is to give a complete introduction to Graph Theory and to cover very recent areas of Graph Theory, so that interested students can continue their research in this area.

**Unit I:** Fundamental Concepts – Introduction, Graphs, labeled Graphs, weighted Graphs, vertex degrees, isomorphism, paths, cycles, and trails, connectedness, bipartite graphs, Eulerian Circuits, graphic sequences, directed graphs, Eulerian digraphs, radius and diameter, subgraphs, operations on graphs, adjacency, incidence and path matrices.

**Unit II:** Trees and distances - basic properties, distances in trees and graphs, disjoint spanning trees, enumeration of graphs, decomposition and graceful labeling, minimum spanning trees, shortest paths.

**Unit III:** Eulerian graphs, Hamiltonian graphs, necessary and sufficient conditions, Hamiltonian sequences, Matching, maximum matching, Hall's theorem, independent sets and covers, Konig's theorem, maximum bipartite matching, weighted bipartite matching, Tutte's theorem, stable matching.

**Unit IV:** Connectivity and paths – cuts and connectivity, k-connected graphs, connectivity of digraphs, applications of Menger's theorem, maximum network flow.

**Unit V:** Coloring of graphs – vertex colorings and upper bounds, Brooks' theorem, structure of k-chromatic graphs, extremal problems and Turan's theorem, color-critical graphs. Edge coloring. Planar graphs - Embeddings and Euler's formula – dual graphs, Kuratowski's theorem (without proof), four colour conjecture, five colour theorem for planar graphs, face colouring.

**Text Book:**

J.A.Bondy and U.S.R.Murty – Graph Theory with Applications, Macmillan Co, 1976

**Unit I:** Chapter 1.1-1.8

**Unit II:** Chapter 2.1-2.5

**Unit III:** Chapter 4.1-4.4, 5.1-5.3

**Unit IV:** Chapter 3.1-3.3

**Unit V:** Chapters 6.1, 6.2, 7.1-7.3, 8.1-8.2, 9.1-9.6

**Reference Books:**

1. F. Harary – Graph Theory, Addison Wesley publishing house, 1972
2. R.Balakrishnan and K.Ranganathan – A text book of Graph Theory, Springer Verlag, 2000
3. G. Chartrand – Introductory Graph Theory, Dover publications, 1985
4. G. Chartrand and O. R. Oellerman – Applied and Algorithmic Graph Theory, Mcgraw Hill, 1993
5. M.Murugan – Topics in Graph Theory and Algorithms, Mudali publishing house, 2003,
6. Narasingh Deo – Graph Theory with Applications to Engineering and Computer science, Prentice Hall of India, 1984
7. K.R.Parthasarathy – Basic Graph Theory, Tata Mcgraw Hill, 1994
8. D. B.West – Introduction to Graph Theory, Prentice Hall of India, 2001.

**Objective:** Combinatorics is the branch of Mathematics studying the enumeration, combination, and permutation of sets of elements and the mathematical relations that characterize their properties. The objective is to introduce large variety of applications and how algorithmic approach can be applied to solve a combinatorial problem. This course will also initiate interest in the students in higher studies and research in applicable mathematics.

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

- Understand the techniques of combinatorial approach in a counting problem.
- Explain the fundamental combinatorial structures that naturally appear in various other fields of mathematics and computer science.
- Apply algorithmic approach to the solution of the problem.
- Develop mathematical maturity.
- Describe and solve some real time problems using concepts of combinatorics.
- 

**Unit I:** Two basic counting principles – Simple arrangement and selections – Arrangement and selection with repetitions.

**Unit II:** Distributions – Distribution of distinct objects – Distribution of identical objects – Binomial identities.

**Unit III:** Generating functions – Calculating coefficients of generating functions – Partitions – Exponential generating functions.

**Unit IV:** Recurrence relation – Solution of linear recurrence relations – Solutions of inhomogeneous recurrence relations.

**Unit V:** Inclusion and exclusion formula – Derangement – Introduction to rook polynomial.

**Text book:**

A.W.Tucker, Applied Combinatorics, Wiley, 2011.

**Unit I:** Section 5.1, 5.2, 5.3

**Unit II:** Section 5.4, 5.5

**Unit III:** Section 6.1, 6.2, 6.3, 6.4

**Unit IV:** Section 7.1, 7.3, 7.4, 7.5

**Unit V:** Section 8.2, 8.3 (page 335 -341)

**Reference Books:**

1. D.Cohen, Combinatorics, Wiley, 1978.
2. M.Hall, Combinatorial Mathematics, McGraw Hill, 1968.
3. C.L.Liu, Introduction to Combinatorial Mathematics, 1994.
4. H.J.Ryser, Combinatorial Mathematics, Carus Mathematical Monograph, 1965.
5. Krishnamurthy, Combinatorics, PHI, 1998.



**Objective:** To give an introduction to Mathematical techniques in analysis of Partial Differential Equations. Analyze the Linear and non Linear Partial Differential equations with certain methods. Also Discuss about their applications such as one dimensional wave equations and calculus of variation.

The learners can gain the knowledge about analysis of Partial Differential Equations, their characteristics and its applications.

**Unit I :**

Linear Equations of the first order – Integral Surfaces Passing through a given curve – Surfaces Orthogonal to a given system of surfaces – Nonlinear Partial Differential Equations of the first order – Cauchy’s Method of Characteristics – Compatible systems of first order equations – Charpit’s Method.

**Unit II:**

Linear partial differential equations with constant coefficient- Equations with variable coefficients - Characteristic curve of second order equation - Characteristics of equations in three variables - The solution of linear Hyperbolic Equations.

**Unit III:**

Separation of variables - Elementary solutions of Laplace equation - Families of equi-potential surfaces - Boundary value problems.

**UnitIV:**

Separation of variables - Problems with axial symmetry - Kelvin’s inversion theorem - The theory of Green’s functions for Laplace Equations - The Relation of Dirichlet’s problem to the Calculus of Variation.

**Unit V :**

Elementary Solutions of the One – dimensional Wave equation – The Riemann-Volterra solution of the One- dimensional Wave equation – Vibrating Membranes: Application of the Calculus of the variations.

**Text Book :**

Sneddon IAN., “Elements of Partial Differential Equations”, Mc Graw Hill Book Company, New York 1957; Republished by Dover in 2006.

**Unit I:** Chapter 2: Sec 4-10

**Unit II:** Chapter 3: Sec 4 – 8

**Unit III:** Chapter 4: Sec 2 – 4

**Unit IV:** Chapter 4: Sec 5 – 9

**Unit V:** Chapter 5: Sec 2 -4

**Reference Books :**

1. Dennemeyer R., “Introduction to Partial Differential Equations and Boundary Value Problems”, McGraw Hill Book Company, 1968.
2. Pinsky M.A., “Partial Differential Equations and Boundary Value Problems”, McGraw Hill Book Company, 3<sup>rd</sup> Edition, 1998.
3. Coleman P. M., “An Introduction to Partial Differential Equations with MAT LAB”, Chapman & Hall / CRC, 2005.

PGM 5541 / PSM 5541

Topology

6hrs/ 5cr

**Objective:** The course will enable the students to master the basic concepts of topology. The course deals with various topics in topological spaces like compactness, connectedness, separation axioms, countability axioms and metrizable of topological spaces

The learner will be able to understand and appreciate that the Topological spaces are the generalization of the concept of metric spaces. The inherent complexity of topological spaces as the most abstract human imagination can be appreciated by the learner. The intrinsic and novel methods of proof adopted can be a source of inspiration for solving problems in every walk of life

**Unit I:** Topological Spaces, bases and sub bases, order topology, subspace topology, product topology, metric topology, closed sets and limit points, closure and interior, continuous functions and homeomorphisms

**Unit II:** Product topology, Metric topology, connected spaces, path connected spaces, locally connected spaces, components and path components

**Unit III:** Compact spaces, limit point compact spaces, sequentially compact spaces, countably compact spaces, equivalence of various compactness in metric spaces, locally compact spaces, Alexandroff one-point compactification

**Unit IV:** Countability axioms, first countable and second countable spaces, separable and Lindelof spaces

**Unit V:** Separation axioms-Frechet, Hausdorff, regular, completely regular, normal and completely normal spaces, Urysohn lemma, Urysohn metrization theorem, Tietz extension theorem, Tychonoff theorem.

**Text Book:**

**J.R.Munkres-** Topology, 2<sup>nd</sup> edition, Pearson New International edition, 2014.

**Unit I:** Chapter 2 (sec 12,13, 14, 15, 16,17, 18)

**Unit II:** Chapter 2 (sec 19, 20, 21), Chapter 3 (Sec 23,24 ,25)

**Unit III:** Chapter 3 (Sec 26, 27, 28, 29)

**Unit IV:** Chapter 4 (Sec 30, 31, 32)

**Unit V:** Chapter 4 (Sec 33, 34, 35, 37)

**Reference Books:**

1. G.F.Simmons-Introduction to topology and modern analysis, McGraw Hill,1963(2004)
2. S.T. Hu-Introduction to general topology, Tata McGraw Hill,1979
3. K.D.Joshi-Introduction to general topology, New Age International Publisher,2014.
4. J. Dugundji, Topology, William C. Brown Pub.,1966.
5. J.L.Kelley, General Topology, Van Nostrand,1955.

**Objective:** The aim of this course is to gain an in depth knowledge in Complex Analysis, to have an understanding of concepts and techniques used in dealing with functions of complex variables and to facilitate on study of complex integration and series.

The learners will be able to know that how to apply the complex concepts like index and residue in screening tests.

**Unit I:** Elementary Properties and Examples of Analytic Functions: Power Series, Analytic Functions, Analytic Functions as Mappings, Mobius Transformations.

**Unit II:** Complex Integration: Power Series Representation of Analytic Functions, Zero's of Analytic Functions, The Index of a Closed Curve, Cauchy's Theorem & Integral Formula.

**Unit III:** The homotopic version of Cauchy's Theorem and Simple Connectivity, Counting Zeros, The Open Mapping Theorem, Goursat's Theorem.

**Unit IV:** Singularities: Classification of Singularities, Residues, The Argument Principle.

**Unit V:** The maximum Modulus Theorem: The maximum Principle, Schwarz's Lemma, Convex functions and Hadamard's Three Circles Theorem, Phragmen-Lindelof Theorem.

**Text Book:**

J.B.Conway, Functions of one complex variable, Narosa publishing house, 1973

**Unit I:** Chapter 3: sections 1, 2, 3

**Unit II:** Chapter 4: sections 1, 2, 3, 4, 5

**Unit III:** Chapter 4: sections 6, 7, 8

**Unit IV:** Chapter 5: sections 1, 2, 3 and related problems

**Unit V:** Chapter 6: sections 1, 2, 3, 4

**Reference books:**

1. L.V.Ahlfors, Complex analysis, Mcgraw Hill, 1979
2. V.Karunakaran, Complex analysis, Narosa publishing house, 2002
3. S.Ponnuswamy, Foundations of Complex analysis, Narosa publishing house, 1997.

**Objective:** The Objective of this course is to develop an ability in the students to apply Statistical methods to real life problem, to understand the limitation of these methods, to think probabilistically and to generalize the statistical theory to several variables. The course deals with random variable, stochastically independence, distribution functions, conditional probability, standard theoretical distributions, sampling distributions, distributions of functions of random variable and limiting distributions.

Statistical tools are applied in all branches of science and humanities to verify and test various hypothesis, estimation of values of certain unknown parameters, to find the relation between two or more quantities, to find meaningful inferences from raw data. In this course statistics is not dealt as statistical methods, but as the mathematical foundation of interpretation of mathematical data with rigorous mathematical treatment.

**Unit I:** Probability Set functions – conditional probability, random variables (discrete & continuous), expectation of random variables – Chebyshev’s inequality.

**Unit II:** Distribution of two random variables, conditional distribution and expectations, Correlation coefficient, independent random variables – extension to several random variables.

**Unit III:** Some special distributions- Binomial, Poisson, Gamma, Chi-square and Beta distributions, Normal and Multivariate normal distributions, t and F distributions.

**Unit IV:** Unbiasedness, consistency and limiting distributions. Expectation of function, convergence in probability, convergence in distribution – mgf technique, Central limit theorem.

**Unit V:** Sampling and statistics – Order statistics, confidence intervals for difference in means, confidence intervals for difference in proportions. Introduction to hypothesis testing. Statistical tests – Chi-square tests.

**Text Book:**

Robert V. Hogg, Allen Craig, Joseph W. Mckean, Introduction to Mathematical Statistics, 6<sup>th</sup> ed., Pearson Prentice Hall,2011.

**Unit I:** Chapter 1: Sec.1.3-1.10

**Unit II:** Chapter 2: Sec.2.1-2.7

**Unit III:** Chapter 3: Sec.3.1-3.6

**Unit IV:** Chapter 4: Sec.4.1,4.2,4.3.3.,4.4

**Unit V:** Chapter 5: Sec:5.1,5.2.1,5.4,5.5.5.7.

**Reference Books:**

- 1.J.E.Freund – Mathematical Statistics, Prentice Hall of India, 2000
- 2.SS.Wilks – Mathematical Statistics, John Wiley and sons,1962
- 3.S.C. Gupta and V.K. Kapoor – Fundamentals of Mathematical Statistics, Sultan chand and co,2000.
- 4.T.Veerarajan, Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt.Ltd.2017.

**Objective:** The aim of the course is to enable the student to understand the basic ideas of measure theory. The course deals with the concepts abstract measure spaces, abstract integration, Lebesgue measure, Lebesgue integration and the relation with Riemann integration and various types of convergence of sequence of measurable functions. Measure theory generalizes the concept of length, area, volume, summation and integration in a general setup. Modern treatment of probability theory and mathematical statistics heavily relies upon measure theory ideas. These ideas are also used in functional analysis. Both ideas from real analysis and topology are needed to understand measure theory.

The learners get ideas in sigma algebras, measure spaces, measurable functions, outer measures, decompositions of measures, product measures.

**Unit I:** Introduction – Lebesgue outer measure – Measurable sets – Regularity – Measurable functions – Borel and Lebesgue measurability.

**Unit II:** Integration of non-negative functions – Lebesgue integral – Fatou's lemma – Lebesgue monotone convergence theorem – The general integral – Lebesgue dominated convergence theorem – Integration of series – Riemann and Lebesgue integrals.

**Unit III:** The four derivatives – Continuous Non-differentiable functions – Functions of bounded variation – Lebesgue's differentiation theorem – Differentiation and integration.

**Unit IV:** Measures and outer measures – Extension of a measure – Uniqueness of the extension – Completion of a measure – Measure spaces – Integration with respect to a measure.

**Unit V:** Signed measures and the Hahn decomposition – The Jordan decomposition – The Radon-Nikodym theorem (statement only) – Some applications of the Radon-Nikodym theorem.

**Text book:**

G. Debarra, Measure theory and integration, New age international, 1996.

**Unit I:** Chapter 2 (except section 2.6)

**Unit II:** Chapter 3

**Unit III:** Chapter 4 (except section 4.6)

**Unit IV:** Chapter 5

**Unit V:** Chapter 8 (except section 8.5)

**Reference books:**

1. P.R. Halmos, Measure theory, Springer international student edition, 1981
2. Royden, Real analysis, Macmillan, 1988.
3. W. Rudin, Real and complex analysis, Tata MC Graw Hill, 1966.
4. Munroe, M.E., Introduction to measure and integration – Addison Wesley, 1953.
5. I.K. Rana, An Introduction to measure and integration, Narosa Publishing House, 1997.

PGM 5349 / PSM 5349

Programming in C++ with OOPS

4hrs/ 3cr

**Objective:** The objective of this course is to enable the students to understand the fundamental concepts of Object - Oriented programming using C++ and to train them to apply these concepts in solving the real world problems.

Students are encouraged to write programs in C++ related to the problems they encounter in day-to-day life and validate in the computer lab.

**Unit I:** Introduction- Need for object oriented programming-Advantages of OOP-Basic concepts of OOP- Objects- Classes-Inheritance- Reusability- Polymorphism – Overloading- C++ console I/O commands- Tokens –Expressions – Control structures.

**Unit II:** Function Prototyping- Call by reference-Return by reference-Inline functions-Default arguments - Function overloading- Classes and objects- Static member functions –Arrays of objects- Friend function-Pointers to members- Constructors and Destructors functions.

**Unit III:** Operator overloading- Overloading unary and binary operators- Overloading binary operators using friend function-Manipulation of strings using operators-rules for overloading operators-Type conversion.

**Unit IV:** Inheritance- Single Inheritance –Multiple Inheritance –Multilevel Inheritance - Hierarchical and hybrid inheritance- Virtual base classes-Abstract classes-Constructors in derived classes-Nesting of classes.

**Unit V:** Polymorphism- Pointers- This pointer- Virtual functions-Pure virtual functions-Exception handling-Opening and closing a file- File pointers and their manipulations - Updating a file – Error handling during file operations.

**Textbook:**

Balagurusamy E., Object Oriented Programming with C++, PHI, 2008

**Unit I:** Sections : 1.3-1.8,3.2-3.7, 3.13-3.19, 3.22, 3.24.

**Unit II:** Sections : 4.2-4.11, 5.3-5.18, 6.2-6.11.

**Unit III:** Sections : 7.2-7.8.

**Unit IV:**Sections : 8.2-8.12.

**Unit V:** Sections :9.1-9.7, 11.1-11.9,13.2-13.7.

**Reference books:**

1. A. Chandra Babu & T. Joshuva Devadoss, Programming with C++, Narosha Publishing House Ltd. 2008
2. Herbert Schildt, Teach yourself C++, Osborne McGraw Hill, 1994.
3. Herbert Schildt, C++ Complete Reference, Osborne McGraw Hill, 1995.
4. Rajaram R, Object Oriented Programming and C++, New Age International Publications, New Delhi, 1997
5. Robert Latfore, Object Oriented Programming in Microsoft C++,Galgotia Publication, 1993.

**Objective:** The objective of the course is to learn the fundamental programming concepts and methodologies which are essential to build a C++ programs.

It enables them to write programs using these concepts and to practice them in the C++ programming language via laboratory experiences.

1. Programs using scanf and printf statements.
2. Programs using conditional statements.
3. Programs using looping statements.
4. Programs using functions ( inline function, default arguments etc..)
5. Programs using the concept of function overloading.
6. Programs related to classes and objects.
7. Programs using static member function and arrays of objects.
8. Programs using the concept of friend and virtual functions.
9. Programs on Constructors and Destructors.
10. Programs on Operator overloading.
11. Programs related to Inheritance.
12. Basic programs on files.

PGM 5542 / PSM 5542

Functional Analysis

6hrs/ 5cr

**Objectives:** The aim of the course is to enable the student to understand the basic ideas of functional analysis. The course deals with normed linear spaces, Banach spaces, Hilbert spaces, bounded linear functionals, operators and projections.

Functional analysis is an important area of pure mathematics which has wide range of applications in quantum mechanics, theoretical physics, control theory, approximation theory, and optimization techniques. The learner will be able to appreciate these advanced mathematical structures and its application various fields

**Unit I:** Normed Spaces, Continuity of Linear Maps, Hahn Banach theorems. Banach spaces.

**Unit II:** Uniform Boundedness Principle, Closed Graphs and Open Mapping Theorems, Duals and Transpose.

**Unit III:** Inner Product Spaces, Hilbert spaces, ortho normal sets, Approximation and Optimization, Projections and Riesz Representation Theorems.

**Unit IV:** Projections, Bounded Operators, Adjoint, Self Adjoint, Normal and Unitary Operators, orthogonal projections.

**Unit V:** Finite dimensional spectral theory.

**Text Books:**

1. B.V. Limaye, Functional analysis, Wiley Eastern 2015

**Unit I:** Chapter 2 (sec 5,6,7,8)

**Unit II:** Chapter 3 ( sec 9, 10) , Chapter 4 (sec 13)

**Unit III:** Chapter 6 ( sec 21, 22, 23, 24)

**Unit IV:** Chapter 7 (sec 25, 26)

2. G.F. Simmons, Introduction to topology and modern analysis, McGraw Hill, 1963(2004)

**Unit V:** Chapter 11(sec 60, 61)

**Reference Books:**

1. S. Ponnuswamy, Foundations of functional analysis, Narosa Publishing house, 2017.
2. W. Rudin, Functional Analysis, TataMcGraw-Hill Publishing Company, New Delhi, 1991, 2<sup>nd</sup> reprint 2007.
3. G. Bachman and L. Naric, Functional Analysis, Academic Press, New York, 1966.
4. E. Kreyszig, Introductory Functional Analysis with Applications, John wiley & Sons, New York, 1978.



**Objective :** The aim of this course is to enable the students to know the basic principles of classical mechanics and its applications. Students have a deep understanding of the mechanics of a particle and the motion of a rigid body.

This course demonstrate knowledge and understanding of the following fundamental concepts in the mechanics of system of particles, motion of rigid body and the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics. Students should acquire thorough knowledge both of the fundamentals and of significant contemporary research developments.

**Unit I :** Mechanics of a particle-Mechanics of a system of a particles-Constraints-D' Alembert's principle and Lagrange's equations.

**Unit II :** Hamilton's principle- Derivation of Lagrange's equations from Hamilton's principle.The Euler angles - The Cayley -Klein parameters and related quantities - Euler's theorem on the motion of a rigid body - Finite rotations.

**Unit III :** The rigid body equations of motion - Angular momentum and kinetic energy of motion about a point - Tensors and Dyadics - The inertia tensor and the moment of inertia. The heavy symmetrical top with one point fixed .

**Unit IV :** The equations of Canonical transformation - Examples of canonical transformation Poisson brackets and Canonical invariants. Equation of motion in Poisson bracket -Infinitesimal canonical transformation - the angular momentum Poisson brackets relations - Liouville's theorem.

**Unit V :** The Hamilton - Jacobi equation for Hamilton's principal function. The Harmonic Oscillator problem as example of Hamilton - Jacobi method, Hamilton's characheristic function - Separation of variables in Hamilton -Jacobi equation-Action angle variables - The Kepler Problems in Action-angle variables

**Text Book:**

Classical Mechanics - H. Goldstein-Addison Wesley , 2<sup>nd</sup> edition, 2001.

**Unit I :** Chapter 1 : sec 1.1 to 1.4

**Unit II :** Chapter 2 :sec 2. 1 , 2.3 and Chapter 4 : 4.4 to 4.7.

**Unit III :** Chapter 5 :5.1 to5.3 and 5.7

**Unit IV :** Chapter 9 :9.1 , 9.2 9.4 9.5, 9.6, & 9.8

**Unit V:** Chapter 10 : 10. 1 to 10.4, &10.7.

**Reference Books:**

1. Principle of Mechanics - J.L.Synge and B.A.Griffith - McGraw Hill, 1949.
2. Classical Mechanics - D.E.Rutherford, Oliver Boyd Ltd, 1964.

**Objective:** The Objective of this course is to develop statistical inference (estimation and testing) based on likelihood methods, to study measures of quality of estimators and its properties, optimal tests of hypotheses and Stochastic process.

This course can develop the knowledge of statistical inferences, stochastic processes, poisson process and related distribution.

**Unit I:** Maximum Likelihood Estimation, Rao-Cramer Lower Bound and efficiency, Multi parameter case-Estimation.

**Unit II:** Measures of quality estimators, Sufficient statistic for a parameter, properties of sufficient statistic, Completeness and Uniqueness, the exponential class of distributions, Functions of a parameter, Sufficiency, completeness and independence.

**Unit III:** Most powerful tests – UMP tests, likelihood ratio tests, the Sequential probability ratio test.

**Unit IV:** Stochastic processes- Specification of stochastic processes, stationary processes. Markov chains- definition and examples. Classification of states and chains. Determination of higher transition probabilities.

**Unit V:** Poisson process and related distribution – generalization of Poisson process. Birth and Death process, Markov process with discrete state span – Erlang process.

**Text Books:**

1. Robert V. Hogg, Allen Craig, Joseph W. McKean, Introduction to Mathematical Statistics,

6<sup>th</sup> ed., Pearson Prentice Hall, 2011.

**Unit I:** Chapter 6: Sec.6.1- 6.5

**Unit II:** Chapter 7: Sec7.1-7.6, 7.9

**Unit III:** Chapter 8: Sec 8.1-8.4

2. J. Medhi, Stochastic Processes, Wiley Eastern Limited, 1986

**Unit IV:** Chapter 2: Sec2.1-2.3; Chapter 3: Sec3.1-3.6

**Unit V:** Chapter 4: Sec.4.1-4.6

**Reference Books:**

1. J.E. Freund – Mathematical Statistics, Prentice Hall of India, 2000

2. S.S. Wilks – Mathematical Statistics, John Wiley and sons, 1962

3. S.K. Srinivasan, K.M. Mehata, Stochastic Processes, Tata McGraw Hill, 1988.

4. S.C. Gupta and V.K. Kapoor – Fundamentals of Mathematical Statistics, Sultan Chand and co, 2000.

5. T. Veerarajan, Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt. Ltd. 2017

6. Sheldon.M. Ross, Stochastic Processes, John Wiley & sons.

**Objective:** This course deals with the theory of simplex method network models, dynamic and integer programming, and queuing theory, nonlinear programming and provide the mathematical basis behind these techniques.

The aim of this course is to help the students to understand and apply some of the widely used techniques of Operations Research.

**Unit I:** Theory of simplex method- Computational aspects of simplex method- Simplex method and transportation problem.

**Unit II:** Integer programming problem (Pure & mixed)- formulation- branch and bound method & cutting plane method. Dynamic programming- Capital budgeting problem-Bellman principle-shortest route problem- knapsack problem.

**Unit III:** Network models- minimum spanning tree problem- shortest route problem- maximal flow problem- minimum cost capacitated problem.

**Unit IV:** Queuing theory- Queuing Models-Basic characteristic of queueing system-Steady state solution of markovian queuing models-M/M/1, M/M/C with limited waiting space, M/G/1 Queuing models.

**Unit V:** Determining points of extrema for unconstrained and constrained functions (Optimality conditions)- Jacobian method- Lagrangian multiplier techniques- Kuhn Tucker optimality conditions- Nonlinear programming -Quadratic programming problem.

**Text books:**

1. Hadley – Linear Programming, Addison-Wesley Publishing Co.,1969.

**Unit I:** Chapter 3, 4, 9.3

2. H.A.Taha -Operations Research an introduction. Prentice Hall of India, 7<sup>th</sup> edition, 2003.

**Unit II:** Chapter 9.2, 9.2.1, 9.2.3, 10.1, 10.2, 10.3, 10.3.1.

**Unit III:** Chapter 6.1, 6.2, 6.3.1-6.3.3, 6.4(except 6.4.4), 6.5(except 6.5.4)

**Unit IV:** Chapter 17.6.6, 17.7, 17.7.1

**Unit V:** Chapter 20.1.1, 20.2 (pg: 719-729), 21.1.1 to 21.2.2

**Reference books:**

1. F.S.Hillier and G.J.Liebermann-Introduction to operations research, Mcgraw hill, 1995.

2. F.S.Hillier and G.J.Liebermann-Introduction to Mathematical programming, Mc Graw Hill, 1995

3. S.S.Rao-Optimization, theory and applications. Wiley eastern,1977.

PGM 5450 / PSM 5450

Project

6hrs/4cr

**Objectives:** The aim of this course is to train the students in literature collection and to gain experience for research. Students are encouraged to take it as a challenge, so that the result of the project shall be approved for publication in leading scientific journals.

**Guidelines & Instructions:**

- The project work for M.Sc. Mathematics Program is to be undertaken during IV semester.
- A candidate may, however, in certain cases, be permitted to work on projects in an Industrial/Research Organization, on the recommendations of the Head of the Department. In such cases, the Project work shall be jointly supervised by a supervisor of the department and an expert, as a jointsupervisor from the organization.
- The student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.
- The Project work for M.Sc Mathematics shall be pursued for a minimum of 12 weeks during the final semester.
- The deadline for submission of final Project Report is the last working day of the semester in which project / thesis / dissertation is done.
- In case of candidates of M.Sc. Programmes not completing of project work successfully, the candidates can undertake again in the subsequent semester.

**Evaluation:**

The PG-Head of the Department and the supervisor shall constitute the review committee for each branch of study. The evaluation of Project Work for M.Sc. Mathematics shall be done independently in the respective semesters and marks shall be allotted as per the weightages given in tabular column. There shall be two reviews (each 10 Marks) during the semester by the review committee. The student shall make presentation on the progress made by him / her before the committee. The total marks obtained in the two reviews will be 20 Marks. The internal (Guide) will assess for 30 marks (Including the regular discussion, attendance and participation in Seminars/Workshops/Conferences). The project report (thesis / dissertation) shall carry a maximum 10 marks. The viva-voce examination shall carry 40 marks. (Marks are awarded to each student of the project group based on the individual performance in the viva –voce Examination).

Internal Assessment (50Marks)			End Semester Examination (50 Marks)			
Review -I	Review -II	Internal (Guide)	Evaluation (10 Marks)	Viva – Voce (40 Marks)		
			Internal (Guide)	Examiner I	Examiner II	Examiner III
10	10	30	10	40		

**Review Committee members:**

1. PG - Head of the Department
2. Supervisor/Guide.

**Objective:** C has become the starting point for learning a course on programming language. This course is mainly designed to use C to learn the art of programming, and to appreciate and understand the C language to creatively write a wide range of programmes and peep into the study of Data Structures.

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

Explain the process of problem solving using computer

- Design an algorithmic solution for a given problem
- Write a maintainable C program for a given algorithm.
- Trace the given C program manually.

**Unit I:** Overview of C- basic structure – executing a C program - character sets – C tokens – keywords – identifiers - constants – variables – data types- declaration of variables.

**Unit II:** Operators and expressions- arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise, special operators- managing input and output operations- formatted input and output

**Unit III:** Decision making and branching –simple if – if ... Else- nested if – else if ladder – switch statement –Goto statement.

**Unit IV:** Decision making and looping- while loop – for loop –do while loop – break, continue statements.

**Unit V:** Arrays - introduction – declaration initialization of one dimensional arrays – initializing two dimensional arrays - character arrays and strings – declaring and initializing string variables – string handling functions.

**Text book:**

E. Balagurusamy, Programming in ANSI C 6<sup>th</sup> edition, Tata McGraw Hill, 2013.

**Unit I:** Chapter 1: sec 1.1-1.10, Chapter 2 sec 2.1-2.10

**Unit II:** Chapter 3: sec 3.1-3.12, Chapter 4

**Unit III:** Chapter 5

**Unit IV:** Chapter 6: sec 6.1-6.5

**Unit V:** Chapter 7: sec 7.1-7.6, Chapter 8: sec 8.1-8.8

**Reference books:**

1. P. Pandiyaraja, Programming in C, S. Viswanathan Pvt Ltd, 2005.
2. Herbert Schildt, Advanced C programming, Osborne McGraw Hill, 1990.
3. M. Tim Grady, Turbo C Programming Principles and Practices, McGraw Hill, 1990.

PGM 4302 / PSM 4302

Mathematics for Career Prospects

4hrs/ 3cr

**Objective:** This course aims at providing necessary logical reasoning part which is required of post graduates, especially from arts disciplines, in order to get through in competitive exams like UGC-NET/SET. This course includes Mathematical reasoning, logical reasoning and Data interpretation ideas. The contents were put in order so that a student who had undergone this course will get enhanced with numerical and logical abilities.

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

- Understand the techniques in solving mathematical reasoning problem
- Get enhanced in numerical aptitude
- Solve logical reasoning problem
- Understanding data interpretations
- 

**Unit I:** Alphabetic series - Numerical series - odd man out - Inserting a number in a series- Completing a series- Ranking in a series - Time sequence test.

**Unit II:** Verbal reasoning- Problem solving by substitution - Interchange of signs and numbers- Deriving appropriate conclusions from given set of statements - Logical sequences of words - Venn diagram-based problems.

**Unit III:** Non-verbal reasoning- inserting the missing character - Five figure series - Analogy - Arithmetical reasoning - Analytical reasoning.

**Unit IV:** Logical reasoning - Two premise arguments - Three premise arguments - Statements and arguments-Statements and assumptions – Statements and course of actions-Statements and conclusions -Deriving conclusions from passages-Theme deduction -Cause and effect reasoning.

**Unit V:** Data interpretation- Tabulation - Bar graphs - Pie charts - Line graphs.

#### Text Books:

1. Dr.R.S.Aggarwal; A Modern Approach To Verbal and Non – Verbal Reasoning ;S.Chand and Company.Pvt.Ltd ,2013

**Unit I:** Part 1: Section 1. Chapters 1,11&12.

**Unit II:** Part 1: Section 1. Chapters 13&14.

**Unit III:** Part 1: Section 1. Chapter 15&16; Part 2: Chapter 1,2 &4.

**Unit IV:** Part 1: Section 2, Chapters 1 to 8.

- 2.R.S.Aggarwal, Quantitative Aptitude ,2008.

**Unit V:** Section 2, Chapters 36 to 39.

#### References books:

- 1.Dr.R.S.Aggarwal, A Modern Approach to Verbal Reasoning,S.Chand and Company Pvt.Ltd., 2006.
- 2.Dr.R.S.Aggarwal; A Modern Approach to Non – Verbal Reasoning S.Chand and Company Pvt.Ltd 2006.
3. Dr.R.S.Aggarwal; A Modern Approach to logical Reasoning ;S.Chand and Company Pvt. Ltd. 2013.

PGM 4303 / PSM 4303

Astronomy through Ages

4hrs/ 3cr

**Objective:** The course will concentrate on the celestial objects, various techniques used to fix an object in the sky, and the various parameters that help one to measure the distance of a star. The course also contains the laws governing the celestial bodies discovered by Kepler and Newton. The various phenomenon like eclipses and the waxing and waning of the moon, and the properties of different planets in the solar system, the development of calendar, and the astronomical instruments one uses to measure the celestial bodies are covered in the syllabus.

At the end of the course, the student will be able to admire and appreciate the universe we live in, and will be familiar with the constellations, and various interesting aspects of our universe.

**Unit I:** Celestial spheres: Celestial coordinates, Diurnal motion

**Unit II:** The earth: Zones of earth: Terrestrial Latitudes and Longitudes- Dip of Horizon- Twilight

**Unit III:** Time: Equation of time- Seasons- Calendar- Conversion of time

**Unit IV:** The Moon: Relation between sidereal and synodic months- Elongation-Phase of moon- Path of the moon with respect to the sun

**Unit V:** Eclipses: Solar eclipse- Lunar Eclipse-Ecliptic limits- Synodic period of the nodes of lunar orbit

**Text book:**

S. Kumaravelu, Susheela Kumaravelu, Astronomy, 2007

**Unit I:** Chapter 2-Page number 41-67

**Unit II:** Chapter 3-Page number 98-106, 113-116, 135-137, 144-146

**Unit III:** Chapter 7-Page number 220- 230, 237-242, 244-255(simple problems)

**Unit IV:** Chapter 11-Page number 372-384

**Unit V:** Chapter 11-Page number 397-412

**Reference Books:**

1. Michael Zeilik-Astronomy The Evolving Universe- John Wiley & sons-1988
2. George O. Abell, David Morrison, Sidney C. Wolff- Exploration of the Universe- Saunders College Publishing, 1987.

**PGM 4304 / PSM 4304****Introduction to Statistical Tools****4 hrs/ 3cr**

**Objective:** The objective of this course is to enable the students to learn about the statistical concepts of data collection, analysis, interpretation, and presentation of data to answer questions about the social world. Also, it includes the basic concept of correlation, regression analysis, hypothesis testing, analysis of variance.

Students will be familiar with the computer-based statistical software SPSS.

**Unit I :** Introduction to SPSS – Versions of SPSS – Data editor –SPSS viewer – SPSS smart viewer – Saving files and retrieving a file.

**Unit II:** Introduction to Statistics- Data types – Collection of data – Classification and tabulation of statistical data – Diagrammatic representation- Exploring data with graphs using SPSS.

**Unit III:** Concept of correlation coefficient – Data entry for correlation analysis using SPSS– Interpreting a simple regression on SPSS.

**Unit IV:** Introduction to Sampling — Problems related to t-test and chi square test using SPSS.

**Unit V:** Introduction to analysis of variance –Running one-way ANOVA on SPSS– Output from one-way ANOVA - Two-way ANOVA using SPSS– Output from two-way ANOVA.

**Text Book:**

Andy Field, Discovering Statistics using SPSS, Third edition, SAGE Publications Ltd, 2009.

**Unit I:** Chapter 3(sec. 3.1- 3.9)

**Unit II:** Chapters 1 &4(sec. 1.5 -1.7; 4.3-4.9)

**Unit III:** Chapters 6 & 7 (sec. 6.3,6.4,6.9; 7.2-7.4)

**Unit IV:** Chapters 9 & 18 (sec. 9.3-9.5; 18.5)

**Unit V:** Chapters 10 & 12 (sec. 10.2-10.4; 12.2-12.7).

**Reference Books:**

1. Marija.J.Norusis, SPSS for Windows Base system users guide release 6.0, SPSS Inc,'chicago,Illinois,2007.

2. S.Arumugam & A. Thangapandian Issac, Statistics, New Gamma Publishing House, 2004.

3. S.C.Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand &sons, 2007.



**THE AMERICAN COLLEGE**  
**POST GRADUATE DEPARTMENT OF PHYSICS**  
**Programme for M. Sc. PHYSICS (w. e. f. 2018-19 onwards)**

Semester	Course No.	Course Title	Hours/ Wk	Credits	Marks
I	PGP / PSP 4431	Classical & Non Linear Dynamics	5	4	80
	PGP / PSP 4433	Mathematical Physics – I	4	4	80
	PGP / PSP 4435	Condensed Matter Physics – I	4	4	80
	PGP / PSP / PSP 4337	Astrophysics	4	3	60
	PGP / PSP 4339 PGP / PSP 4341	Observational Astronomy Physics of Home Appliances*	4	3	60
	PGP / PSP 4343	Physics Lab – I	9	3	60
			<b>30</b>	<b>21</b>	<b>420</b>
II	PGP / PSP 4434	Instrumentation & Microcontrollers	5	4	80
	PGP / PSP 4436	Mathematical Physics – II	4	4	80
	PGP / PSP 4438	Quantum Mechanics – I	4	4	80
	PGP / PSP 4340	Nanophysics	4	3	60
	PGP / PSP 4342 PGP / PSP 4344	Physics in Human Physiology Sustainable Energy Resources*	4	3	60
	PGP / PSP 4346	Physics Lab – II	9	3	60
			<b>30</b>	<b>21</b>	<b>420</b>
III	PGP / PSP 5431	Nuclear & Particle Physics	5	4	80
	PGP / PSP 5433	Electrodynamics & Plasma Physics	4	4	80
	PGP / PSP 5435	Physical Electronics	4	4	80
	PGP / PSP 5437	Laser & Spectroscopy	4	4	80
	PGP / PSP 5439	Quantum Mechanics – II	4	4	80
	PGP / PSP 5441	Project – I	9	4	80
			<b>30</b>	<b>24</b>	<b>480</b>
IV	PGP / PSP 5432	Thin Films & Vacuum Technology	5	4	80
	PGP / PSP 5434	Condensed Matter Physics – II	4	4	80
	PGP / PSP 5436	Analog Electronics	4	4	80
	PGP / PSP 5438	Thermodynamics & Statistical Physics	4	4	80
	PGP / PSP 5440	Matrix, Fourier & Non Linear Optics	4	4	80
	PGP / PSP 5442	Project – II	9	4	80
			<b>30</b>	<b>24</b>	<b>480</b>

\* Buffer Course

This course enables learners to understand the

- Basic concepts and application of Lagrangian dynamics.
- Theory of small oscillations and central force problem.
- Dynamics of rigid bodies and physics associated with it.
- Usage of Hamiltonian equations and Canonical Transformations.
- Basics of non-Linear Dynamics.

### **Unit I: Lagrangian Dynamics**

Constraints - D' Alembert's Principle and Lagrange's Equations - Velocity-Dependent Potentials and the Dissipation Function - Hamilton's Principle - Some Techniques of the Calculus of Variations - Derivation of Lagrange's Equations from Hamilton's Principle - Conservation Theorems and Symmetry Properties - Energy Function and the Conservation of Energy.

### **Unit II: Central Force Problem and Small Oscillations**

Reduction to the Equivalent One-Body Problem - The Equations of Motion and First Integrals - Scattering in a Central Force Field - Transformation of the Scattering Problem to Laboratory Coordinates - Small Oscillations - The Eigenvalue Equation and the Principal Axis Transformation - Frequencies of Free Vibration, and Normal Coordinates, Linear Tri atomic Molecule.

### **Unit III: Rigid body Dynamics**

The Independent coordinates of a Rigid Body - Orthogonal Transformations - The Euler Angles - Angular Momentum and Kinetic Energy of Motion about a Point – Tensors - the Inertia Tensor and the Moment of Inertia - The Eigen values of the Inertia Tensor and the Principal Axis Transformation - Solving Rigid Body Problems and the Euler Equations of Motion.

### **Unit IV: Hamiltonian dynamics and Canonical Transformations**

Legendre Transformations and the Hamilton Equations of Motion - Cyclic Coordinates and Conservation Theorems - Equations of Canonical Transformation - Examples of Canonical Transformations - The Harmonic Oscillator - The Symplectic Approach to Canonical Transformations - Poisson Brackets and Other Canonical Invariants - The Angular Momentum Poisson Bracket Relations.

### **Unit V: Nonlinear dynamics**

Autonomous and non - autonomous systems – Differential equation: equilibrium points-Phase space and Phase trajectories - Stability, Attractors and Repellers - General criteria for stability – Classification of Equilibrium Points - Periodic Attractor - Some simple bifurcations - Saddle-Node, Pitchfork, Transcritical and Hopf.

**Text Books:**

1. Goldstein, Poole and Safko, *Classical Mechanics*, 3 edition, Pearson Publication (2001)  
Unit I: Chapter 1.3-1.5, 2.1-2.3, 2.6-2.7  
Unit II: Chapter 3.1-3.2, 3.10-3.11, 6.1-6.4  
Unit III: Chapter 4.1-4.4, 5.1-5.5  
Unit IV: Chapter 8.1-8.2, 9.1-9.5, 9.7
2. M. Lakshmanan and S. Rajasekar, *Nonlinear Dynamics*, Springer (India) Pvt. Ltd. (2003)  
Unit V: Chapter 3.1-3.5, 4.1.

**References:**

1. John R. Taylor, *Classical Mechanics*, University Science Books, (2004)
2. Louis N. Hand and Janet D. Finch, *Analytical mechanics*, Cambridge University Press, (1998)
3. J.C. Upadaya, *Classical Mechanics*, Himalayan Publishing House, New Delhi (2009)

**PGP / PSP 4433****Mathematical Physics - I****4 hrs / 4 Cr**

This course enables learners

- To earn knowledge in complex variables
- To acquire knowledge about special functions and series solutions of differential equations in physics
- To understand basic concept about Fourier series and integral transforms
- To know the basis about numerical methods
- To impart mathematical knowledge for the description of physics phenomena

**Unit I: Complex Variable**

Functions of a complex variable – analytic function – Cauchy-Riemann conditions - Cauchy's integral theorem and integral formula - Taylor's and Laurent's expansions - Cauchy residue theorem – Evaluation of residues - Evaluation of definite integrals

**Unit II: Special Functions in Physics**

Gamma functions – Beta functions – Dirac-Delta functions – Green's functions- One dimension – Two and three dimension - Applications of Green's functions.

**Unit III: Series Solutions of Differential Equations in Physics**

Differential equations, Generating function, Rodrigues' formula Recurrence relations and Orthogonality of Bessel, Legendre, Hermite and Laguerre polynomials

**Unit IV: Fourier series and Integral Transforms**

Fourier series - Application of Fourier series - Fourier Integral theorem - Fourier Transform – Convolution theorem – Parseval's relation – Transforms of derivatives - Application of Fourier transform - Laplace transform - Application of Laplace transform.

**Unit V: Numerical Methods**

Roots of polynomial and transcendental equations - Newton-Raphson method - Lagrange's interpolation - Numerical integration - Trapezoidal, Simpson's method - Euler's method, Runge-Kutta method

**Text Books:**

1. Charlie Harper, *Introduction to Mathematical Physics*, Prentice-Hall, Inc, (2008)  
Unit I: Chapter 3.3, 3.4, 4.2 – 4.7  
Unit IV: Chapter 7.1, 8.1 – 8.3
2. George B. Arfken and Hans J. Weber, *Mathematical Methods for Physicists*, Elsevier Academic Press Seventh Edition, (2012)  
Unit II: Chapter 10.1, 4, 5; 8.6; 16.5,6  
Unit III: Chapter 11.1, 2; 12.1, 2, 3; 13.1,2
3. M.K. Venkataraman, *Numerical Methods in Science and Engineering*, National Publishing Co, Fifth Edition, (1999)  
Unit V: Chapter 3.1 – 3.5; 8.4; 9.7, 8, 10; 11.10,13

**References:**

1. Eugene Butkov, *Mathematical Physics*, Addison Wesley Publishing Company (1995).
2. Louis A. Pipes and Lawrence R. Harvill, *Applied Mathematics for Engineers and Physicists*, McGraw-Hill, International Third Edition (1970).
3. Sadri Hassani, *Mathematical Physics. A Modern Introduction to its Foundations*, Springer Second Edition (2002).
4. Mary L Boas, *Mathematical Methods in the Physical Sciences*, John Wiley & Sons Third Edition (2005).
5. P.K.Chattopadhyay, *Mathematical Physics*, New Age International Publishers (2013).

This course enables learners

- to acquire knowledge of crystal structure
- to understand the various diffraction techniques
- to develop the skill of finding the imperfection in crystals
- to appreciate the different bonding natures in crystals
- to apply the systematic approach to problem solving in crystal vibrations

**Unit I: Crystallography**

Basic concepts of crystallography-Index system for crystal planes –Simple crystal structure – Reciprocal lattice vectors – Fourier analysis of the basis: Structure factor for SC, BCC, FCC structures – Atomic scattering factor- Quasi crystals.

**Unit II: Crystal diffraction**

Braggs law – different scattering methods-derivation of scattered wave amplitude -anomalous dispersion of scattering by crystals- Theory of X-ray diffraction-temperature effect- crystal structure determination

**Unit III: Crystal imperfections**

Imperfections in crystals –Point defects: Lattice vacancies- Diffusion- Color centers- Surface and interface physics: Concentration of Frenkel and Schottky defects – Line imperfections – Screw imperfection – Burger vector – Surface imperfections – volume defects-Dislocations.

**Unit IV: Crystal binding**

Crystals of inert gas – van der Waals interactions – Repulsive interaction – Equilibrium lattice constants – Cohesive energy – Ionic crystals – Madelung energy – Evaluation of Madelung constant – Covalent, Metallic and Hydrogen bonding – elastic strain components

**Unit V: Crystal vibrations**

Vibrations of crystal with monoatomic basis – group velocity – Two atoms per basis – Quantization of elastic waves – Phonon momentum – Phonon heat capacity – Debye theory of specific heat – Debye  $T^3$  law – Anharmonic crystal interactions

**Text Book:**

1. Charles Kittel, *Introduction to Solid State Physics*, 5<sup>th</sup> edition, (1993).  
Unit I: Pages: 18- 30, Pages: 50 – 62  
Unit II: Pages: 37- 48,  
Unit III: Pages: 538-549,565-581  
Unit IV: Pages: 76-100,  
Unit V: Pages: 107 – 119,127-142

**References:**

1. S.O. Pillai, *Solid State physics*, New age international (P) limited (1997).
2. Ali Omar, *Elementary Solid State Physics*, Pearson Education India, (2000).
3. H.V Keer, *Principles of Solid State*, Wiley Eastern Lmt. (1994)
4. M.A.Wahab, *Solid State Physics*, Narosa Publishing house, Delhi, (1999)

This course enables learners

- To understand the advances in astronomy from ancient time
- To understand the birth and evolution of star
- To earn knowledge in understanding galaxy
- To gain knowledge about different types of telescopes
- To know the basis of the origin of universe

### **Unit I: Birth of Modern Astronomy**

Birth of modern astronomy- –Compare and contrast the views of reality held by Plato and Aristotle– universe in the seventeenth century – Kepler’s Laws – Newtonian gravitation – seasons – Eclipse – Solar, lunar - solar family.

### **Unit II: Stellar Evolution**

Formation of a star from a cloud of interstellar matter- Birth of low mass stars like our sun, - main-sequence star to a dead star- white dwarf - neutron star - Inventory of the Solar System

### **Unit III Galactic astronomy:**

Milky Way - Hubble classification of galaxies-Spiral galaxies, Elliptical galaxies, Irregular galaxies, Dwarf galaxies – Mysterious objects – Pulsar, Quasar, comets, asteroids - meteors and meteoroids.

### **Unit IV: Telescopes**

Astronomical observations – optical telescopes – Reflecting – refracting – telescope mount – – Radio telescope — UV-IR-X-ray telescopes.

### **Unit V: Origin of Universe**

The Big bang - Formation of Elements, Discovery of the Galaxies, Expansion of the Universe – Hubble’s law – steady state – pulsating theory

### **Text books:**

1. Nigel Marshall, *GCSE Astronomy*, IV Edition , Mickledore Publishing, (2010)  
Unit I:Chapter 1.4  
Unit II:Chapter 3.4, 2.1  
Unit III: Chapter 4.1, 4.2, 2.2  
Unit V:Chapter 4.3
2. William J. Kaufmann, *Astronomy: The Structure of the Universe*, Macmillan Publishers Co., Inc. New York, (1999)  
Unit I: Chapter 1  
Unit IV:Chapter 6  
Unit V: Chapter 14

**References:**

1. Shu F, *The physical universe*, University of California, (1982).
2. George O. Abell, *Exploration of the Universe*, Saunders college publishing, (1986)
3. K.D. Abhayanker, *Astro Physics Stars and Galaxies*, Tata McGraw – Hill publishing, New Delhi (1992)

**PGP / PSP 4341****Physics of Home Appliances****4 hrs / 3 Cr**

This course enables learners

- To acquire knowledge about principles of operation of everyday home appliances
- To learn techniques of working of various domestic appliances
- To acquire skills testing and maintenance of domestic appliances
- To create an awareness towards consumption of energy
- To contribute towards a greener environment

**Unit I: Introduction to Electricity and Electronics**

Basic Electricity: Voltage, Current, Resistance, Impedance & Power factor - Transformers - Step-up & Step-down - Single phase & Three phase circuits – Fuse, Concept of Earthing  
Electronics: Familiarization of electronic components - Capacitor, Choke coil, Diode, Transistor, Thyristor

Basic Equipments for testing and servicing: Multimeter - Measurement of current, voltage and resistance - Checking transistors and diodes in circuit measurements - Soldering Iron - Flux - Lead

**Unit II: Heating Appliances**

Electric stove - Electric Rice cooker - Toaster - Kettle - Coffee maker - Iron box - Immersion heater - Geyser - Hair drier - Microwave oven

**Unit III: Motorised Appliances**

Electric fans - Mixer - Grinder/Blenders - Washing machine - Vacuum cleaner - Domestic water pump - Dish washer

**Unit IV: Refrigeration Appliances**

Refrigerator: Compressor - coolants - Automatic defrost circuits - Air coolers - Air conditioners

**Unit V: Other Appliances**

Lights: Incandescent Bulbs, Tubelight, CFL bulb – LED- Voltage stabilizer - Inverters – UPS

**References**

1. Eric Kleinert, *Troubleshooting and Repairing major appliances*, McGraw Hill Professional, 3<sup>rd</sup> edition, (2012)
2. B.L. Theraja & A.K. Theraja, *A Text Book of Electrical Technology*, S. Chand & Company Ltd., New Delhi, India, (2005)
3. ShashiBhushanSinha, *Handbook of Repair and Maintenance Of Domestic Electronics Appliances*, BPB Publications, India, (2016)

**PGP / PSP 4343**

**Physics Lab - I**

**9 hrs / 3 Cr**

The laboratory sessions are designed to

- Inculcate good laboratory practice and work habits.
- Reinforce the concepts and techniques presented in the lectures.
- Make students acquainted with Data and error analysis
- Offer hands-on experience with modern instrumentation.
- Teach soft skills to the students.

**Total of 16 Experiments:**

**Compulsory experiments:**

1. Fabrication of a dual power supply –regulation study
2. Familiarization of CRO, signal generators
3. Work shop practice – Use of tools and machines.

**Any 7 from the following:**

4. Familiarization - excel – calculations and graph and PCB software
5. CDS calibration – Na Lamp – Hg spectrum – Fabry perot etalon.
6. Michelson interferometer – Wavelength –Na, Hg & laser.
7. Reflection grating – finding groove spacing- CD, DVD and grating.
8. Calibration techniques - Thermister - Thermocouple
9. linear polarizer & Quarter wave plate - circular and elliptical polarization
10. Eddy current – Electromagnet & mapping the magnetic field.
11. Refractive index of glass, and liquids, sugar content– laser pointer.
12. Fourier series - analyzing periodic function - experiment
13. Balmer series - hydrogen spectrum – Rydberg constant
14. Hartman interpolation formulae – CDS
15. Age of universe - using spectrum and galaxy diagram
16. Channelled spectrum – to determine the thickness of mica sheet

**Any 6 from the following:**

17. Characteristics of a solar cell- fill factor.
18. Band Energy gap using diode and LED
19. Study of ac circuits – RC, RL, and LCR – using CRO.



20. Use of Digital and Analog Simulation software for solving circuits.
21. Lab View – Data logging
22. Study of charging and discharging of a capacitor.
23. OP-AMP - wave form generator- sine-square-triangle-ramp
24. second order active filter - OP-AMP
25. Timer 555 – a stable, mono stable, bi stable, VCO and Schmidt trigger.
26. Multiplexing and demultiplexing - 4- bit

**PGP / PSP 4436****Mathematical Physics - II****4 hrs / 4 Cr**

This course enables learners

- To understand about the linear vector and matrices
- To know the basic about Tensors
- To earn knowledge about Tensor calculus and probability
- To acquire knowledge about group theory and its representation
- To emphasize the use of advanced mathematical tools to analyse physics phenomenon

**Unit I: Linear Vector Space and Matrix Analysis**

Definition of a linear vector space – Linear independence, basis – Scalar product – Orthonormal basis – Gram-Schmidt orthogonalization process – Linear operators. Special matrices – Eigen values and Eigen vectors – Cayley Hamilton theorem – Coordinate transformations.

**Unit II: Tensors Analysis**

Introduction – Transformation of Coordinates – Contravariant and Covariant tensors - Algebra of tensors – Quotient law – The line element – Fundamental metric tensor – Associate tensors.

**Unit III: Tensors Calculus and Probability**

Christoffel symbols – Covariant differentiation of tensors – Equation of the Geodesic line – Riemann-Christoffel tensors. Elementary probability theorem – random variables – Binomial, Poisson and Normal distributions

**Unit IV: Abstract Group Theory**

Definition and nomenclature – multiplication table – Rearrangement theorem – Cycle groups – Sub-groups – Cosets, class – Normal divisors and factor groups – Class multiplication - Continuous groups – SU (2) and SU(3) – Orthogonal.

**Unit V: Theory of Group Representation**

Reducible and irreducible representation – Great orthogonality theorem (no proof) – Character representation – Character table decomposition of reducible representation – Regular representation – Application of representation theory

**Text Books:**

1. P.K.Chattopadhyay, *Mathematical Physics*, New Age International Publishers (2013).  
Unit I: Chapter 7.1–7.6
2. Charlie Harper, *Introduction to Mathematical Physics*, Prentice-Hall, Inc (1976),  
Unit I: Chapters 2.6 – 2.9  
Unit II: Chapters 9.1 – 9.5  
Unit III: Chapter 9.6
3. Louis A. Pipes and Lawrence R. Harvill, *Applied Mathematics for Engineers and Physicists*, McGraw-Hill, International Third Edition (1970)  
Unit III: Chapter 16.6 – 16.13
4. A.W.Joshi, *Elements of group theory for physicists*, New Age International Publishers (1997),  
Unit IV: Chapter 1, 4.5.4.6, 4.8  
Unit V: Chapter 3

**References:**

1. Eugene Butkov, *Mathematical Physics*, Addison Wesley Publishing Company (1995).
2. A.W.Joshi, *Matrices and Tensors in Physics*. New Age International Publishers (2017).
3. George B. Arfken, Hans J. Weber and Frank E. Harris, *Mathematical Methods for Physicists*, Elsevier Academic Press Seventh Edition (2012).
4. Sadri Hassani, *Mathematical Physics. A Modern Introduction to its Foundations*, Springer Second Edition (2002).
5. Mary L Boas, *Mathematical Methods in the Physical Sciences*, John Wiley & Sons Third Edition (2005).
6. SathyaPrakash, *Mathematical Physics*, Sultan Chand and Sons (2014).

**PGP / PSP 4438**

**Quantum Mechanics - I**

**4 hrs / 4 Cr**

This course enables learners

- To understand the significance of Schrodinger equation
- To understand the basic concepts of wave mechanics
- To develop skills in solving problems
- To inculcate the knowledge of angular momentum and its applications
- To acquire knowledge about scattering theory

**Unit I: The Schrodinger Equation and Stationary States**

A Free particle in One Dimension – Generalization to Three Dimensions – The Operator Correspondence and the Schrodinger Equation for a Particle Subject to Forces –

Normalization and Probability Interpretation – Non-normalizable Wave Functions and Box Normalization – Conservation of Probability – Expectation Values: Ehrenfest's Theorem – Admissibility Conditions on the Wave Function – A Particle in a Square Well Potential – Square Potential Barrier – Delta-Function Well

### Unit II: General Formalism of Wave Mechanics

The Fundamental Postulates of Wave Mechanics – The Eigenvalue Problem: Degeneracy – Observables: Completeness and Normalization of Eigen functions – Closure – Physical Interpretation of Eigen values, Eigen functions and Expansion Coefficients – The Uncertainty Principle – States with Minimum Value for Uncertainty Product – Commuting Observables: Removable Degeneracy.

### Unit III: Exactly Solvable Eigenvalue Problems

The Simple Harmonic Oscillator – Analytical Method – The Abstract Operator Method – Angular Momentum and Parity – Eigenvalue Equation for  $L^2$ : Eigen values and Eigen functions – Spherical Harmonics – The Hydrogen Atom – Solutions of the Radial Equation: Energy levels – Stationary State Wave functions - Charged particle in a uniform magnetic field – Integer Quantum Hall Effect.

### Unit IV: Angular Momentum

The Hilbert Space of State Vectors: Dirac notation – Representation of Dynamical Operators – Unitary Transformation - The Eigenvalue Spectrum – Matrix representation – Spin Angular Momentum – A Charged particle in a uniform magnetic field - Non-relativistic Hamiltonian with Spin : Diamagnetism – Addition of Angular momenta – Evaluation of C. G. Coefficients - Spin Wave functions for a system of two spin-1/2 particles - Identical Particles with Spin.

### Unit V: Scattering Theory

Kinematics of the Scattering Process – Wave Mechanical Picture of Scattering – Green's functions: Formal Expression for Scattering Amplitude – The Born Approximation; Partial Wave Analysis – Phase Shifts – The Scattering Amplitude in terms of Phase shifts – The Differential and Total Cross-Section: Optical Theorem – Phase shifts: Relation to Potentials – Scattering by a Square Well, Hard Sphere;

### Text Book:

1. P. M. Mathews & K. Venkatesan, *A Text Book of Quantum Mechanics*, 2<sup>nd</sup> Ed., Tata McGraw Hill, New Delhi (2013)  
 Unit I: 2.1 – 2.14  
 Unit II: 3.2 – 3.5, 3.7 – 3.9, 3.11 - 3.13  
 Unit III: 4.1 – 4.4; 4.6 – 4.11; 4.15 – 4.17; 4.23 – 4.24  
 Unit IV: 7.1 – 7.3; 8.1 – 8.8  
 Unit V: 6.1 – 6.6; 6.8 – 6.12; 6.14 – 6.15; 6.17

### References:

1. L. I. Schiff, *Quantum Mechanics*, 3<sup>rd</sup> Ed., McGraw Hill New York (1968).

2. G. Aruldas, *Quantum Mechanics*, 2<sup>nd</sup> Ed., PHI Learning Private limited, New Delhi (2013).
3. J. J. Sakurai, *Modern Quantum Mechanics*, Addition-Wisley (1999).
4. S. R. Shankar, *Principles of Quantum Mechanics*, 2<sup>nd</sup> Ed., Springer (2007).

**PGP / PSP 4342**

**Physics in Human Physiology**

**4 hrs / 3 Cr**

This course enables learners to understand the

- Musculoskeletal system
- Circulatory system
- Nervous system
- Auditory system and
- Metabolic processes of Human body

**Unit I: Forces and human body**

Equilibrium and Stability - Equilibrium Considerations for the Human Body - Stability of the Human Body under the Action of an External Force - Skeletal Muscles - Levers - The Elbow - The Hip - The Back - Standing Tip-Toe on One Foot - Dynamic Aspects of Posture. Standing at an Incline - Friction at the Hip Joint - Spine Fin of a Catfish

**Unit II: Motions and human body**

Vertical Jump - Effect of Gravity on the Vertical Jump- Running High Jump - Range of a Projectile - Standing Broad Jump - Long Jump- Motion through Air - Energy Consumed in Physical Activity.

Forces on a Curved Path - A Runner on a Curved Track - Pendulum - Walking - Physical Pendulum - Speed of Walking and Running - Energy Expended in Running - Alternate Perspectives on Walking and Running - Carrying Loads.

**Unit III: Motion of Fluids and human body**

Force and Pressure in a Fluid - Pascal's Principle - Hydrostatic Skeleton - Archimedes' Principle - Power Required to Remain Afloat - Buoyancy of Fish - Surface Tension - Soil - Insect Locomotion on Water - Contraction of Muscles – Surfactants.

Viscosity and Poiseuille's Law - Turbulent Flow - Circulation of the Blood - Blood Pressure - Control of Blood Flow - Energetics of Blood Flow - Turbulence in the Blood - Arteriosclerosis and Blood Flow - Power Produced by the Heart - Measurement of Blood Pressure.

**Unit IV: Sound / Heat and human body**

Energy Requirements of People - Energy from Food - Regulation of Body Temperature - Control of Skin Temperature - Convection - Radiation - Radiative Heating by the Sun - Evaporation - Resistance to Cold - Heat and Soil.

Properties of Sound - Hearing and the Ear - Bats and Echoes - Sounds Produced by Animals  
- Acoustic Traps - Clinical Uses of Sound - Ultrasonic Waves

### **Unit V: Optics/Electricity and human body**

Vision - Nature of Light - Structure of the Eye - Accommodation - Eye and the Camera - Lens  
System of the Eye - Reduced Eye - Retina - Resolving Power of the Eye - Threshold of Vision  
- Vision and the Nervous System - Defects in Vision - Lens for Myopia - Lens for Presbyopia  
and Hyperopia - Extension of Vision.

The Nervous System- Electricity in the Bone- Electric Fish

### **Text book:**

1. Paul Davidovits, *Physics in Biology and Medicine*, 3<sup>rd</sup> Edition, Academic press (2008).  
Unit I : Chapter 1 and 2  
Unit II : Chapter 3 and 4  
Unit III: Chapter 7 and 8  
Unit IV: Chapter 11 and 12  
Unit V : Chapter 13 and 15

### **Reference book:**

1. Vasantha Pattabhi and N. Gautham, *Biophysics*, Kluwer academic publishers, (2002).

**PGP / PSP 4344**

**Sustainable Energy Resources**

**4 hrs / 3 Cr**

This course enables learners

- To know the distinguished characteristics of renewable energy.
- To understand the significance of solar radiation, which is an input to the solar devices
- To explain the energy extraction from wind, tides and organic substances.
- To observe the thermal energy conversions in ocean and earth's core.
- To interpret different forms of energy storage and their transmission.

### **Unit I: Principles of Renewable Energy**

Fundamentals - Scientific principles of renewable energy - Technical implications - Social  
implications - Heat transfer - Heat circuit analysis and terminology - Conduction - Convection  
- Radiative heat transfer - Properties of transparent materials - Heat transfer by mass transport.

### **Unit II: Solar Energy Systems**

Solar radiation - Measurements of solar radiation- Solar water heating - Evacuated collectors  
- Solar ponds - Solar concentrators - Solar thermal electric power systems - Photovoltaic  
generation - Solar radiation absorption - Types of photovoltaic systems and their Applications

**Unit III: Energy Conversion Systems**

Power from the wind - Turbine types and terms - Characteristics of the wind - Power extraction by a turbine - Electricity generation - Mechanical power - Biomass and biofuels - Biofuel classification - Biomass production for energy farming - Direct combustion for heat - Pyrolysis (destructive distillation) - Anaerobic digestion for biogas - Vegetable oils and biodiesel - Tidal power - The cause of tides - Tidal current/stream power - Tidal range power.

**Unit IV: Thermal Energy Systems**

Ocean thermal energy conversion (OTEC) - Principles - Heat exchangers - Pumping requirements - Environmental impact - Geothermal energy - Geophysics - Dry rock and hot aquifer analysis - Harnessing Geothermal Resources.

**Unit V: Energy Storage Systems**

Energy systems, storage and transmission - The importance of energy storage and distribution - Biological storage - Chemical storage - Heat storage - Electrical storage: batteries and accumulators - Fuel cells - Mechanical storage.

**Text Book:**

1. John Twidell and Tony Weir, *Renewable Energy Resources*, 2<sup>nd</sup> edition, London, Taylor & Francis Group, (2006).  
Unit I: Chapter: 1.3 - 1.6, 3.1 - 3.7  
Unit II: 4.1, 4.7, 4.8, 5.1, 5.7, 6.7 – 6.9, 7.1, 7.3, 7.4, 7.6 – 7.9  
Unit III: 9.1, 9.2, 9.6 – 9.9, 11.1 – 11.5, 11.8, 11.10, 13.1, 13.2, 13.4, 13.5  
Unit IV: 14.1, 14.2 - 14.4, 14.6, 15.1 – 15.4  
Unit V: 16.1 – 16.7

**References:**

1. D. Y. Goswami, F. Kreith and J. F. Kreider, *Principles of Solar Engineering*, Philadelphia, Taylor and Francis, (2000).
2. L.L. Freris, *Wind Energy Conversion Systems*, Prentice Hall, (1990).
3. C. S. Solanki, *Solar Photovoltaics: Fundamental Applications and Technologies*, Prentice Hall of India, (2009)
4. S.P. Sukhatme, *Solar Energy: principles of Thermal Collection and Storage*, Tata McGraw-Hill (1984).
5. E H Thorndike, *Energy & Environment: A Primer for Scientists and Engineers*, Addison-Wesley Publishing Company, (1976)
6. R Wilson & W J Jones, *Energy, Ecology and the Environment*, Academic Press Inc. (1975)

The laboratory sessions are designed to

- Inculcate good laboratory practice and work habits.
- Reinforce the concepts and techniques presented in the lectures.
- Make students acquainted with Data and error analysis
- Offer hands-on experience with modern instrumentation.
- Teach soft skills to the students.

**Total of 16 Experiments:****Any 8 from the following:**

1. Hall Effect - Hall coefficient, Hall voltage, carrier density and mobility.
2. GM counter - counter plateau and resolving time
3. CDS - arc spectrum
4. Michelson interferometer - optical bread board - refractive index of gas
5. Ultrasonic interferometer - Physical parameters of pure and binary liquids - dielectric constant, verification of iterative equations
6. XRD – Determination of structural parameters
7. Determination of Hysteresis loss – tracing B-H loop on the CRO
8. Free fall – displacement-time graph, g calculation using charging and discharging
9. Four probe - Measurement of sheet resistance, resistivity, Energy gap -thin films, silicon & aluminum foil.
10. Susceptibility - electro magnet - Quinke’s method – liquid
11. Microwave - Characteristics, dielectric constant in liquid and solids
12. Thick lens systems – nodal points – optical bench
13. Charge of the electron - using spectrometer.
14. MATH-CAD – Graphics and Mathematical analysis

**Any 8 from the following:**

15. Pulse Width Modulation - Study & DC motor control.
16. Op-Amp - logarithmic and Anti logarithmic amplifier, current to voltage converters and voltage to current converters
17. FM Modulation and demodulation.
18. Experiments in physics with expEYE-17.
19. Lab view – multiplexer and demultiplexer
20. Stepper motor control - using micro controller.
21. Design of counters – using flip flops, MOD counters using 7490.
22. FET – characteristics –  $V_p$ ,  $I_{DSS}$ , gm, rd.
23. Analog computation using - OP-AMP.
24. D/A conversion - (R-2R and weight network).
25. Instrumentation amplifier.
26. Study of RAM – using ICs.

## PROGRAM / COURSE FRAME

## P.G. DEPARTMENT OF CHEMISTRY (AIDED)

## Program for Choice Based Credit System - 2018 – 2019

S.N.	Sem	Course Code	Course Title	Hours	Credits	Marks
1	1	PGC 4431	Organic Chemistry – I	6	4	80
2	1	PGC 4433	Inorganic Chemistry – I	5	4	80
3	1	PGC 4435	Physical Chemistry – I	5	4	80
4	1	PGC 4301	Chemistry and Health	4	3	60
5	1	PGC 4303	Organic Qualitative Lab	5	3	60
6	1	PGC 4305	Physical Chemistry Lab – I	5	3	60
*	1	PGC 4307	Chemistry in Daily Life	4	3	60
<b>Total</b>				<b>30</b>	<b>21</b>	<b>420</b>
7	2	PGC 4432	Organic Chemistry – II	6	4	80
8	2	PGC 4434	Inorganic Chemistry – II	5	4	80
9	2	PGC 4436	Physical Chemistry – II	5	4	80
10	2	PGC 4302	Chemistry and Beauty	4	3	60
11	2	PGC 4304	Organic Quantitative Lab	5	3	60
12	2	PGC 4306	Physical Chemistry Lab – II	5	3	60
*	2	PGC 4308	Chemistry in Small Scale Business	4	3	60
<b>Total</b>				<b>30</b>	<b>21</b>	<b>420</b>
13	3	PGC 5431	Organic Chemistry – III	5	4	80
14	3	PGC 5433	Inorganic Chemistry – III	5	4	80
15	3	PGC 5435	Physical Chemistry – III	5	4	80
16	3	PGC 5301	Inorganic Qualitative Lab	5	3	60
17	3	PGC 5901	Research Methodology Lab	10	9	180
<b>Total</b>				<b>30</b>	<b>24</b>	<b>480</b>
18	4	PGC 5432	Organic Chemistry – IV	5	4	80
19	4	PGC 5434	Inorganic Chemistry – IV	5	4	80
20	4	PGC 5436	Physical Chemistry – IV	5	4	80
21	4	PGC 5302	Inorganic Quantitative Lab	5	3	60
22	4	PGC 5902	Project	10	9	180
<b>Total</b>				<b>30</b>	<b>24</b>	<b>480</b>
<b>Grand Total</b>				<b>120</b>	<b>90</b>	<b>1800</b>

\* Buffer courses



**SEMESTER –I****Core Theory****PGC 4431****ORGANIC CHEMISTRY – I****6 hr/4 cr****Objective:**

This is the first of the four-semester sequential course in organic chemistry. The students will be taught the basics in bonding and reactive intermediates and various substitution, addition, elimination and rearrangement reactions. They will also learn the fundamentals and applications of UV-visible and IR spectroscopy.

**Learning Outcomes:**

- The students will be able to identify the aromaticity of the molecules.
- The students will classify the intermediates as well as rearrangements pertaining to them.
- Students will distinguish various mechanisms in substitution and elimination reactions.
- Students will differentiate various mechanisms in nucleophilic and electrophilic substitution reactions.
- Students will be able to calculate the  $\lambda_{\text{max}}$  for the various organic compounds and also able to interpret IR data.

**UNIT-I:****Bonding in Organic molecules**

Electrical effects – inductive, electromeric, mesomeric effects and hyperconjugation, tautomerism - Aromaticity in benzenoid and non-benzenoid compounds – Huckel's rule, energy level of  $\pi$  molecular orbitals, annulenes, anti aromaticity, non aromaticity, homo aromaticity.

**Structure and reactivity**

Effect of structure on reactivity – resonance, field and steric effects, Hammond postulates, Curtin-Hammett principle, Quantitative treatment - Hammett equation and linear free energy relationship, substituent and reaction constants - Taft equation.

**UNIT-II:****Reactive intermediates**

Carbocations- Synthesis, geometry, memory effect, stability and reactions, rearrangement reactions-Carbanion- Synthesis, geometry, stability and reactions, rearrangement reactions-Free Radical- Synthesis, Structure of radical, radical stability, reactions of radical-Pinacol coupling, McMurry reaction, Acyloin reaction, Selective radical bromination- Carbenes-Synthesis, types of carbenes and their geometry, reactions of carbene- addition to alkene-

Simmon-Smith reaction-stereospecific and stereoselective addition to carbenes, insertion reaction, rearrangement reactions-Nitrene.

### **Rearrangements reactions**

Migration to electron deficient carbon- Wagner-Meerwein, pinacol-pinacolone, allylic, Wolff-Migration to electron rich carbon-Favorskii, Stevens, Sommet-Hauser, Wittig, Neber- Migration to electron deficient nitrogen-Beckmann, Hofmann, Curtius- Migration to electron deficient oxygen-Baeyer-Villiger, Hydroperoxide, Dakin.

## **UNIT-III:**

### **Aliphatic nucleophilic Substitution**

The  $S_N2$ ,  $S_N1$ , mixed  $S_N1$  and  $S_N2$ , SET mechanisms-neighbouring group mechanism, participation by  $\pi$  and  $\sigma$  bond, non-classical carbocations- $S_Ni$  mechanism- anchimeric assistance  $S_N1$  mechanism - Nucleophilic substitution at an allylic, aliphatic trigonal and vinylic carbon-reactivity-effect of substrate structure, attacking nucleophile, leaving group, reaction medium-ambident nucleophile and substrate-Phase transfer catalysis of nucleophilic substitution.

### **Aliphatic Electrophilic substitution**

Bimolecular mechanism,  $S_E2$  and  $S_{Ei}$ ,  $S_{E1}$  mechanism- Effect of leaving group and solvents.

### **Elimination reactions**

$E2$ ,  $E1$  and  $E1cB$  mechanism-syn-anti dichotomy- $E1$ - $E2$ - $E1cB$  spectrum-Orientation of the double bond-reactivity- effects of substrate structure, attacking base, leaving group, medium-mechanism and orientation in pyrolytic elimination.

## **UNIT-IV:**

### **Aromatic Nucleophilic substitution**

The  $S_NAr$ ,  $S_N1$ , benzyne and  $S_{RN}1$  mechanism – Reactivity-effect of substrate structure, leaving group, attacking nucleophile.

### **Aromatic Electrophilic substitution**

Arenium ion mechanism- orientation & reactivity in mono substituted benzene ring-ortho/para ratio-Partial rate factors-Ipso attack-orientation in other ring systems-Diazonium coupling, Vilsmeier reaction, Gattermann-Koch reaction, Bischler-napieralski reaction-Fries rearrangement.

## UNIT-V:

### Addition to Carbon-Carbon multiple bond

Electrophilic, Nucleophilic, Free radical addition-Cyclic mechanism-Addition to conjugated system-Orientation and reactivity.

### Ultraviolet and visible spectroscopy

Various electronic transitions (185-800nm) – Beer-Lambert's law- effect of solvent on electronic transitions - UV bands for carbonyl compounds, unsaturated compounds, dienes, conjugated polyenes- Feiser- woodward rules for conjugated diene and carbonyl compounds –Fieser-Kuhn rules for polyenes-UV spectra of aromatic and heterocyclic compounds- Steric effect in biphenyls-Applications of UV-visible spectroscopy.

### Infrared spectroscopy

Molecular vibrations-sample handling techniques- finger print region- Identification of functional groups- interpretations of IR spectra-factors ( hydrogen bonding electronic effects, conjugation, mass effects and ring strain) influencing vibrational frequencies- Applications of IR spectroscopy.

## References

1. Jerry March, Advanced Organic Chemistry, Reaction mechanism and structure, John Wiley and sons 4<sup>th</sup>Edn., 1992.
2. E.S. Gould, Mechanism and structure in Organic Chemistry, Rinehart & Winston, INC, 1960.
3. Clayden, Greeves, Warren and Wothers, Organic Chemistry, OXFORD University Press, 2007.
4. Peter skyes, A Guide book to mechanism in Organic Chemistry, Pearson, 2004.
5. C.K. Ingold, Structure and mechanism in Organic Chemistry, Cornell university press.
6. Graham Solomon, Organic Chemistry, John wiley and sons INC 8<sup>th</sup>Edn. 1992.
7. Carey and Sundberg, Advanced Organic Chemistry, Part. A, Structure and mechanism, Planum press 3<sup>rd</sup> Edition, 1990.
8. Willam Kemp, Organic Spectroscopy, Palgrave, 3<sup>rd</sup> edition, 1991.
9. R.M. Silverstein, G.C. Basslerand J.C.Morril, Spectroscopic Indentification of Organic compounds, John Wiley & sons INC 5<sup>th</sup> edition 1991.

**Semester-I****Core Theory****PGC 4433****INORGANIC CHEMISTRY-I****5 hr/ 4 cr****Objective:**

This course deals with the basic concepts like periodic properties, bonding theories and structure. Concepts on acid-base, solid state chemistry, diffraction techniques and nuclear chemistry will also be discussed.

**Learning outcome:**

After completion of this course the student will be able to

- Rationalize the atomic properties and acid base concepts.
- Discuss the structural implications and imperfections in ionic compounds.
- Appreciate covalent and metallic bonding and differences in electrical properties.
- Describe crystal structure and diffraction techniques.
- Explain nuclear properties, reactors and applications.

**UNIT – I: Basic Concepts**

The modern long form of periodic table – shielding – periodic properties of atoms - ionisation energy and electron affinity – factors affecting – scales of electronegativity – Pauling, Allred-Rochow, Allen scales – acids and bases – Lewis concept – solvent system concept – measure of acid and base strength – steric effect – solvation effect – hard and soft acid base interaction – classification – acid-base strength and hardness, softness – applications of HSAB principle – symbiosis – theoretical basis – Non aqueous solvents – reactions in liquid ammonia, liquid sulphur dioxide – superacids – molten salts

**UNIT – II: Ionic Bonding**

The ionic bond – properties – radius ratio rule – applications – typical crystal structure – AX type – NaCl, CsCl, ZnS, NiAs – AX<sub>2</sub> type – CaF<sub>2</sub>, TiO<sub>2</sub> – lattice energy – Born-Landé' equation (no derivation) – Born Haber cycle – implications – limitations of radius ratio rule – covalent character in ionic bond – polarization – layer CdI<sub>2</sub>

Imperfections in solids – classification based on composition – stoichiometric and non stoichiometric – classification based on size and shape – point, line and extended – Fe<sub>3</sub>O<sub>4</sub>, Fe<sub>1-x</sub>O, UO<sub>2+x</sub>

**UNIT – III: Covalent Bonding**

Covalent bonding – VB theory – hybridisation and overlap – VSEPR theory with applications to inorganic compounds and ions – MO theory – MO diagrams for A<sub>2</sub>, AB (Coulson treatment) and AB<sub>2</sub> (BeH<sub>2</sub>, NO<sub>2</sub><sup>-</sup>) molecules – bond energy – bond order

Metallic bond – band theory – electrical properties of solids – conductors, insulators, semiconductors – doping – superconductors – types – Meissner effect – BCS theory – applications

#### **UNIT – IV: Solid State**

Symmetry – crystal system – Bravais lattice – space groups (H.M notation) – structure factor – scattering factor – x-ray diffraction – single crystal diffraction and powder diffraction – systematic absences – indexing of diffraction data to cubic system – lattice parameter determination – Neutron and electron diffraction – Solid state reactions – types and mechanism

#### **UNIT – V: Nuclear Chemistry**

Radioactivity – decay constant – half-life period – G.M. counter – scintillation counter – nuclear models – liquid drop model – nuclear fission and nuclear fusion reaction – shell model – nuclear forces, quantization, magic numbers – nuclear accelerators – linear accelerators – cyclotron, synchrocyclotron, betatron – nuclear reactors – fast breeder reactors – applications of radioactivity – solubility determination, neutron activation analysis, radiometric titrations

#### **References:**

1. Huheey, J. E., Keiter E.A., Keiter R.I., Inorganic Chemistry – Principles of Structure and Reactivity, Harper International, IV Edition, 1993.
2. Shriver D.F. and Atkins P.W., Inorganic Chemistry, Oxford University Press III Edition, 1999.
3. Meissler G.L. and Tarr T.A., Inorganic Chemistry, Pearson Academy, Inc., III Edition, New Delhi, 2004.
4. Porterfield W.W., Inorganic Chemistry, Academy Press, Elsevier, California, 2005.
5. Cotton F.A., Wilkinson G., Advanced Inorganic Chemistry VI Ed., John Wiley and Sons, New York, 1999.
6. William Jolly L., Modern Inorganic Chemistry, Mcgraw-Hill New York, 1985.
7. Greenwood N.N., Ionic Crystals, Lattice Defects and Non-stoichiometry, Butterworths and Co Ltd., 1968.
8. Cotton F.A, Wilkinson G, and Gaus P.L, Basic Inorganic Chemistry, John Wiley and Sons, New York, III Edition 2007.
9. Azaroff. L.V., Introduction to Solids, TataMcGraw Hill Publishing Company, 1995.
10. West A.R., Solid State Chemistry and its Applications, John Wiley and Sons, New York, 1984.
11. Hannay N.B., Solid State Chemistry, Prentice Hall of India Private Limited, New Delhi, 1976.
12. John Wormald, Diffraction Methods, Clarendon Press, Oxford, 1973.
13. Azaroff L.V., Elements of X-ray Crystallography, McGraw Hill, New York, 1968.

14. Jaffe H.H. Milton Orchin, Symmetry in Chemistry, John Wiley and Sons, New York, 1965.
15. Arnikaar H.J., Essentials of Nuclear Chemistry, New Age International (P) Limited, Publishers, New Delhi, IV Edition, 2011.
16. Friedlander G, Kennedy J.W., Edward S. M., Miller J.M., Nuclear and Radiochemistry, John Wiley & Sons. Inc., III Edition, 1981.
17. Glasstone S., Source book on atomic energy, III Edition, Van.DNostrand Company, London 1967.

**Semester-I****Core Theory****PGC 4435****PHYSICAL CHEMISTRY-I****5hr/ 4 cr****Objective:**

This is the first course of the five sequential courses in physical chemistry. This course deals with aspects of quantum chemistry, group theory, application of quantum chemistry, group theory approach to bonding and kinetic approach to gases.

**Learning outcomes:**

At the end of the programme the learners should

- Apply eigen values, eigen vectors and differential equations in physical and theoretical chemistry.
- Relate the quantum concepts to molecular systems via harmonic, spin and rigid rotator.
- Utilize group theory to study optical and magnetic properties and symmetry operations of small and medium size molecules.
- Identifying and distinguishing hybridization based geometries of complex systems.
- Calculate the velocity, most probable speed of the particles, relate the physical significance and parameters of gas molecules mean free path.

**UNIT – I: QUANTUM MECHANICS-I**

Black body radiation-photoelectric effect, Need for quantum mechanics-Uncertainty principle-de-Broglie equation-The Schrodinger equation (time dependent and time independent) and the postulates of quantum mechanics. Operator algebra – commuting and non-commuting operators – Linear and Hermitian operators – eigen function, eigen values and degeneracy – orthogonality and normalization of wave functions – expansion theorem – eigen value spectrum- Discussion of solutions of the Schrodinger equation to some model systems viz., particle in a box, the harmonic oscillator, the rigid rotor, the hydrogen atom.

## UNIT – II: QUANTUM MECHANICS-II

Approximate methods – The variation theorem – linear variation principle – Perturbation theory (first order and non-degenerate). Application of variation method and perturbation theory to the Helium atom. Ordinary angular momentum, generalized angular momentum, eigenfunctions for angular momentum, eigenvalues of angular momentum, operator using ladder operators, addition of angular momenta, spin, antisymmetry and Pauli exclusion principle. Electronic configuration, Russell – Saunders terms and coupling schemes, Slater-Condon parameters, term separation energies of the  $p^n$  configuration, term separation energies for the  $d^n$  configurations, magnetic effects: spin-orbit coupling and Zeeman splitting, introduction to the methods of self-consistent field, the virial theorem.

## UNIT – III: GROUP THEORY

Definition and properties of groups – sub-groups and classes. Symmetry elements and operations – symmetry point groups – identification of the point groups of molecules – representation of groups – matrix representation of symmetry operations – reducible and irreducible representations – construction of character tables – the Great Orthogonality theorem – Molecular vibrations – the symmetry of normal vibrations – determining the symmetry types of the normal modes – contributions of particular internal coordinates to normal modes – selection rules for fundamental vibrational transitions.

## UNIT – IV: BONDING

QM of bonding – VB & MO theories  $H_2$ ,  $H_2^+$  system – comparison - Huckel theory of conjugated systems, bond order and charge density calculations. Applications to ethylene, butadiene, cyclopropenyl radical, cyclobutadiene, benzene. Introduction to extended Huckel theory.

Symmetry aspects of MO theory – symmetry factoring of secular equations – carbocyclic systems – LCAO – MO  $\pi$  - bonding. Naphthalene system – symmetry based “selection rules” for cyclization. Hybrid orbitals – hybridization schemes for  $\sigma$  and  $\pi$  bonding – hybrid orbitals as a linear combination of atomic orbitals-selection rules for electronic transition-HCHO, butadiene and benzene system.

## UNIT – V: KINETIC THEORY OF GASES

Equations of state – molecular speeds – distribution of molecular velocities – one, two and three dimensions (Maxwell distribution of molecular velocity) – Maxwell distribution as energy distribution – Maxwell Boltzmann distribution law – Principle of equipartition energy and quantization – calculation of vibrational heat capacity – transport properties – thermal conductivity in a gas – the molecular collisions and mean free path in a gas – viscosity – diffusion of gases – nonsteady state – Poiseuille formula.

### References:

1. Walter J. Moore, Physical Chemistry, 5<sup>th</sup> edition, Orient Longman, 1976.

2. Castellan, Physical Chemistry, 3<sup>rd</sup> edition, Addison-Wesley, 1986.
3. Atkins, Physical Chemistry, 7<sup>th</sup> edition, Oxford University Press, 2000.
4. Cotton, Chemical Applications of Group Theory, 3<sup>rd</sup> edition, Wiley, 1998.
5. Chandra, Introductory quantum chemistry, 4<sup>th</sup> edition, TMH, 1994.
6. McQuarrie, Quantum Chemistry, Oxford university press, 1983.
7. Levine, Quantum Chemistry, 5<sup>th</sup> edition, Prentice-Hall, 2003.
8. Hall, Group Theory and Symmetry in Chemistry, 1970.
9. Raman, Group Theory and its application to chemistry, TMH, 1990.
10. Hanna, Quantum mechanics in Chemistry, Benjamin, 1965.

**Semester-I****CBCS****PGC 4301****CHEMISTRY AND HEALTH****4hr/ 3 cr****Objective:**

This is an introductory course on understanding health in terms of chemistry. This course will attempt to make the students aware of fundamental chemistry of health maintenance with food and medicines, diagnosis of deviation from healthy living, correcting such deviation with medicinal practices and products.

**Learning outcomes:**

- ✓ Students will get introductory facts about normal health
- ✓ Know the role of food in maintenance of health
- ✓ Gain knowledge about deviation from normal health and their diagnosis
- ✓ Familiarise with various sources of medicines and medicinal practices in society
- ✓ Acquaint themselves with various routes of administration and forms of application

**UNIT –I: Health and food**

Food materials: sources, types – calorific value-Macro and micronutrients – non- dietary foods - balanced diet-imbalance and its consequences- Food and allergy -natural and manmade food materials - food pollution – food contamination-organic food materials- Effect of food materials on body ailments.

**UNIT-II: Health and chemicals**

Health maintenance - Height weight-body mass index-obesity- Healthy skin, hair , bones – Role of enzymes , hormones in health - Nutritional additives-vitamins-micro nutrients - various disorders associated with deficiencies of metal and non metal elements. Sources for various nutrients - fibre content - vitamins etc.



### UNIT- III: Diagnosis and tools

Traditional methods of diagnosis – Pulse – blood pressure – Analysis of blood, urine, stool, sputum, semen – Normal values of various factors in blood-Reasons for abnormal value of sugar- cholesterol-urea- creatinine - control measures – Microscopy, Endoscopy, Auto-analyser, Differential cell counter, X-ray, ECG,EEG,scanning : ultrasound, echo, CT, MRI,

### UNIT-IV: Drugs and Medicinal practices

Various sources- animal-plants- earth-microbes - Synthetic drugs –Biotechnology – Human gene therapy – History of drug discovery – serendipity (w.r.t. penicillins, sulpha drugs, clavulanic acid)- Various medical practices: Siddha, Ayurvedha, Unani, Acupuncture, Naturopathy, Allopathy.

### UNIT –V: Drugs and Medicinal preparations

Requirements of an ideal drug - Need for conversion of drug into medicine – Additives and their role – Various forms of administration of drugs: solid, liquid, semisolid, aerosols, powders, tablet, capsules, suppositories, injectables, syrups, suspensions, ointments, creams – Various routes of administration of drugs: enterals, parenterals, intraadermals etc.,

### References

1. David Krupadanam.G.L., Vijayaprasad.D, VaraprasadRao.K, Reddy.K.L.N, Sudhakar.C, DrugsUniversitypress(India) Ltd., Orient Longman, First edn.2001.
2. Ramnaiksood, Medical laboratory technology-Methods and interpretation, 3<sup>rd</sup>edn, Jaypee Brothers medical publishers, 1995.
3. Evelyn Pearce, General Text Book of Nursing, ELBS, 1990.
4. JayashreeGhosh, Applied Chemistry, 1<sup>st</sup>Edn, S.Chand& company pvt.Ltd, 2016

### SEMESTER –I

PGC 4303

### ORGANIC QUALITATIVE ANALYSIS

Core Lab

5 hr/ 3 cr

- Separation of organic mixtures
- Elemental analysis
- Functional group(s) identification
- preparation of derivatives
- Physical properties determination (melting point and boiling point)

### References

1. B. S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, Vogel's textbook of Practical Organic Chemistry, Pearson, 5<sup>th</sup> edition, 1989.
2. N.S. Gnanpragasam and G. Ramamurthy, Organic Chemistry Lab Manual, S. Viswanathan Pvt. Ltd.

SEMESTER – I  
PGC 4305

PHYSICAL CHEMISTRY LAB – I

Core Lab  
5 hr/ 3 cr

**Objective:**

This lab course incorporates wide range of experiments from various aspects of physical chemistry.

**Learning Outcomes:**

On successful completion of the course the learner will be equipped to

- explain the principles of electrochemistry
- carry out adsorption
- understand kinetic studies
- interpret compound forming phase diagram
- enlighten the concept of optical rotation

A. PHASE DIAGRAM

1. Two components systems (compound forming)

B. POTENTIOMETRIC METHOD

2. Dissociation constants of weak acid (acetic acid) & pH of buffer solution
3. redox titration (FAS vs  $K_2Cr_2O_7$ )

C. CONDUCTOMETRIC METHOD

4. mixture of strong acid & weak acid vs strong base
5. equivalent conductance of a strong electrolyte & verify the Onsager's equation
6. *Estimation of  $NH_4Cl$*
7. *concentration of mixture of  $HCl$ ,  $HClO_4$  and  $H_2SO_4$*

D. ADSORPTION

8. unknown concentration and the adsorption of oxalic acid from aqueous solutions by activated charcoal & examine the validity of classical and Langmuir's adsorption isotherms

E. KINETICS

9. rate constant and activation energy for ester hydrolysis (at different temperatures for two different concentrations)
10. rate constant and order (potassium persulphate vs potassium iodide)

F. POLARIMETRY

11. *effect of solvent on the optical rotation of camphor*

G. HEAT OF REACTION

12. *effect of solvent on the optical rotation of camphor by polarimetry*

**Demonstration -02; Regular practicals-12; Revision-01; Model Exam-01**

**Reference:**

1. J.B. Yadav, Advanced practical Physical Chemistry, 18<sup>th</sup>Edt (2000), Goel Publishing House, Meerut.

2. B. Viswanathan and P.S. Raghvan, Practical Physical Chemistry, (reprinted: 2009), Viva Books Private Ltd., New Delhi.
3. P.C. Kamboj, University Practical Chemistry, (2011-2012), Vishal Publishing company, Punjab.
4. Saroj Kr Maity and Naba Kr Ghosh, Physical Chemistry Practical, (2012), New Central Book Agency Private Ltd., London

**Semester-I**

**CBCS**

**PGC 4307**

**CHEMISTRY IN DAILY LIFE**

**4hr/3 cr**

**Objective:**

This course is intended to introduce the basic concepts of chemistry of materials, energy, food ,colour and chemistry in the field of agriculture playing primary role in daily life.

**Learning outcomes:**

- Understanding the chemistry of materials in daily life
- Knowing about energy and its optimum use
- Understanding the chemistry of food and its fate
- Answering basic concepts in colour& its chemistry
- Having a broad knowledge about agriculture and its development

**Unit-I: Materials Chemistry**

Definition of materials - History of materials development – Importance of materials science – Classification of materials on the basis of Phase, Composition – Structural materials - Functional materials – Alloys, ceramics, polymers - Properties: Mechanical, Thermal, Optical, Electrical, Catalytic – Applications – Material chemistry and medical advances – Upcoming material chemistry challenges.

**Unit-II: Energy Chemistry**

Various forms of energy – Atoms, molecules, bonding and their relationship with energy – Sources of energy in earth – Solar energy production , transmission, transformation and storage m- Solar energy harvesting by living systems, non-living systems- Biomass, fossil, water as medium of transformation of energy – hydro / hydel, wind, tidal, thermal and atomic power – Food as source and storage of energy for human – Energy storage methods, instruments, Capacitors, batteries – Methods to meet future energy requirements.

**Unit-III: Food Chemistry**

Food chemistry – constituents of normal food - carbohydrates, protein, lipids, fibres, other nutrients: minerals, vitamins, enzymes, color, flavour, food additives - Balanced food

and nutrition. History of food processing and methods – cooking – ingredient concerns- degree of processing – Food physical chemistry – nutraceuticals – dietary supplements – Functional foods – Natural Vs synthetic – food fortification.

#### **Unit-IV: Color Chemistry**

Concept of color – Physical and chemical basis of colors - Interaction of light with objects - Complementary colors (RGB & CYM) – visible and invisible – optical properties: reflection, deflection, refraction, diffraction , dispersion – Chemical properties: chromophore, auxochrome, excitation, relaxation, fluorescence, phosphorescence with Jablonski diagram - Chemistry colors the world - colors of sky ,sea, rainbow, water, ice, leaves, flowers, paints etc. - Pigments, dyes – color printing - color fading, color fastness – color vision and color blindness – chemistry of vision- chemistry of hair coloring – Psychological effects of color - Illeffects of color

#### **Unit-V: Soil Chemistry**

Soil and atmosphere-Exchange and cycling between them – Properties of soil- - soil fertility – Ways of increasing the productivity - Chemicals in agriculture – Nutrient: macro and micro – deficiency diseases - Manures and fertilizers : qualities and classification- Pests and control methods - Pesticides types and mode of action and illeffects – Green revolution and pollution Genetic engineering and breeding – Organic farming and sustainable agriculture – Future challenges in agriculture

#### **References:**

1. [http://dionne.stanford.edu/MatSci202\\_2011/Lecture1\\_ppt.pdf](http://dionne.stanford.edu/MatSci202_2011/Lecture1_ppt.pdf)
2. [https://en.wikibooks.org/wiki/A-level\\_Applied\\_Science/Colour\\_Chemistry/Colour](https://en.wikibooks.org/wiki/A-level_Applied_Science/Colour_Chemistry/Colour)
3. <https://www.slideshare.net/ns90tnau/energy-storage>
4. [http://www.ei.lehigh.edu/learners/energy/readings/energy\\_basics.pdf](http://www.ei.lehigh.edu/learners/energy/readings/energy_basics.pdf)
5. <http://www.rsc.org/learn-chemistry/content/filerepository/CMP/00/001/340/The%20Chemistry%20of%20Energy%20-%20Student%20Guide.pdf>
6. <https://www.slideshare.net/ns90tnau/energy-storage>
7. Jayashree Ghosh, Applied Chemistry, 1<sup>st</sup> Edn, S.Chand & company pvt.Ltd, 2016

**Objective:**

This is the second of the four semester sequential course in organic chemistry. Students will be dealing with various concepts of Stereochemistry, Conformational Analysis, ORD, CD, Spectroscopy, Natural products and Heterocyclic compounds.

**Learning Outcomes:**

- The students will be able to identify the elements of chirality in the molecules and also apply the various rules to synthesize chiral compounds.
- The students will be able to predict the stability of various conformations and using ORD, CD curves students will fix the absolute configuration of the molecule.
- Students will identify the spin system present in the molecules and interpret the data both in proton and carbon NMR.
- Students will distinguish the fragmentation pattern followed in various organic compounds and interpret the mass data.
- Students will identify compounds belonging to various natural sources and also synthesize different heterocyclic compounds.

**UNIT-I:****Stereochemistry**

Elements of Symmetry-Classification of conformation & configuration based on energy criterion-stereoisomerism, conformations & chirality - racemic modification & classification of racemic modifications, quasi racemates- molecules with more than one chiral center, Nomenclature-D & L, R & S, R\* & S\*, threo and erythro isomers-Pref&Pruf-Prelog system, Brewster system-Stereoisomerism-axial chirality, planar chirality & helicity - allens, spiranes, biphenyls, ansa compounds, cyclophanes, trans-cyclooctene - chirality due to  $sp^3C-sp^3C$  - Topicity&prostereoisomerism-topicity of ligands, groups and faces - homotopic, enantiotopic and diastereotopic atoms, groups and faces – racemization - mechanism of racemization-asymmetric transformation - methods of resolution - optical purity & enantiomeric excess-asymmetric synthesis-substrate controlled-Cram's rule, Prelog's rule-reagent controlled-optimally active catalyst-solvent controlled- stereospecific and stereoselective synthesis-Stereochemistry of compounds containing nitrogen, sulfur and phosphorus- pyramidal inversion, 1,3-synaxial interaction, anomeric effect, exo-anomeric effect, Rabbit-ear effect-repulsive gauche effect (hockey sticks effect).

**UNIT-II:****Conformational analysis**

Conformations and stability of mono, disubstituted and trisubstituted cyclohexanes- conformations of cyclohexanone, 2 & 3 alkyl ketone effect- conformations of 2-nal & 2,6-dihalo cyclohexanones-alkylidene cyclohexanes- conformations of 1,3-dimethylpiperazine, pyranose sugars, 1,3-oxazines, 1,4-oxathiane- conformations and stability mono and disubstituted decalins, perhydrophenanthrenes, perhydroanthracenes- reactivities of cyclohexane, cyclohexanones with respect to oxidation, reduction, substitution and elimination.

**ORD/CD**

Linearly & circularly polarized lights- circular birefringence & circular dichroism- ORD and CD curves: Cotton effect- applications of CD & ORD- use of plane curves- Empirical & semiempirical rules- axial haloketone rule, octant rule.

**UNIT-III:****Proton NMR spectroscopy**

NMR phenomenon- CW and FT NMR- relaxation effects – chemical shifts- factors influencing Chemical shifts (electronegativity, anisotropic effects and van der Waals' deshielding)- Chemical and magnetic equivalence- exchange phenomenon- spin-spin coupling- Simplification of complex spectra using double resonance techniques, Shift reagents and increased field strength- Classification of spin systems- analysis of AX, AMX, ABX systems- Geminal, vicinal and long range couplings- NOE in stereochemistry.

**Carbon NMR spectroscopy**

<sup>13</sup>C NMR basic principles- Off resonance and broad band decoupling techniques gauche effect.

**UNIT-IV:****Two dimension NMR spectroscopy**

An introduction to 1 – D pulse technique – J-resolved 2-D NMR- 2D techniques- HOMCOR, HETCOR, NOESY, DEPT, INEPT, APT and INADEQUATE Techniques.

**Mass spectrometry**

Introduction, ion production – EI, CI, FD, FAB and MALDI- rules of fragmentation- even electron rule, nitrogen rule, Stevenson's rule, rule of thirteen- molecular ion peak, base peak, isotopic peak, metastable peak- McLafferty rearrangement - double hydrogen transfer – prominent fragmentation pattern- mass spectral fragmentation of organic compounds containing common functional groups – hydrocarbons, alcohol, amine, acid, ester, amide, aldehyde, ketone, halocompounds, nitro compound, ether - conjoint spectra.

## UNIT-V:

### Natural products

Structural elucidation of Terpenoids ( $\alpha$ -pinene and  $\alpha$ -cadinene)-Alkaloids (quinine and papaverine)-Anthocyanins and flavones (cyanin chloride and quercetin).

### Heterocyclic Chemistry

Preparation, reactivities, comparison of basicity of heterocyclic compounds with more than one hetero atom—pyrazole - imidazole - isooxazole – thiazole - pyridazine - pyrimidine – pyrazine.

### References

1. D. Nasipuri, Stereochemistry of Organic Compounds: Principles and Applications, New Academic Science, 3<sup>rd</sup> edition, 1991.
2. Ernest L Eliel, Samuel H. Wilen, Stereo Chemistry of Organic compounds, John Wiley & Sons, INC, 2003.
3. Michael Hanack, Conformational Theory, Academic Press, 1965.
4. William Kemp, Organic Spectroscopy, Palgrave, 3<sup>rd</sup> edition, 1991.
5. R.M. Silverstein, G.C. Bassler, J.C.Morril, Spectroscopic Identification of Organic compounds, John Wiley & sons INC 5<sup>th</sup> edition 1991.
6. Reg Davis & Martin Frearson, Mass spectrometry, ACOI, John Wiley & Sons, 1989.
7. William Kemp, NMR in chemistry-A multinuclear introduction, Macmillan, 1986.
8. Joseph B. Lambert & Eugene P. Mazzola, Nuclear magnetic resonance spectroscopy, Pearson Prentice Hall.
9. Joseph B. Lambert, Herbert F. Shurvell, Lawrence Verbit, R. Graham Cooks, George H. Stout, Organic structural analysis, Macmillan Publishing CO, Inc, 1976.
10. H. Gunther, NMR spectroscopy: Basic principles, Concepts and Applications in chemistry, 2<sup>nd</sup> edition, Wiley, 1995.
11. I.L. Finar, Organic Chemistry Vol:2, Pearson, 5<sup>th</sup> edition 1975.
12. T. L. Gilchrist, Heterocyclic Chemistry, John Wiley & Sons, Inc., 1985.
13. R.R. Gupta, M. Kumar, V. Gupta, Heterocyclic Chemistry, Vol-I & II, Springer, 1998.
12. J.A. Joule and K. Mills, Heterocyclic Chemistry, Wiley, 5<sup>th</sup> edition, 2010.
13. R.M. Acheson, An introduction to the chemistry of heterocyclic compounds, John Wiley, 3<sup>rd</sup> Edition, 2008.

Semester-II

Core Theory

PGC 4434

INORGANIC CHEMISTRY-II

5 hr/4 cr

**Objective:**

The coordination chemistry of transition metal complexes, spectral tools normally employed for characterization, reactivities of complexes with reaction mechanisms will be discussed in this course.

**Learning outcome:**

After completion of this course the student will be able to

- Rationalize coordinating ability, complex stability and isomerism.
- Describe the structural aspects of coordination compounds.
- Interpret electronic spectra, NQR spectra and magnetic data.
- Elucidate the structure using IR, NMR, MB and EPR data.
- Explore the synthetic pathways, reaction mechanism and rates.

**UNIT – I: General concepts in coordination chemistry**

General view of transition metals and coordination chemistry - size, variable oxidation state, catalytic property - comparison of first, second and third transition series – nomenclature – Structure and coordination number – higher coordination numbers – isomerism – types - stability of complexes – complex equilibria – factors affecting stability - chelate effect - determination of stability constants – Job's method - ORD and CD - ligand conformation

**UNIT – II: Theories of coordination compounds**

Theories of bonding – VBT – principles — defects – CFT – CFSE – Octahedral symmetry – Tetrahedral symmetry – factors affecting CFSE – Applications of CFSE – Jahn-Teller distortion – consequences – Square planar complexes – limitations of CFT – evidences of metal-ligand covalency – LFT – MOT of octahedral and tetrahedral complexes – sigma & pi bonding in MOT

**UNIT – III: Magnetic properties, electronic and NQR spectra**

Electronic Spectroscopy – Term Symbols – Orgel diagrams – intensities, Shapes of peaks - assignment of transitions - calculation of crystal field parameters for  $d^3$ ,  $d^8$  systems – charge transfer spectra – types

Magnetic property of complex ions – types of magnetic property – groups with small and large multiplet separation – orbital contribution to magnetic moment

NQR – principle – eQq – interpretation – effect of crystal lattice – structural information



### UNIT – IV:IR, NMR, MB and EPR spectra

Vibrational spectroscopy – applications - symmetry and coordination site – complexes of aqua, cyano, nitro, nitrito, urea, acetylacetonato ligands

NMR – applications –  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{15}\text{N}$ ,  $^{17}\text{O}$ ,  $^{31}\text{P}$ ,  $^{19}\text{F}$  – paramagnetic complexes – contact shift, pseudo contact

Mossbauer spectra – principle – isomer shift – electron environment – quadrupole interaction – application

EPR – g value – presentation of spectrum – hyperfine splitting – factors affecting g value – application to Cu(II) complexes – zero field splitting and Kramer's degeneracy, metal ligand covalency

### UNIT – V: Reactions of metal complexes

Reaction mechanisms of transition metal complexes- classification – anation – aquation and base hydrolysis – acid hydrolysis – stereo chemistry of the products – factors affecting the rate – nucleophilic substitution reactions of square planar complexes - Trans effect - theories – polarization,  $\pi$ -bonding – electrons transfer reactions – inner and outer sphere reaction – mechanism - template effect

#### References:

1. Huheey J.E, Keiter E.A, Keiter R.L, Medhi O.K, Inorganic Chemistry - Principles of structure and Reactivity, Pearson Education, ISBN 81-7758-130-9, 2006.
2. Cotton F.A and Wilkinson, G., Advanced Inorganic Chemistry, John Wiley and Sons, New York VI Edition 1999.
3. Purcell K.F and Kotz J.C., Inorganic Chemistry, Saunders, Philadelphia, 1977.
4. Meissler G.L. and Tarr T.A., Inorganic Chemistry, Pearson Academy, Inc., III Edition, New Delhi, 2004.
5. Shriver D. F and Atkins P.W, Inorganic Chemistry, oxford univ. Press 1999
6. Ebsworth E.A.V, Rankin D.W.H, Cradock S, Structural Methods in Inorganic Chemistry, Wiley-Blackwell illustrated edition, 1986.
7. Kettle S.F.A, Coordination Compounds, The ELBS and Nelson, 1969.
8. Drago, R.S Physical Methods in Inorganic Chemistry, Reinhold, NY 1965.
9. Drago, R.S Physical Methods in Chemistry, W.B. Saunders Philadelphia 1977.
10. Lever, A.B.P., Inorganic Electronic Spectroscopy, Elsevier., Amsterdam II Edition.
11. Figgis, B.N., Introduction to ligand fields, Interscience, NY 1996.
12. Sutton D., Electronic spectra of transition metal complexes, McGraw-Hill, London, 1968.
13. Nakamoto, Kazuo, Infrared and Raman Spectra of Inorganic and Coordination Compounds, IV edition, John Wiley and Sons, NY, 1986.
14. Basalo .F and Pearson R.G. Mechanisms of Inorganic reactions, a study of metal complexes in solution, Wiley eastern New Delhi 1984.

**SEMESTER –II****Core Theory****PGC 4436****PHYSICAL CHEMISTRY-II****5 hr/ 4 cr****Objective:**

This is the second course in the four sequential courses in physical chemistry. This course deals with rotational, vibrational, electronic, nuclear magnetic resonance spectroscopy, EPR, NQR and Mossbauer Spectroscopy.

**Learning Outcomes:**

On successful completion of the course the learner will be equipped to

- Apply rotational and vibrational spectroscopy to various types of molecules
- Get exposed to various Raman, electronic and photo-electron Spectroscopy
- Understand the fundamental concepts of nuclear magnetic resonance spectroscopy
- Derive advanced knowledge on nuclear magnetic resonance spectroscopy
- Have knowledge about EPR, NQR and Mossbauer Spectroscopy

**UNIT – I: ROTATIONAL AND VIBRATIONAL SPECTROSCOPY**

Rotation spectroscopy – rotation of molecules and rotational spectra rigid diatomic molecule – intensities of spectral lines – effect of isotopic substitution – non-rigid rotator – spectrum of non-rigid rotator – linear polyatomic molecules – symmetric top molecule – asymmetric top molecule

Introduction to vibration – rotation spectroscopy – energy of diatomic molecules – simple Harmonic Oscillator – Anharmonic Oscillator – Diatomic vibrating rotator – breakdown of Born-Oppenheimer approximation – normal modes and normal coordinates – overtone and combination bands – influence of rotation on the spectra of polyatomic linear molecules with parallel and perpendicular vibrations – symmetric top molecules with parallel and perpendicular vibrations – effect of nuclear spin – FT-IR.

**UNIT – II: RAMAN AND ELECTRONIC SPECTROSCOPY**

The Raman effect – quantum mechanical and classical approach to Raman effect – polarizability – Pure rotational Raman spectra of linear, symmetric top, spherical top and asymmetric top molecules – vibrational Raman spectra – Rule of mutual exclusion – IR and Raman active frequencies – Fermi Resonance – rotational fine structure – depolarization ratio – vibrations of spherical top molecules – The Laser source – production and energy level studies of gas, solid and liquid state lasers – Applications of laser Raman Spectroscopy – Structural determination – polarized and depolarized Raman lines – Resonance Raman Spectroscopy – surface-enhanced Raman scattering– Non-linear Raman effects – Hyper Raman effect– Stimulated Raman effect – Inverse Raman effect – Coherent anti-stoke Raman (CARS) Spectroscopy – Time resolved Raman Spectroscopy.

Electronic spectra of molecules – Born-Oppenheimer approximation – vibrational coarse structure – Frank-Condon principle – rotational fine structure of electronic – vibration transitions – Fortrat diagram – pre-dissociation.

Basic principles – photo-electric effect – ionization process – Koopman's theorem – photoelectron spectra of simple molecules – ESCA – chemical information from ESCA – Auger electron spectroscopy – basic idea.

### **UNIT – III: NMR-I**

Nuclear spins and magnetic moments – resonance condition – Larmor precession–relaxation – population of energy levels – Bloch equation – NMR spectrum – chemical shift – factors affecting chemical shift values – spin-spin coupling – quantum mechanical formulation – Hamiltonian operator for high resolution NMR  $A_2$  system, AB system and AX system – direct analysis AB system,  $AB_2$  system and ABX system.

Double resonance experiments – spin decoupling – spin tickling – NOE – INDOR – hetero nuclear double resonance broadband and off-resonance decoupling – CIDNP – Dynamic NMR.

### **UNIT – IV: NMR-II**

$^1\text{H}$  NMR: FT-NMR instrumentation – pulse FT NMR – relaxation mechanisms – relaxation time determination of T1 and T2–gated decoupling

$^{13}\text{C}$  NMR: 1D NMR – SEFT, SPI, INEPT, DEPT and INADEQHATE – 2D NMR experiments – presentation of 2D NMR spectrum – COSY – HOMCOR, HETCOR, HMQC, HMBC, NOESY – 2D INADEQUATE – J-resolved spectra

Chemical shift and charge density calculation – computation of  $^{13}\text{C}$  chemical shift values using tables – theory of geminal coupling, vicinal coupling and long-range coupling – Solid state NMR.

### **UNIT – V: ESR, NQR AND MOSSBAUER SPECTROSCOPY**

**EPR:** esr. experiment – thermal equilibrium and relaxation – experimental methods and instrumentation – magnetic field modulation – g-factor – absorption intensity and concentration measurements – factors influencing the absorption line-shape – hyperfine structure and its energy levels – interpretation of e.s.r spectra in solution – anisotropic systems – triplet state – energy levels for Kramer's doublets

**NQR:** introduction – general principles – experimental detection of N.Q.R frequencies – chemical bonding – substituent effects – interpretation of  $^{14}\text{N}$  quadrupole coupling constants

**Mossbauer spectra:** basics – recoilless emission and absorption – spectrum – experimental methods – hyperfine interactions

**References:**

1. W. J. Moore, *Physical Chemistry*, 5<sup>th</sup> edition, Orient Longman, 1976.
2. Atkins, *Physical Chemistry*, 7<sup>th</sup> edition, Oxford University Press, 2000.
3. C.N. Banwell, *Fundamentals of Molecular Spectroscopy*, 4<sup>th</sup> edition, TMH, 1997.
4. R.S. Drago, *Physical methods in chemistry*, Saunders, PA, 1987.
5. Gilson and P.J. Hendra, *Laser Raman Spectroscopy*, Wiley, New York, 1970.
6. Straughan and Walker, *Spectroscopy*, Vol. I, II and III, Chapman and Hill, 1976.
7. E. B. Becker, *High Resolution NMR*, 2<sup>nd</sup> edition, Academic press, 1980.
8. W.Kemp, *NMR in chemistry*, McMillan, 1986.
9. G. Aruldas, *Molecular structure and spectroscopy*, Prentice-Hall, 2001.
10. H. Günther, *NMR Spectroscopy: Basic Principles, Concepts, and Applications in Chemistry*, 1<sup>st</sup> edition, Wiley, 1990.
11. H. Günther, *NMR Spectroscopy: Basic Principles, Concepts, and Applications in Chemistry*, 2<sup>nd</sup> edition, Wiley, 1994.
12. D. N. Sathyanarayana, *Vibrational Spectroscopy: Theory and Applications*, New Age International, 2015.
13. D. N. Sathyanarayana, *Handbook of Molecular Spectroscopy*, I K International Publishing House, 2015.
14. D. N. Sathyanarayana, *Introduction to Magnetic Resonance Spectroscopy ESR, NMR, NQR*, 2 – e, I K International Publishing House, 2013.

**Semester-II**

CBCS

PGC 4302

CHEMISTRY AND BEAUTY

4hr/ 3 cr

**Objective:**

This course is intended to impart awareness about healthy human living maintaining a beautiful appearance. There will be a study on hygienic practices, maintaining skin, hair and physique to enhance natural beauty.

**Learning outcomes:**

- Understanding the problems and solutions for hygienic living
- Maintaining the hair and its beautification
- Understanding the functions, problems of skin and making it have a goof appeal
- Ways and means to enhance beauty
- Keeping the physique fit

**Unit I: Hygiene and Appearance**

Hygiene and civilisation-bathing and clothing-soap and bath oils and essences -cleansing and cold creams-antiperspirants and deodorants-

Functions of dentifrices-characteristics, ingredients and formulation of tooth pastes/toothpowders- composition and formulation of mouthwashes-naturopathic medical practices-factors affect skin-skin care in different seasons-silver nanoparticles in cosmetics-sources and extraction of perfumes from natural sources.

### **Unit II: Hair and Beauty**

Hair-structure, types and functions-ailments of hair-steps to keep hair healthy-hair care products- composition, characteristics and formulation of shampoos/anti-dandruff shampoos-characteristics, classification and formulation of hair colourants.

Hair waving- chemistry of temporary and permanent hair waving-conditioners-neutralizer-methods of hair straighteners-unwanted hairs-depilation and epilation-shaving preparations before and after shaving.

### **Unit III: Skin and Beauty**

Structure and functions of skin- skin colour- nutrients for skin-problems of the young skin and aging of the skin- raw materials and its characteristics, formulation of skin care products-moisturising creams, nourishing cream and emollient cream- herbal extracts and essential oils in skin care-

Sunshine and suntan-sun protection factor-skin bleaches

Skin creams- cleansing and cold creams-characteristics-types of cleansing creams-general procedure for manufacturing-vanishing cream and its procedure of formulation-sunscreen preparations-principle and formulae.

### **Unit IV: Beauty Enhancers**

Social trends in use of makeup products- colour and pigments in cosmetics-face powder and talcum powder-vanishing and foundation creams-rouges and blushers-eye makeups: mascara, eyeshade, eyeliner, eyebrow and kohl

Lipstick-characteristics of lipstick- basic raw materials and its role in formulation of lipstick-tests for lipsticks

### **Unit V: Physique and Beauty**

Symmetry in human body-height, weight and body mass index-daily habits and health-chemistry of maintaining body structure and appearance-physical exercise- yoga, walking, jogging and gym- wrong postures and effects-food habits and diets-clothing and beauty.

### **References:**

1. B.M.Mithal and R.N.Saha, A handbook of cosmetics, VallabhPrakashan Publication, New Delhi, 2000

Science and the beauty business , John V. Simmons. V.1, The science of cosmetics. Macmillan Education, 1

SEMESTER –II

Core Lab

PGC 4304

ORGANIC QUANTITATIVE ANALYSIS

5 hr/ 3 cr

**Volumetric analysis**

1. Estimation of phenol/aniline
2. Estimation of glucose (Bertrand's method)
3. Estimation of glucose (Lane and Eynon method)
4. Estimation of ketone
5. Estimation of formaldehyde/carbonyl compounds

**Preparation (Two-stage)**

1. Nitroacetanilide →p-bromoacetanilide→p-bromoaniline
2. Benzophenone→benzophenoneoxime→benanilide
3. Benzoin→benzil→benzilic acid
4. 4-nitrotoluene→4-nitrobenzoic acid→4-aminobenzoic acid

**Analytical methods**

1. Chromatography
  - a. TLC – separation of organic mixtures
  - b. column chromatography – purification of organic mixtures
2. Reduced pressure distillation
3. Extraction of caffeine
4. Extration of pigments/terpenoids-Soxhlet method
5. Recrystallization techniques

**References**

1. B. S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, Vogel's textbook of Practical Organic Chemistry, Pearson, 5<sup>th</sup> edition, 1989.
2. N.S. Gnanpragasam and G. Ramamurthy, Organic Chemistry Lab Manual, S. Viswanathan Pvt. Ltd.
3. N.K. Vishnoi, Advanced Practical Organic Chemistry, Vikas Publishing, 1<sup>st</sup> edition, 1979.

SEMESTER – II

Core Lab

PGC 4306

PHYSICAL CHEMISTRY LAB – II

5 hr/ 3 cr

**Objective:**

This lab course covers the various physical chemistry concepts there by enhance subject understanding.

**Learning Outcomes:**

On successful completion of the course the learner will be equipped to

- explain the principles of distribution
- carry out experiments in the concept of viscosity
- experience on hand usage of spectrophotometry
- carry out electrochemical methods to find dissociation and hydrolysis constant & solubility product
- interpret three component phase diagram

**A. PHASE DIAGRAM**

1. three component system: acetic acid, chloroform and water

**B. POTENTIOMETRIC METHOD**

2. Mixture of KCl and KI vs  $\text{AgNO}_3$  & calculate their solubility product
3. mixture of strong acid & weak acid vs strong base & calculate their dissociation constant

**C. CONDUCTOMETRIC METHOD**

4. hydrolysis constant of freshly prepared and dried aniline hydrochloride
5. *mixture containing oxalic acid and acetic acid using alkali*
6. solubility product of barium sulphate (barium chloride vs potassium sulphate)
7. mixture of  $\text{H}_2\text{SO}_4$ ,  $\text{CH}_3\text{COOH}$  and  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  vs alkali

**D. SPECTROPHOTOMETRY**

8. *binary mixture composition (potassium dichromate and potassium permanganate)*

**E. VISCOSITY**

9. Viscosity, composition & validity of J. Kendall's equation of different mixtures (nitrobenzene and Benzene (or) toluene and  $\text{CCl}_4$ )

**F. DISTRIBUTION METHOD**

10. distribution co-efficient (benzoic acid in benzene/water & prove its dimerisation in benzene)
11. *formula of complex ion (formed between cupric ion and ammonia)*
12. *distribution co-efficient ( $\text{I}_2$  in  $\text{CCl}_4$  / water)*

**Demonstration -02; Regular practicals-12; Revision-01; Model Exam-01**

**Reference:**

1. J.B. Yadav, Advanced practical Physical Chemistry, 18<sup>th</sup>Edt (2000), Goel Publishing House, Meerut.
2. B. Viswanathan and P.S. Raghvan, Practical Physical Chemistry, (reprinted: 2009), Viva Books Private Ltd., New Delhi.
3. P.C. Kamboj, University Practical Chemistry, (2011-2012), Vishal Publishing company, Punjab.
4. Saroj Kr Maity and Naba Kr Ghosh, Physical Chemistry Practical, (2012), New Central Book Agency Private Ltd., London

**Semester-II****Life Skill****PGC 4308****CHEMISTRY IN SMALL SCALE BUSINESS****4hr/ 3 cr****Objectives**

This course enables the students to understand the various small scale products in the field of hygiene, food and petroleum. Students will be trained to prepare small scale products such as face powder, candles, shoe polish, jam and jelly etc.

**Learning outcome**

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

- differentiate various aqua based products.
- identify the role of various ingredients in the formulations of surfactants.
- distinguish the impacts of various ingredients added in the food products.
- prepare the various small scale products.
- acquire skills to develop new formulations of products.

**Unit I: Aqua products**

Water- Potable water- standards for potable water –hard water - soft water - water softening - Permutit process - reverse osmosis - desalination of sea water- distilled water - importance- sparkling water - standards for food processing industry - Laboratory and medical grade water (ultra pure water)

**Unit II: Hygiene products**

Soap- toilet soap- shaving soap- medicated soap- transparent coloured soap-cleaning action of soap- Shampoo- formulations - varieties



Laundry aids- laundry tablets- surfactant- foam regulator- anti redeposition agents- peroxide bleach- bleach activator- fabric softner - fragrance

Air freshener - types- toxicity – deodorant and antiperspirant – antiseptic - disinfectants - phenoyls- black phenoyls, scented phenoyls- After shave lotions – sunscreen lotions - SPF factor - formulation.

### **Unit III: Sugar and salt based products**

Jam, Jelly, Marmalade - Technical flow sheet of processing, problems in production – important considerations in jelly making – syrups – Ice cream - types - ingredients - manufacture – stabilizer – emulsifiers – preservatives- types- factors influencing selection of preservatives – pickles – Food colours - natural synthetic – food flavours- flavoured compounds

### **Unit IV: Petroleum based products**

Candles - variety of candles - raw materials - machinery - method of candle making – crayons - machines and method – Shoe polish - basic ingredients - preparative methods – Lipsticks - classification and formulation – Nail polish -formulation – Hair dye and hair colourants – perfumery materials- natural and synthetic.

### **Unit V: Laboratory preparation of small scale products**

Face powder, tooth power, candle, phenoyl, soap & detergents, chalk, inks, stamp pad inks and shoe polish, syrup, jelly.

### **Text books**

1. R.P.Srivatsava, Sanjeev Kumar, Fruits and vegetable preservation, International book distributing company (2006).
2. J.V.Simmons, Science and the Beauty Business,. V.1, The science of cosmetics, Macmillan Education (1989).

### **References**

1. W.A. Poucher, Perfumes, Cosmetics, soaps, Vol 2, The production and manufacture and applications of perfumes, Chapman Hall Ltd, London (1979)
2. John Emsley, Better looking, better living, better loving, Wiley –VCH VerlagGmbH& Co(2007)
3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, (2001)

**POSTGRADUATE DEPARTMENT OF BOTANY**  
**Programme for M.Sc., BOTANY from 2018 - 2019 onwards**

S.No	COURSE TITLE	HOURS	CREDIT	Max
<b>SEMESTER I</b>				
PGB4521	Plant Diversity	7	5	100
PGB4523	Principles of Microbiology	7	5	100
PGB4425	Plant Diversity and Microbiology LAB	6(L)	4	80
PGB4227	Cell Biology and Genetics	3	2	40
PGB4229	Environmental Biology	3	2	40
PGB4331	<b>CBCS (Campus Ecology/ Pl. based enterprises)</b>	4	3	60
	<b>Total</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>SEMESTER II</b>				
PGB4522	Plant Systematics	7	5	100
PGB4524	Biomolecules	7	5	100
PGB4426	Plant Syst. & Biomolecules LAB	6(L)	4	80
PGB4428	Mycology and Pathology	6	4	80
PGB4330	<b>CBCS (Trends in Agriculture/ Plants and people)</b>	4	3	60
	<b>Total</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>SEMESTER III</b>				
PGB5621	Physiological Biochemistry	7	6	120
PGB5623	Morphogenesis	7	6	120
PGB5425	Physi. Bio. and Morpho. LAB	6(L)	4	80
PGB5527	Molecular Biology	6	5	100
PGB5329	Biol.Tech and Res.Method	4	3	60
	<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>
<b>SEMESTER IV</b>				
PGB5722	Biotechnology	8	7	140
PGB5424	Gen. Eng, PTC and Ind. Mic. LAB	6(L)	4	80
PGB5326	Nanobiology	4	3	60
PGB5328	Systems Biology	4	3	60
PGB5730	Projects	8	7	140
	<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>

**CREDITS (21+21+24+24=90)**

**CBCS**

<b>Campus Ecology</b>	<b>SEM (I)</b>
<b>Plant based enterprises</b>	<b>SEM (I)</b>
<b>Trends in Agriculture</b>	<b>SEM (II)</b>
<b>Plants and people</b>	<b>SEM (II)</b>

**PLANT DIVERSITY**

**PGB4521**

**7Hrs/5 Cr**

**PREAMBLE:** Students will explore the stupendous variation in the organization of internal and external morphology encountered in cryptogamic plants. The complexity of these features they will unravel in the light of lines of evolution. They will appreciate the interrelationship among them. Students will learn the lessons from the past fossil history to relate it to the present.

**OBJECTIVES**

1. to have a wider understanding of plants' evolutionary trend.
2. to get exposed to the vistas of phylogenetic relationships among Archegoniates.
3. to get to know the complexity and simplicities in their structure, organization and life pattern

**UNIT I: Paleontological History:** Earth as a living planet – origin of life – evolution of green plants through ages – geological timescale – continental drift – kingdom classification – mega extinction and speciation – classification and characterisation of major plant groups – fossils and fossilization.

**UNIT II: Algae:** General features – criteria for various classifications – thallus organization – biology and distribution – evolution of life cycle patterns – fossil algae – ecology and economic importance – algal research in India and key contributors – algae as symbiont – biology of lichens.

**Unit III: Bryophytes:** General features, distribution and ecology – variations of gametophytes and sporophytes – classification and inter-relationships – trends in bryology (Sphagnales and Takkakiales) – progressive and retrogressive evolution.

**Unit IV: Pteridophytes:** General features and distribution – origin of land plants – evolution of stele – alternation of generations, heterospory and seed habit – structural variations in gametophytes and sporophytes – apogamy and apospory – aquatic ferns – contributions of Indian pteridologists.

**Unit V: Gymnosperms:** Origin and evolution of seed bearing plants – general features of Cycads, Conifers, and Gnetopsids – morphology, anatomy and reproductive biology – evolution of seed – fossil gymnosperms – origin of angiosperms.

**TEXT BOOKS**

1. Cavers, F.1971. The interrelationship of bryophytes. Dawsons Pallwall. ISBN -0-521-66794-1
2. Chopra, R.N.2001. Biology of Bryophytes. Narosa publishers. ISBN: 81-224-343- 9
3. Lee,R. E. 2009. Phycology. Cambridge University Press. ISBN: 978-0521-14144-42.
4. Rashid, A. 1982. An introduction to Pteridophyta. Vikas publishing Co. (repr.ed). ISBN: 81- 259-0709-2
5. Sporne, K. R. 1962. The morphology of Pteridophytes. Hutchinson University Library. California. ISBN 978009123861
6. Sporne, K.R. 1965. The morphology of gymnosperms: The structure and evolution of primitive seed plants. B. I. Publications Pvt. Ltd. ISBN 81 7225 0398. 10.

7. Stewart, W.N and Rothwell G.W. 2010 Paleobotany and the Evolution of Plants. Cambridge University Press (2<sup>nd</sup> Edn). ISBN – 10:0521126088

#### REFERENCE BOOKS

1. Bell, P.R. and A.R. Hemsley. 2000. Green plants, their origin and diversity. Cambridge University Press, U.K. (2<sup>nd</sup> Edn). ISBN: 0-521-64109-8
2. Bold, H.C. and Wynne, M.J. 1985. Introduction to the Algae: Structure and Reproduction. 2nd Edn. Prentice Hall. Englewood Cliffs, New Jersey. ISBN: 978-0134777467
3. Fritsch, F.E. 1945. The structure and reproduction of the algae. Vikas publishing Co. ISBN: 0-521-77051-3.
4. Ingrouille M and Eddie B 2006., Plant diversity and evolution. Cambridge Univ. Press. ISBN 0 521 79433 1.
5. Johri.R. M., Latha.S and Sharma.S. 2009. Text book of Pteridophyta. Wisdorn Press. ISBN 978 81 9086 35 82.
6. Kumar, H.D. 1988. Introductory Phycology. East West press. ISBN: 81- 859- 3896-2.
7. Morris, I. 1971. An introduction to Algae. Hutchinson University Librarary. ISBN: 0-090-80713-8
8. Smith, G.M. 1966. Cryptogamic botany vol. 1. Algae and Fungi. Tata McGraw-Hill Book Company. (2<sup>nd</sup> ed.).ISBN : 0-070-99576-1.
9. Vanterpoorten, A. and Goffinet,B. 2009. Introduction to Bryophytes. Cambridge Press. ISBN: 978-0-521-70073-3

### PRINCIPLES OF MICROBIOLOGY

**PGB 4523**

**7hrs/5Cr.**

**PREAMBLE:** This course enables students to understand the basic concepts in microbiology and microscope as a tool to explore the microbial life. The emphasis will be given to their cosmopolitan distribution, diversity and ability to adapt in different environments. Microbes in different environmental conditions will be discussed with practical examples. Applied microbiology section will provide a glimpse on the industrially important microbes.

#### OBJECTIVE

1. to understand the basic concepts in microbial diversity, metabolism and genetics.
2. to make the students knowledgeable with respect to the subject and its practicable applicability.
3. to promote understanding of basic and advanced concepts in microbiology.
4. to expose the students to different processes used in industries and in research field.
5. to develop their ability to apply the knowledge of microbiology in day to day life.

**UNIT I: General Microbiology:** History – scope – microbial diversity – extremophiles – ultra-structure of eukaryotic and prokaryotic cells – human microbiome – natural classification, phylogenetic approach – numerical taxonomy (simple match coefficient and

## **PGB 4**

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Jaccard coefficient), modern approach – base composition – nucleic acid sequencing (RNA fingerprint – 5S rRNA and 16S rRNA) – Bergey's classification.

**UNIT II: Tools and Techniques:** Microscopy (brightfield, darkfield, phase-contrast, fluorescence and electron microscopy) – microbial nutrition – quantitative measurement of bacterial growth – sterilization and disinfection – physical and chemical agents – methods of isolation – axenic cultures – maintenance and preservation.

**UNIT III: Biology of Bacteria and Viruses:** Energy production (anaerobic fermentation – aerobic respiration) – bacterial recombination (conjugation – transduction – transformation.) Viruses (general characteristics, structure, composition and classification of viral genomes.) bacteriophages (morphology and structure of T4 and  $\lambda$  phage. ) – classification of viral vaccines – rabies and HIV.

**UNIT IV: Environmental Microbiology:** Air microflora (indoor and outdoor), soil microflora ( diversity and abundance) – organic matter decomposition – biological nitrogen fixers (symbiotic and asymbiotic) – aquatic microflora (fresh and marine) – microbes in biodegradation, biodeterioration and bioremediation – potability, microbial assessment and purification of water – waste water treatment – solid waste treatment – source of food and energy.

**UNIT V: Applied Microbiology:** Scope – intrinsic and extrinsic factors affecting the growth of microbes – food microbiology (microbes in food, and spoilage, prevention and preservation methods – functional foods (probiotics, prebiotics, synbiotics and nutraceuticals) – dairy microbiology (microflora of raw milk, processed milk, spoilage and defects, fermented milk and microbiological standards of milk, milk products ) – clinical microbiology (common pathogens, protocol for specimen collection, handling, transportation, processing, laboratory safety and infection control.) – applications of microbes in agriculture – bioinoculants – biofertilizer (types, mass production and quality control).

### **TEXT BOOKS**

1. Dubey, R. C. and Maheswari, D. K. 2013. A Textbook of Microbiology, S. Chand & Comp. ISBN 81-219-2620-3
2. Pelczar, H.J. E.C.S. Chan and N.R. Kreig. 1996. Microbiology concepts and applications. McGraw Hill Inc. ISBN 0-07-049234-4

### **REFERENCE BOOKS**

1. Atlas, M R. 1997. Principles of Microbiology. Wm. C. Brown Publishers. ISBN 0-8151-0889-3
2. Hull, R. 2004. Plant Virology. 4<sup>th</sup> Edn. Academic Press., ISBN 0-12-361160-1
3. Madigan M.T. and Martinko, J. M. 2006. Biology of Microorganisms, 11<sup>th</sup> ed., Pearson Prentice. 9780132017848 and 0132017849
4. Perry, J. J. and Stanley, J. T. 1997. Microbiology Dynamics and Diversity. Saunders College Publishing. ISBN 0-03-053893-9
5. Prescott, M. J., Harley, J. P. and Klein, D. A. 2008. Microbiology, 7<sup>th</sup> ed. WCB McGraw Hill. ISBN 978 007-126 727 4
6. Stanier, R.Y. 1987. General Microbiology. 5<sup>th</sup> Ed. McMillan Education Ltd. ISBN 0-333-41768-2

7. Talaro, K. P. and Talaro, A. 2002. Foundations in Microbiology. McGraw Hill Publ. ISBN 0-07-232042-7

**PGB 4425 PLANT DIVERSITY AND MICROBIOLOGY LAB 6Hr /4Cr**  
**PLANT DIVERSITY**

**PREAMBLE:** Students will explore the enormous variation in the organization of internal and external morphology encountered in cryptogamic plants. The complexity of these features they will unravel in the light of lines of evolution. They will appreciate the interrelationship among them.

**I. ALGAE:** Taxonomy, thallus organization and reproductive structures of the following taxa:

1. **Chlorophyta** – *Chlamydomonas, Volvox, Ulothrix, Oedogonium, Cladophora, Spirogyra, Fritchiella, Coleochaete, Chaetomorpha, Caulerpa, Chara.*

2. **Phaeophyta** – *Dictyota, Padina and Sargassum*

3. **Rhodophyta** – *Batrochospermum, Gracilaria, Polysiphonia*

4. **Sea weeds-** Collection and the identification of macro algae and agarophytes from coastal lines

**II. BRYOPHYTES:** Study and the evolution of the thallus organization of the sporophytic and gametophytic structures of following taxa:

5. **Marchantiales** – *Riccia, Targionia, Marchantia* **Jungermanniales**

6. **Anthoceratales** – *Porella, Anthoceros* **Bryopsida** – *Sphagnum, Funaria* and *Polytrichum*

**III. Pteridophytes:** Study and the evaluation of the following taxa:

7. **Psilopsida** – *Psilotum*, **Lycopsidea and Sphenopsida** – *Lycopodium, Selaginella, Isoetes, Equisetum*

8. **Pteropsida and Leptosporangiate ferns** - *Marsilea, Salvinia, Azolla, Adiantum, Gleichenia and Pteridium.*

**IV. Gymnosperms:** Morphology and anatomy of vegetative and reproductive structures of the following types

09. **Cycadopsida** : *Cycas, Zamia*

10. **Coniferopsida** : *Pinus, Cupressus, Podocarpus, Araucaria.*

11. **Gentopsida:** *Gnetum*

12. **Fossil Pteridophytes and Gymnosperms** - Fossil cycads (*Lyginopteris oldhamia* Stem TS (*Lyginodendron*), *Lyginopteris* male (*Crassothea*); *Lyginopteris* rachis (*Rachiopteris aspera*); *Lyginopteris* pinnae (*Sphenopteris*), *Botryopteris* root, sporangia; petiole (*Botryopteris ramosa*), TS of stem (*Botryopteris cylindrica*). *Lepidodendron* -Stem (leaf base), periderm (*Stigmara*); Medullosa.

**V. Field Visit:** Field trips to the Eastern and Western Ghats to study plants in their natural habitats.

**REFERENCE BOOKS**

1. Bold, H. C. & Wynne, M. J. 1985. Introduction to the Algae: Structure and Reproduction. 2nd Edition. Prentice Hall. Englewood Cliffs, New Jersey. ISBN : 9780134777467

2. Cavers, F. 1971. The interrelationship of bryophytes. Dawsons Pallwall. ISBN -0-521-66794-1
3. Fristch, F. E. 1945. The structure and reproduction of the algae. Vikas publishing Co. ISBN: 0-521-77051-3.
4. Kumar, H.D. 1988. Introductory Phycology. East West press. ISBN: 81- 859- 3896-2.
5. Morris, I. 1971. An introduction to Algae. Hutchinson University Library. ISBN: 0-090-80713-8
6. Rashid, A. 1998. An introduction to Bryophyta. Vikas publishing Co ISBN: 81-259-0569-
7. Rashid, A. 1982. An introduction to Pteridophyta. Vikas publishing Co. (repr.ed). ISBN: 81- 259-0709-2
8. Sporne, K. R. 1965. The morphology of gymnosperms: The structure and evolution of primitive seed plants. B.I.publications Pvt.Ltd. ISBN 81 7225 0398.

### **MICROBIOLOGY**

**PREAMBLE:** Students will get hands on training in basic microbial culture technique. They will be exposed to the standard methods of microbial load analysis in environmental samples, staining techniques and growth studies. Students will be able to know about the basic aspects of isolation, characterisation of fungi and diversity of macrofungi. Methods involved in screening microbes for commercial enzymes production. Experiments on antagonistic studies will help them to screen chemicals and microbes to be used in microbial control strategies.

1. Principles of Microscopy – microbial photographs.
2. Preparation of culture media, sterilization - moist heat – dry heat- radiation-filtration.
3. Pour plate- spread plate, streak plate-serial dilution – hanging drop.
4. Microbial examination of different habitats – CFU, MPN, colony characterization.
5. Staining techniques - Smear preparation, Gram staining, endospore staining, capsular staining and fungal staining.
6. Microbial enzyme screening: amylase, protease, lipase, cellulase.
7. Growth studies: Growth curve – heamocytometry and turbidometry
8. Actinomycetes – isolation and characterization
9. Fungal endophyte study – isolation technique.
10. Type study - *Mucor*, *Rhizopus*, *Pilobolus* and *Aspergillus*
11. Macrofungal fruiting bodies - diversity
12. Disease symptoms and assessment methods - Paddy blast scale.
13. Evaluation of fungicide: Slide germination technique and inhibition zone technique
14. Biological control – Antagonistic property.
15. Visit to microbiological lab/ microbe-based industry.

### **REFERENCE BOOKS**

1. Cappuccino, J. G. and N. Sherman. 2003. Microbiology – A Laboratory Manual. Pierson Education. ISBN 81-2970265
2. Gunasekaran, P. 2000. Laboratory Manual in microbiology. ISBN 81-224- 0783-8

3. Anonymous 1983. Field problems of tropical rice. International Rice Research Institute, Philippines. ISBN 971-194-080-8



**CELL BIOLOGY AND GENETICS****PGB 4227****3Hr / 2Cr**

**PREAMBLE:** This course unravels the principles of heredity and variations among living organisms that obeys the principles of Mendel and post Mendelian concepts. Topics to be discussed include allelic and gene interaction, polygenic inheritance, sex inheritance, linkage and crossing over. The students will learn about gene maps to locate the loci of genes, its aberration and influence on human traits. Students will also be introduced about the structure and components of cell, its organelles and functions. Various modes of cell division and special emphasis on chromosome and DNA will be dealt.

**OBJECTIVE:**

1. to gain analytical and problem solving skills related to genetics.
2. to learn the basics of cell and its organelles, that will be a platform for learning molecular biology of cell.
3. to understand holistic picture of life cycle pattern of a cell

**UNIT 1: Cell architecture:** Concept of Cell – ultrastructure and organization of plasma membrane – cell wall – cytoskeleton nucleus – nucleolus – chromosome – chloroplasts, mitochondria – lysosome – peroxisomes – glyoxysomes – centriole – flagellum – cilium and vacuoles – cell cycle and cell division.

**UNIT 2: Concepts of Heredity:** Pre-Mendelian and Mendelian genetics – classical experiments in plants – phenotype and genotype variations – allele and gene interactions – application of statistics in genetics – laws of Mendel – Mendel-Fisher Controversy.

**UNIT 3: Post Mendelian Era:** Case study for sex determination – linkage and crossing over – gene Maps (*Neurospora*, *Yeast*, *Caenorhabditis elegans*, *Drosophila melanogaster* and *Homo sapiens*) – recombination – homologous and non-homologous recombination including transposition – evolution of sex chromosome.

**UNIT 4: Structural and numerical alterations of chromosomes:** Mutations (types, causes and detection) – lethal, conditional, biochemical loss and gain of function – insertional mutagenesis – deletion – duplication – inversion – translocation – polyploidy and ploidy level

**UNIT 5: Human Genetics :** Chromosomal aberrations – pedigree analysis – lod score for linkage testing – karyotyping – polygenic inheritance – heritability and its measurements.

**TEXT BOOKS**

1. Gerald Karp. 2013. Cell Biology. 7<sup>th</sup> edition. John Wiley & Sons. ISBN:1118318749
2. Sinnot, E. W. 1991. Principles of genetics. 3<sup>rd</sup> edition. McGraw Hill Inc. ISBN: 0 07099 4137.
3. Bruce, A., Bray, A., Karen, H., Alexander, J., Julia, L., Martin. R., Keith, R., and Peter W. 2014. Essential Cell Biology 4<sup>th</sup> edition. Garland Science& Taylor and Francis Group. ISBN:978 0 8153 4454

**REFERENCE BOOKS**

1. Gardner E. J., Simmons M. J., Snustard, D P. 2006. Principles of Genetics. John Wiley & sons Inc. ISBN:8126510439
2. Karp, G., Janet I., and Marshall, W. 2015. Cell and Molecular Biology, Binder Ready Version: Concepts and Experiments. John Wiley & Sons. ISBN:1118886143.
3. Klug W S., Cummins, M., Spencer C. A., and Palladino. M.A. 2016. Concepts of genetics. Pearson Education India. ISBN:1 292 077 263
4. Russel P J. 2002. Essential genetics. 2<sup>nd</sup> ed. Blackwell Scientific Publishers. ISBN:0 80534697 X
5. Stansfield W D. 1991. Theory and problems of genetics. 3<sup>rd</sup> edition. McGraw Hill Inc. ISBN:070060877

**ENVIRONMENTAL BIOLOGY****PGB 4229****3Hr/ 2 Cr**

**PREAMBLE:** This course imparts knowledge on scientific understanding of environment structure, components and its dynamics in maintaining its equilibrium. It helps the students to be aware of the fact that how human activities impact the ecological equilibrium and strategies employed by the world community to conserve nature for better future.

**OBJECTIVES:**

1. to know the principles of individual organisms interacting among themselves and the environment
2. to explore the diverse habitat of the plants and specialization of the internal and external morphology to suit that purpose

**UNIT I: Elements of environment:** Components of environment – Liebig’s and Shelford’s law of limiting factors (Temperature, light and salinity) – salient features (lithosphere, atmosphere, hydrosphere and biosphere.)

**UNIT II: Biocoenology:** Structure, Types (Pond, marine, forest and detritus ecosystem) – ecological pyramids – food chain – food web – ecological niches – energy flow – types of productivity and their measurement – biogeochemical cycles - carbon sequestration - cybernetics of ecosystem.

**UNIT III: Community level Interaction:** Physiognomy, classification of community (Clements), concept of climax community – ecotone – edge effect – ecospecies – ecological amplitude – plant succession (causes and process of hydrosere, xerosere) – allopatric and sympatric speciation –ecological barriers.

**UNIT IV: Population Ecology:** Group attributes (natality, mortality, biotic potential, age distribution, gene pool) – growth dynamics (growth curves, survivorship curves, carrying capacity, r and k selection) – population cycles (fluctuations and equilibrium) – population regulation (density dependent and density independent factors)

**UNIT V: Human and Environment:** Anthropogenic impact on environments – aquatic (eutrophication, pesticide pollution, bioaccumulation, biomagnifications) – terrestrial (deforestation, desertification, habitat fragmentation, solid waste disposal, pacific gyres) –

atmosphere (ozone depletion and global climate change) environment – conservation strategies (Rio earth summit, Kyoto protocol, WWF, IUCN, Red data book, *ex-situ* and *in-situ* conservation of biodiversity).

### **TEXT BOOKS**

1. Kumar H,D.,( 1992), Modern concepts of Ecology, Vikas Pub. House Pvt. Ltd., New Delhi.
2. Sharma, P. D. 2017. Ecology and Environment. Rastogi Publications ISBN: 9789350781227.
3. Subramanyam, N.S., Sambamurty, A.V.S.S. 2000. Ecology , Narosa Pub. ISBN- 817319289-8.
4. Tansley ( 2003) , An introduction to Plant Ecology, Discovery Pub. House , New Delhi. ISBN -81-7141-203-3
5. Verma, V. ( 2011) Plant Ecology, Ane Books Pvt. Ltd., New Delhi. ISBN- 978-93-8061-800-5

### **REFERENCE BOOKS**

1. Kormondy,E.J. 2004. Concepts of Ecology , 4<sup>th</sup> Edi., Prentice –Hall of India Pvt. Ltd., New Delhi. ISBN- 81-203-1148-5
2. Odum, E P. 1970. Basic Ecology . Holts –Saunder Edition, CBS college Publizing, Japan . ISBN- 4-8337-0080-8
3. Subramanyam, N.S., Sambamurty, A.V.S.S. ( 2000) Ecology , Narosa Pub. ISBN- 81-7319289-8.

## **CAMPUS ECOLOGY**

**PGB 4331**

**4 Hr / 3 Cr**

**PREAMBLE:** This course stresses the importance of ecological knowledge to preserve and protect the nature and its elements *per se* in the campus. Awareness of our own ecosystem alone can give an insight towards the conservation of our own environment. The present course aimed at giving quality education on the basics of ecosystem, in order to give a clean atmosphere within the campus. Uniqueness of the flora and fauna in the campus will tickle the young mind to broaden their vision towards the biodiversity of the campus. After the completion of the course the students will be able to understand, appreciate and conserve the nature.

### **OBJECTIVES:**

1. to make the students understand and appreciate the ambience of the campus
2. to make the students appreciate the physical climate of the campus
3. to feel the diversity of the campus
4. to study the ecological diversity of the campus using simple methods

**UNIT I: Understanding the campus:** Origin and history – departments – etymology – building designs – architecture – various facilities – organizational set up – satellite campus – origin and history – beneficiaries.

**UNIT II: Biodiversity:** flora and fauna – seasonal variations – exotic plants and weeds – horticultural species – arboretum – species of birds and animals – importance of flora and fauna

**UNIT III: Ecoclimate:** Serenity of the campus – ecological factors – rainfall – temperature – altitude – impact of plants – campus as an ecosystem – litter fall – rain water harvesting – water crisis and conservation.

**UNIT IV: Waste regulation:** waste disposal – litter vs solid waste – basics of solid waste management – pollution (air, water and environment) – ecological ethics – importance of diversity – atmospheric cleanliness – future scope.

**UNIT V: Eco-watching:** Tree cover – quadrat analysis (density, abundance and frequency) – basics of bird watching – tree identification – unique trees and animals – litter drop method – basics of aerobiology.

### TEXT BOOKS

1. Anonymous, 2016. Green Audit Report. The American College, Madurai.
2. Odum, E. & Barrett G.W. 2005. Fundamentals of ecology. Cengage Learning India Private Limited ISBN 8131500209, 9788131500200
3. Sharma, P. D. 2017. Ecology and Environment. Rastogi Publications ISBN: 9789350781227.

### REFERENCE BOOKS

1. Anonymous 2005. The American college Commemorative publication SCILET
2. Bor N.L. & Raizada M.B. 2000 Some Beautiful Indian Climbers and Shrubs, Bombay Natural History Society. Bombay
3. McCann,C. 1966. 100 Beautiful trees of India – A descriptive and pictorial handbook. D.B.Taraporevala Sons & Co Private Ltd, Bombay.
4. Sahni K C. 1998. The Book of Indian Trees. Bombay Natural History Society. Bombay. ISBN – 13: 978 – 0195645897
5. Santapau, H. 1966. Common trees, India land and the people, National book Trust India New Delhi. ISBN: 81 – 237 – 0288 – 4

## PLANT BASED ENTERPRISES

PGB4331

4Hr / 3 Cr

**PREAMBLE:** This course will survey the overall business potentiality of plants and practical aspects of food fermentation in regard to beer, wine, and cheese/dairy. Focus will be on the processes of converting source material to finished products. Students will gain a fundamental understanding of theory and technology involved in it.

### OBJECTIVES:

1. to enable students to understand trade based on plant produce.
2. to sensitize the students on the use of organic products.
3. to facilitate the students to use microbes and mushrooms for commercial exploration

**UNIT I: Plant Trade:** Opportunity identification, positioning as an entrepreneur – building and presenting a business plan –funding and entrepreneurial finance – marketing strategies – talent acquisition – management – practical insights into challenges – trade license and registration marks – sources of finance – selection of site and factory construction

**UNIT II: Fresh and Dry Plant Market:** Nursery – cut flowers – raw drugs – natural dyes – food and food supplements – herbs.

**Unit III: Processed Products:** Fermented food products – milk and milk products – alcoholic fermentations – yeast fermentations – jam – jelly – squash – patisserie.

**Unit IV: Farm Supplements:** Bio-fertilizers – microbes as biofertilizers – green manures – mass cultivation of *Azolla*, *Rhizobium* and *Spirulina* – bioconversion of organic wastes – composting processes (vermi, home composting)

**UNIT V: Mushroom Technology:** Identification – characterization – collection – edible and poisonous – nutritional and medicinal value – formulations of fruiting substrates, spawning and culture techniques – protocols for cultivation (bag, tray, column and log culture – indoor and outdoor cultivation) – harvesting, storing, packing – marketing strategies.

#### **TEXT BOOKS**

1. Bahl, N. 2000. Hand book on mushroom cultivation. 4th Ed. Oxford & IBH Publishing Co. New Delhi. ISBN: 8120413997
2. Biswas, S, Datta, M and Nagachan, S.V. 2012. Mushrooms- A manual for cultivation. PHI Learning Private Limited, New Delhi. ISBN: 978-8120344945
3. Krishnamoorthy, 1999. Hand book of mushroom cultivation. TNAU Publications, Coimbatore, Tamil Nadu, India.
4. SubbaRao, N. S., 1988, Biofertilizers in agriculture. Oxford & IBH Publishing Co., New Delhi. ISBN: 9789061914051
5. SubbaRao, N. S., 1995. Soil microorganisms and Plant Growth. Oxford & IBH Publishing Co., New Delhi. ISBN: 1886106185
6. SubbaRao, N. S., 1993. Biofertilizers in agriculture and forestry. India Book House Ltd. New Delhi. ISBN-13: 978-1881570295

#### **REFERENCE BOOKS**

1. Chang, T.S. and Hayes, W.A. 1978. The biology and cultivation of edible mushrooms. Academic Press, New York. ISBN: 9781483271149
2. Nair, M.C., Gokulapalan, C. and L. Das, 1997. Topics on mushroom cultivation. Scientific Publishers, Jodhpur, India.

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**PLANT SYSTEMATICS****PGB 4522****7Hr / 5Cr**

**PREAMBLE:** The present course is aimed at giving a holistic account on the nuances of flowering plants such as history, classification and the relationship with non flowering plants. Nomenclature of higher plants is another wing of plant systematics which ought to be given importance. Teaching herbarium techniques on hand, might give the students an insight regarding the study of plant specimens and appreciate the morphology of plants better. Alternative methods of classification of plants will make the students see beyond microscope to the digital world.

**OBJECTIVES:**

1. to explore the diversity of angiosperms
2. to understand and appreciate the evolutionary trend in the plant world.
3. to inculcate knowledge on the rules and regulations of ICN
4. to understand the modern gadgets in plant systematic
5. to learn about the use of modern gadgets in plant systematics

**UNIT I: Ascent of angiosperms:** Origin of flowering plants – angiosperm phylogeny – co-evolution – basal angiosperms – ecological dominance of angiosperms – latitudinal and altitudinal zonation of floristic wealth, biomes – physiognomy and structures of forest in southern India – endemism and hotspots.

**UNIT II: History of classification:** Pre-Linnaean, Linnaean and post Linnaean period – contributions of Linnaeus, Bentham and Hooker, Engler and Prantle and Bessey – angiosperm phylogeny groups APG I, II, III, and IV – ethnobiological classification of plants.

**UNIT III: Herbarium taxonomy:** Objectives and functions – herbarium preparation – collection – pressing – poisoning and drying – identification – mounting – labeling – incorporation – herbarium ethics – maintenance – important herbaria – BSI (Botanical Survey of India), and TBGRI (Tropical Botanical Garden and Research Institute) Rapinat herbarium (RAPINAT) – Kew Garden (KEW).

**UNIT IV: International Code of Nomenclature:** History of different codes – botanical congress – ICBN to ICN (Melbourne code 2010), IAAT (Taxon), IAPT (Rheede) – principles of ICN – taxonomic hierarchy – active principles (priority of publication, typification, effective publication) valid names, rejection of names, author citation – botanical naming (polynomial, trinomial and binomial).

**UNIT V: Trends in classification:** Cladistics and biosystematics (chemo, sero and molecular taxonomy) – numerical taxonomy – Kubitzski system – use of computers – automated pattern recognizing systems – matrices, online data bases: IPNI (International Plant Names Index) – Index Kewensis and The Plant List.

**TEXT BOOKS**

1. Bhattacharyya, B. 2005. Systematic Botany, Narosa Pub. House Pvt. Ltd. ISBN 81-7319-542-0
2. Krishnamurthy, K.V. 2003. A text Book on Biodiversity (Principles and Practice), Science Publishers, USA. ISBN 1578083257.
3. Lawrence, G. H. M. 1964. Taxonomy of Vascular Plants. Oxford and IBH Publishers. ISBN 17-L5-5
4. Prathipalsingh, 2010. Introduction to biodiversity. Ane books Pvt. Ltd. New Delhi. ISBN 978-1-8052-185-0
5. Singh, G. 2007. Plant systematics theory and practices. Oxford and IBH Publishing Co. ISBN 81-204-1652-x
6. Sivarajan, V. V. 1999. Introduction to the principles of Plant Taxonomy. Oxford & IBH publishing co. ISBN: 81-204-0445-9.
7. Pandey, B.P. 2013. Taxonomy of Angiosperms, S. Chand Publishing, New Delhi. ISBN 9788121909327

**REFERENCE BOOKS**

1. Davis, P. H. & Heywood, V. H. 1972. Principles of Angiosperm taxonomy. Edinburgh, London, Publ. ISBN 0 8825 5129 8
2. Henry, A. N. and Chandrabose, M. 1979. An aid to the International Code of Botanical Nomenclature. Today and Tomorrow Publ. ISBN 8 1701 9094 0
3. Jain, S. K. and Rao R. R. 1993. A handbook of field and herbarium methods. Today and Tomorrow Publ. ISBN 8 1701 9130 0
4. Jones Jr. SB and Luchsinger AE 1987. Plant systematics. McGraw- Hill Book Company. ISBN 0-07-032796-3.
5. Stace, C.A. 1989. Plant taxonomy and biosystematics, 2<sup>nd</sup> Ed. Edward Arnold, ISBN 0-7131-2955-7
6. Simpson, M. G. 2010. Plant Systematics, 2<sup>nd</sup> Ed. Academic press ISBN 978-0-12-374380-0.

**BIOMOLECULES****PGB4524****7 Hr / 5 Cr**

**PREAMBLE:** The course is designed to give intricate details on the structural classification of macro and micromolecules. The flow of carbon and nitrogen in the biological system shall be traced in the process of making and breaking primary and secondary metabolites and hormones. The secondary metabolism in plants and the biosynthesis of secondary metabolites would be discussed in detail.

**OBJECTIVES :**

1. To provide the basics of particles and the principles of their interactions.
2. To enable the students to appreciate integration of various metabolic pathways

**UNIT I: Molecules of life:** Atoms, molecules, bonds, functional groups, periodic table, nomenclature, units of measurement – physical constants – concepts of pH and buffers – simple inorganic molecules to macromolecules, reducing power, energy rich molecules – basic design of metabolism.

**UNIT II: Carbohydrates:** Configurational and conformational aspects of carbohydrates – structure, properties and importance of structural (cellulose and chitin) and storage

polysaccharides (starch and glycogen) – glycolysis – pentose phosphate pathway – Krebs cycle.

**UNIT III: Amino acids, Proteins and Enzymes:** Structure and classification, physical, chemical and optical properties of amino acid – peptides – Ramachandran Plot – porphyrin biosynthesis – amino acids metabolism (synthesis and deamination) – enzyme catalysis – substrate specificity – kinetics and allosterism – coenzymes.

**UNIT IV: Lipids & Nucleic acids:** Chemical nature of lipids (fatty acids, triacylglycerol, phospholipids, waxes, spingolipids) – topology of biological membrane – fluid mosaic model – biosynthesis of membrane lipids – lipid metabolism (biosynthesis, oxidation and energy budget) – chemical structure and base composition – biosynthesis and break down of nucleotides – metabolic regulation.

**UNIT V: Micromolecules:** Secondary metabolites – terpenoids (synthesis of IPP) – alkaloids and flavonoids – vitamins

#### **TEXT BOOKS**

1. Voet, D, J. G. Voet and Pratt, C. W. 2008, Principles of Biochemistry, John Willey and Sons, Publ. ISBN 13-978-0470-23396-2
2. Devlin, T.M. 2002, Biochemistry, 5<sup>th</sup> Edn. Wiley-Liss Publ. ISBN 0-471-411361.

#### **REFERENCE BOOKS**

1. Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P., 2002. Molecular Biology of the Cell, 4<sup>th</sup> Edn. Garland Science Publ. ISBN 0-8153-4072-9.
2. Berg, J. M., Tymoczko, J. L. and Stryer L. 2007. Biochemistry, 6<sup>th</sup> Edn, W.H. Freeman and Company, ISBN 0-7167-8724-4
3. Dey, P. M. and Harborne, J. B. 2000. Plant Biochemistry. Harcourt Asia, Pvt. Ltd. Singapore. ISBN 0-12-214674-3 (HB)
4. Gurr, M.I., Harwood, J. L. and Frayn, K. N. 2002 Lipid Biochemistry 5<sup>th</sup> Edn. Freeman Publ. ISBN 1-4039-4876-3
5. Mathews, C.K., Van Holde, K. E. and Ahern, K. G., 2005, Biochemistry, Pearson Ed. Publ. ISBN 81-297-0215-0
6. Nelson, D. L. and Cox, M. M. 2008. Principles of Biochemistry 5<sup>th</sup> Ed., CBS Publ. ISBN 1 4292 1241 1.
7. Murray, R. K., D. K. Granner, P. A. Mayes, and V.W. Rodwell, 2000. Harpers Biochemistry, 25<sup>th</sup> Ed., McGraw Hills Pub. ISBN 0 8385 3684 0.



**PLANT SYSTEMATICS**

**PREAMBLE:** This course focuses on exploring the diversity of the Angiosperms. The nuances of this course will help students to understand and appreciate the evolutionary trend in the plant world. Hands on experience will envision the students to understand the plant morphology of vegetative and reproductive parts. Students will be trained to botanically describe and identify the species with the help of available local floras. Field trips will be arranged to study the plants in their natural habitat which will further enrich the young minds and direct them towards the conservation of the higher plant.

**OBJECTIVES:**

1. to explore the diversity of angiosperms
  2. to understand and appreciate the evolutionary trend in the plant world.
  3. Hands on experience to study plant morphology and vegetative parts
  4. To botanically describe and identify the species with the help of available local floras
  5. to study the plants in their natural habitat through field trips
- 
1. Morphology of flowering plants: General description and traits of taxonomic interest
  2. Herbarium preparation (Traditional methods).
  3. Phytography (describing plants with technical terms).
  4. Construction of dichotomous keys (indented and bracketed key)
  5. Identification of local plants using local floras
  6. Phenological study on select tree species in the campus.
  7. Characterisation of different forests in Southern India
  8. Analysis of plant characters - Polypetalae
  9. Analysis of plant characters - Gamopetalae
  10. Analysis of plant characters - Monochlamydae
  11. Analysis of plant characters - Monocots
  12. Computer databases in plant identification
  13. Field visit to at least three of the listed destinations -Alagar Hills, Kuttupatti, Karungalakudi, Kodaikanal, Coimbatore and Udagamandalam.

**REFERENCE BOOKS**

1. Gamble.J. S. 1954. The Flora of Presidency of Madras. Botanical Survey of India Calcutta. ISBN 8 1211 0452 1.
2. Jain, S. K. and Rao R. R. 1993. A handbook of field and herbarium methods. Today and Tomorrow Publ. ISBN 8 1701 9130 0
3. Lawrence, G.H.M. 1964. Taxonomy of vascular plants. Oxford and IBH publ. ISBN 0 0236 8190 X.
4. Matthew,K. M. 1995. An excursion flora of central Tamilnadu. Rapinat Herbarium. ISBN 8 1204 0940 X.

## BIOMOLECULES

**PREAMBLE:** This lab course is designed to train students to analyse some of the metabolic compounds from plants. This laboratory course offers opportunities to learn many analytical techniques. Training in various methods of extraction, purification, isolation and quantification of macro molecules is also provided.

1. Carbohydrates – Qualitative
2. Carbohydrates – Quantitative tests.
3. Protein - Qualitative and Quantitative tests.
4. Estimation of free fatty acids and saponification value.
5. Lipids – Separation of chloroplast lipids
6. Estimation of cholesterol.
7. Amino acids – Estimation of amino acids in biological samples.
8. Separation of amino acids by paper chromatography and Thin Layer Chromatography.
9. Protein separation by Polyacrylamide Gel-Electrophoresis.
10. Extraction and quantification of pigment (Lycopene & Curcumin).
11. Extraction and estimation of vitamins.
12. Extraction and estimation of phenolics

## REFERENCE BOOKS

1. Cooper, T. G. 1991. The Tools of Biochemistry, John Wiley and Sons, Publ. ISBN 0 4711 7116 6.
2. Harborne, 1998. Phytochemical methods, Chapman and Hall, Publ. ISBN 0 4125 7270 2.
3. Jeyaraman, J. 1988. Laboratory Manual in Biochemistry, New Age International Pub., Ltd. ISBN 0-85226-428-3
4. Plummer, D. T., 2003. An Introduction to Practical Biochemistry, 3<sup>rd</sup> Edn. Tata McGraw Hills Pub Company, ISBN 0-07-0994870
5. Sadasivam. S and A. Manickam. 2008. Biochemical methods for Agricultural sciences, 2<sup>nd</sup> edn., New Age International Pub. Ltd., ISBN 978-81-224-2140-8
6. Willson, K. and J. Walker. 1994. Practical Biochemistry, Cambridge University Press, ISBN 0 5217 9965 1.

## MYCOLOGY AND PATHOLOGY

**PGB4428**

**6Hr / 4Cr**

**PREAMBLE:** The course has been designed to give basic knowledge of fungi and plant pathology. The history and development in the field of plant pathology will be traced. The uniqueness of the fifth kingdom – fungi in terms of characteristics, growth pattern and reproduction will be discussed. Host pathogen interactions and stages in disease development will help to understand the pathogen, which in turn will facilitate the strategies of disease management. Etiology and management of important fungal, bacterial, viral and non parasitic diseases will be dealt.

**OBJECTIVES:**

1. to study about the plant diseases with special reference to Southern India.
2. to understand the unique features of fungi as a separate kingdom
3. to understand the diseases, symptoms, causal organisms – etiology of the diseases and control measures.

**UNIT I: Fundamentals of Plant Diseases:** History – classification – diagnosis and identification – Koch’s postulates – gene for gene hypothesis – disease tetrahedron – pathogenesis (disease initiation, development and establishment) – parasitism (role of enzymes, toxins and growth regulators.)

**UNIT II: Elements of mycology:** General characters – habitat – growth pattern – nutrition types – cell wall (structure, composition) – fungal classification upto class level (Alexopolous and Mims) – modes of reproduction – parasexual cycle – fruiting bodies – fungal interactions (parasitic and symbiotic) – importance of VAM fungi – primary and secondary metabolites – commercial fungal enzymes.

**UNIT III: Disease development and defense mechanisms:** Disease development and influence of factors – inoculum and inoculum potential – hypersensitivity – pathogenic impacts on host physiology – host defense mechanisms - innate and induced – morphological and anatomical defenses – biochemical (phenols, phenolic glycosides, phytoalexins) – Pathogenesis Related Proteins (PR) – Systemic acquired and Induced systemic resistance (SAR and ISR).

**UNIT IV: Diseases and Disease Cycle:** Study of the following diseases with reference to their incidents – symptom manifestation and control measures – fungal (rust of wheat, blast of rice, Tikka of groundnut, Red rot of Sugar cane) – bacterial (Bacterial blight, Citrus canker) – mycoplasmal (Little leaf of brinjal, *phyllody* of sesamum – viral (Yellow vein mosaic disease) – nematode (Root knot of potato) – non- parasitic diseases (*Cuscuta*, *Striga*).

**UNIT V: Disease management:** Epidemiology – disease forecasting – concepts on prophylaxis, exclusion and legislation – plant quarantine principles – eradication (crop rotation, field sanitation, elimination of alternate hosts, soil treatment and seed treatments.) –management strategies (chemical and biological) – microbial antagonists [(bacterial, fungal and viral) mode of action, mass production and field application)] – engineered resistance against fungal, viral and bacterial pathogens – Integrated disease management (IDM).

### **TEXT BOOKS**

1. Alexopoulos CG, Mims CW and Blackwell M. 1996. Introductory Mycology, John Wiley. ISBN 9814-12-612-8
2. Singh RS 2005. Plant Diseases. Oxford and IBH publishing. ISBN 8120416589
3. Mehrotra RS and Aggarwal.A. 2003. Plant Pathology. Tata McGraw Hill Pub. ISBN 0070473994

**REFERENCE BOOKS**

1. Agrios G. N. 2006. Plant Pathology. Elsevier Publication, Academic Press. ISBN-13: 9788131206393
2. Biswas S. B. and Biswas A. 1996. An Introduction to Viruses. 4<sup>th</sup> Edn. Vikas Publishing House. ISBN 0706982207
3. Chaube H. S. and Pundhir V. S. 2005. Crop diseases and their management. Prentice Hall of India. ISBN 8120326741
4. Deacon J. W. 2006. Fungal Biology. Blackwell Scientific Publ. Oxford. ISBN 14051 6953 0
5. Dickinson, M. 2003. Molecular Plant Pathology. BIOS scientific Publishers, ISBN 0-203503309
6. Mukerji, K. G. and Bhasin, J. 1972. Plant diseases of India – A source book. Tata McGraw Hill, New Delhi.
7. Vidhyasekaran, P. 2008. Fungal Pathogenesis in Plants and Crops: Molecular biology and host defense mechanisms. CRC Press. ISBN 13: 9780849398674

**PLANTS AND PEOPLE****PGB 4330****4 Hr / 3 Cr**

**PREAMBLE:** The objective of the course is to highlight the importance of plants in our different facets of life. Plants have been part of human civilization from the pre-historic period. The contents are divided to give an overview of plants in different aspects of human being. References of plants in scriptures and Sangam literature will be cited and relevance at the context will be discussed. Cultures are identified based on their food and dressing habits, an overview of history of Indian cuisine will be traced specially with references to south India. Plants always served us as food and medicine the important plants used in the Indian system of medical practitioners also included.

**OBJECTIVES:**

1. to understand and track the history of civilization based on the plants as a focal point of reference
2. to understand the scientific details of the plants referred in the scriptures
3. to appreciate the importance of plants used as food, medicine and perfumes
4. to understand the rich heritage of plant-based medicines in India

**Unit 1. Prehistorical evidences:** Unravelling ancient civilization using plant based prehistoric evidences – cotton fabrics and dyes of prehistoric period – plants in ancient funerary rituals – pollen and paleoclimates

**Unit 2. Scriptures:** Forest and trees associated with Lord Buddha – plants in Bible and Quran – temple trees and sacred plants of India – sacred oil and fragrances used across the religious barriers.

**Unit 3. Plants in literature:** Cultural and biological diversity – Sangam landscape – Thinaï concept – early livelihood strategies in Sangam literature – western literature.

**Unit 4. History of Indian cuisine:** Social history of food – dietary beliefs and cooking patterns of Indians – minor millets, spices and sweeteners of Indian origin.

**Unit 5. Indian System of Medicine:** Indian system of medicine – Siddha, Ayurveda and Unani – revitalization of indigenous medicinal practices and knowledge in south India.

**TEXT BOOKS**

1. Haberman, D. L. 2013. People Trees – Worship of trees in North India Oxford University Press. ISBN-13: 978-0199929160
2. Ahluwalia, S. 2017. Holy Herbs : Modern Connections to Ancient Plants, Fingerprint Publishers. ISBN 9788175994461

**REFERENCE BOOKS**

1. Achaya, K. T. 1998. Indian food: A Historical Companion, Oxford University Press, ISBN 0195644166, 9780195644166
2. Albala, K. 2013. Food: A cultural culinary history the great courses ISBN 10: 1598039474 ISBN 13: 9781598039474
3. Schmithausen, L. 2009. Plants in Early Buddhism and the Far Eastern idea of the Buddha-Nature of Grasses and Trees Published by Lumbini International Research Institute. ISBN 10: 9937217164, ISBN 13: 9789937217163
4. Nanditha, K. and Amirthalingam., 2014. Sacred plants of India, Penguin Books Limited ISBN 10: 0143066269
5. சீனிவாசன், கு . சங்கஇலக்கிய தாவரங்கள், தமிழ் பல்கலைக்கழகம்

**TRENDS IN AGRICULTURE**

**PGB 4330**

**4Hr / 3Cr**

**PREAMBLE:** This course is designed for the non major students and stress would be given on the history, traditional agricultural practices and the cropping pattern practiced for generations. The period in which the production of food materials was surplus and extensive cultivation was practiced in order to cope up with the famine in india. Modern agricultural techniques have also been discussed to have a better understanding about the agricultural practices in India

**OBJECTIVES:**

1. to appreciate and relish the ancient agricultural talents
2. to have a better understanding about the agriculture
3. to know the traditional agricultural knowledge in our country
4. to assuage the ignorance from the young mind

**UNIT I History of agriculture:** Early civilization (Indus valley, Harappa, Mayan Inca, Egyptian, Chinese) – nomads, pastoralism, sedentism – river banks as cradle of civilization – domestication of plants – monoculture – Ganges delta farming – farming in southern India – Sangam literature – ancient crops.

**UNIT II Traditional practices:** Agronomy in India – irrigation methods (dam, kanmai/oorani, ayakattu, anicut, ponds, lakes, channel, well, check dams) – irrigation systems – catchment area – reservoirs – manuring (farm, cattle, green manure) – multicropping – crop rotation.

**UNIT III: Cropping pattern:** Weather based cropping (Kharif, rabi and zadi) – Basic soil types – soil map of southern India – soil and crop selection – top soil – soil erosion and conservation (types and methods)

**UNIT IV: Green revolution:** History (famines in India) – government policies – construction of reservoirs – extensive cultivation – introduction of exotic varieties – fertilizers and pesticide industries – high yielding varieties – rural banks and road – seed banks – wild relatives of cultivars – contributions of Indian Scientists – IRRI, IARI, ICAR and TNAU – ecological backlash.

**UNIT V: Modern practices in agriculture:** Mechanization (seeding, weeding, manuring, harvesting) – intensive cultivation – hybrids – water saving devices – rain water harvesting – biofertilizers – underutilized crops for food security – organic and vertical farming – hydroponics and aquaponics – scope for agriculture in space.

### **TEXT BOOKS**

1. Anonymous, 2011. Hand book of Agriculture, 6<sup>th</sup> ed. ICAR, New Delhi. ISBN 81-7164-050-8
2. Chandrasekaran, B., K. Annadurai, and E. Somasundaram, 2010. A textbook of agronomy, New Age International (P) Limited, Publishers, ISBN (13) : 978-81-224-2859-9

### **REFERENCE BOOKS**

1. Carson, R. 1962. Silent spring, Mariner Books. ISBN 0-618-24906-0
2. Toffler, A. 1980. The Third Wave, Bantam books, United States ISBN 0-517-32719-8 (hardcover), ISBN 0-553-24698-4 (paperback)
3. Raychaudhuri, S.P. and Roy, M., 1993. Agriculture in Ancient India: A Report, ICAR Publication, New Delhi.

**Postgraduate and Research Department of Zoology**  
**The American College, Madurai**  
**Proposed Curriculum for M.Sc. Zoology Program - 2018 Onwards**

SEM	S.No.	Course Code	Course Title	Hours	Credits	Marks
<b>I</b>	1.	PGZ 4431	Animal Diversity	5	4	80
	2.	PGZ 4433	Biological Chemistry	5	4	80
	3.	PGZ 4335	Cell Biology	5	3	60
	4.	PGZ 4337	Know Your Body (CBCS)	4	3	60
	5.	PGZ 4439	Microbiology	5	4	80
	6.	PGZ 4341	Lab. in Cell Biol., Biol. Chem. & Microbiol.	6	3	60
<b>Total</b>				<b>30</b>	<b>21</b>	<b>420</b>
<b>II</b>	7.	PGZ 4432	Animal Physiology	6	4	80
	8.	PGZ 4334	Biostatistics and Bioinformatics	4	3	60
	9.	PGZ 4436	Genetics	5	4	80
	10.	PGZ 4438	Molecular Biology	5	4	80
	11.	PGZ 4340	Poultry Science (CBCS)	4	3	60
	12.	PGZ 4342	Lab. in Anim. Physiol. & Mol. Biol.	6	3	60
<b>Total</b>				<b>30</b>	<b>21</b>	<b>420</b>
<b>III</b>	13.	PGZ 5531	Entomology	6	5	100
	14.	PGZ 5533	Evolution	6	5	100
	15.	PGZ 5535	Immunology	6	5	100
	16.	PGZ 5537	Methods in Biology	6	5	100
	17.	PGZ 5139	Lab. in Entomology	2	1	20
	18.	PGZ 5341	Lab. in Imm. & Meth. in Biol.	4	3	60
<b>Total</b>				<b>30</b>	<b>24</b>	<b>480</b>
<b>IV</b>	19.	PGZ 5532	Biotechnology	6	5	100
	20.	PGZ 5534	Developmental Biology	6	5	100
	21.	PGZ 5536	Environmental Biology	6	5	100
	22.	PGZ 4238	Lab. in Biotech. & Dev. Biol.	4	2	40
	23.	PGZ 5140	Lab. in Env. Biol.	2	1	20
	24.	PGZ 5642	Res. Project	6	6	120
<b>Total</b>				<b>30</b>	<b>24</b>	<b>480</b>
<b>Grand Total</b>				<b>120</b>	<b>90</b>	<b>1800</b>

This course aims at refreshing the fundamental aspects of core Zoology. It provides adequate facts which will enrich the knowledge in Zoology. It deals with broad outline classification of invertebrates and chordates. It also deals with minor phyla, living fossils, connecting links, missing links, Zoogeography and general topics such as parental care and migration of birds.

**Specific Learning Outcome:**

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

- understand the importance of taxonomy and levels of organization
  - appreciate the importance of living fossils, connecting and missing links
  - understand the significance of minor phyla
  - comprehend the natural history of India
1. **Levels of structural organization:** Concepts of species, biological, binomial and trinomial nomenclature. Kinds of classification - five kingdoms, types of taxonomy - morphology, numerical, molecular and phyletic lineages. Hierarchical organization of animal complexity - unicellular, colonial & multicellular forms, coelom, symmetry, organs and systems.
  2. **Methods of Biosystematics:** Classical and modern methods - typological, phenetics, evolutionary, phylogenetic and cladistics. Molecular taxonomy - Phylocode, tree of life & bar-coding of life, Serotaxonomy, Integrated Taxonomic Information System (ITIS), biodiversity informatics and websites related to taxonomy. Importance and applications of systematics in biology.
  3. **Outline classification and Minor Phyla:** Outline classification of Invertebrates (up to class level) and chordates (up to order level) - general characters, examples. Comparative account of digestive, respiratory, exoskeletal, skeletal, circulatory, nervous and urinogenital systems of chordates. Minor phyla - Ctenophora, Ectoprocta, Endoprocta and Rotifera.
  4. **Living Fossils, Connecting and Missing Link:** Geological time scale - Living fossil - *Limulus*, *Latimeria*, *Callorhinchus* (Elephant shark), *Sphenodon*, and *Ctenophora*. Connecting links - *Peripatus*, *Neoplina*, *Protopterus*, *Chimera*, *Balanoglossus* and *Orinhorhyncus*. Missing link - *Archeopteryx*, *Ichthyostega*, and *Seymouria*.
  5. **Natural history of Indian subcontinent:** Zoogeography, major habitat types of the subcontinent, seasonality and phenology. Wildlife organizations - ICZN, WWF, ZSI



and BNHS. General topics - parental care in fishes & amphibia, migrations of fishes & birds.

### Textbook

Hickman CPJR, Roberts SL and Larson A (2001) Integrated Principles of Zoology, Eleventh edn, McGraw-Hill publishers, New York.

### References

1. Agarwal VK (2000) Invertebrate Zoology, First edn, S. Chand & Co Ltd, New Delhi.
2. Ayyar E (1993) Manual of Zoology, Vol. I - Invertebrata, S. Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai.
3. Jordan EL and Verma PS (2013) Invertebrate Zoology, S. Chand & Co Ltd, New Delhi.
4. Kotpal RL (2003) A Text book of Minor Phyla, Eleventh edn, Rastogi Publications, Meerut.
5. Kotpal RL (2014) Modern Textbook of Zoology: Vertebrates, Eleventh edn, Rastogi Publishers, Meerut.

### PGZ 4433

### Biological Chemistry

(5hr/w) (4cr)

Course on biological chemistry includes physical and chemical concepts in biology, composition, structure and functions of carbohydrates, proteins, lipids and vitamins. Enzymes & enzyme kinetics, metabolism of carbohydrates, proteins, lipids, and vitamins will be taught. It also includes biosynthesis and degradation of purines and pyrimidines

#### Specific Learning Outcome:

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

- appreciate the physical and chemical concepts in biology
- understand the chemistry & structure of biomolecules
- gain knowledge on enzyme kinetics & bioenergetics
- understand carbohydrate and vitamin metabolism
- appreciate amino acid, nucleic acid and lipid metabolism

1. **Physical and chemical concepts in biology:** Structure of atoms, molecules and chemical bonds. Biomolecule interaction - van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction and covalent bond. Principles of biophysical chemistry- pH, buffer, reaction kinetics, colligative properties.

- 2. Biomolecules:** Composition, structure, classification and function - Carbohydrates, lipids, proteins and vitamins. Conformation of proteins - Ramachandran plot, primary, secondary, tertiary & quaternary structures, domains, motif and folds.
- 3. Enzymes and bioenergetics:** Enzymes and enzyme kinetics - regulation of enzymatic activity - mechanism of enzyme catalysis - Michaelis-Menten equation - isozymes. Bioenergetics - thermodynamics, free energy, coupled reactions, group transfer and biological energy transducers.
- 4. Carbohydrate and vitamin metabolism:** Types of metabolism. Carbohydrate metabolism - glycolysis, TCA cycle, oxidative phosphorylation, Gluconeogenesis, glycogen metabolism - Glycogenesis and Glycogenolysis, HMP shunt, uronic acid pathway, Vitamin metabolism - vitamins A and C.
- 5. Amino acid, nucleic acid and lipid metabolism:** Amino acid metabolism - Urea cycle. Nucleotides - Biosynthesis and degradation of purines and pyrimidines. Biosynthesis and  $\beta$ -oxidation of fatty acid, Ketone bodies, metabolism of Phospholipids, Glycolipids, Cholesterol and HDL.

### **Textbook**

Voet JG, Pratt CW and Voet D (2016) Fundamentals of Biochemistry: Life at the molecular level, Fifth edn, John Wiley & Sons, New York

### **References**

- Berg JM, Tymoczko L and Stryer L (2012) Biochemistry, Seventh edn, W.H. Freeman, New York.
- Murray RK, Granner DK and Rodwell VW (2006) Harper's Illustrated Biochemistry, Twenty Seventh edn, McGraw Hill Companies, Inc.
- Nelson DL and Cox MM (2013) Lehninger Principles of Biochemistry, Sixth edn, W.H. Freeman, New York.

PGZ 4335

Cell Biology

(5h/wk) (3cr)

This course enables the students to understand the properties of living cells related to cell organization and behaviour.

**Specific Learning Outcome:**

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

- understand the various cell organelles and their role in cell functioning
- appreciate the mechanism of cell signalling and communication
- describe the cell cycle and cell division mechanism

- 1. Cell membrane:** Structure of membrane models - lipid bilayer and membrane proteins - Diffusion, osmosis, ion channels and active transport - membrane pumps - mechanism of sorting and regulation of intra cellular transport - electrical properties of membrane - cell wall.
- 2. Cell signalling and cellular communication:** Cell surface receptors - signalling through G protein coupled receptors - signal transduction pathways - secondary messengers - regulation of signalling pathways - bacterial chemotaxis and quorum sensing. General principles of cell communication - desmosomes - cell adhesion and roles of different cell communication - adhesion molecules - gap junction - extra cellular matrix - integrins.
- 3. Ultrastructure and functions of cellular organelles:** Mitochondria - Golgi bodies - Lysosomes - Endoplasmic reticulum - Ribosomes - Plastids - Chloroplast - Vacuoles – Peroxisomes - Cytoskeleton.
- 4. Nucleus, chromosomes and organization of genes:** Nucleus - structure of chromatin and chromosomes - heterochromatin and euchromatin - unique and repetitive DNA - interrupted gene - gene families.
- 5. Cell division, cell cycle and cancer :** Mitosis and meiosis - their regulation - steps in cell cycle - regulation and control of cell cycle - oncogenes - tumour suppressor genes - cancer and cell cycle - metastasis - interaction of cancer cell with normal cell - apoptosis - therapeutic interventions of uncontrolled cell growth.

**Textbook**

De Robertis EDP and De Robertis EMF (2010) Cell and Molecular Biology, Eighth edn, BI Waverly Pvt. Ltd, New Delhi.

**References**

1. Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P (2002) Molecular Biology of the Cell, Third edn, Garland Science Publisher, New York.
2. Karp G (2010) Cell Biology, Sixth edn, John Wiley & Sons, New York.
3. Kleinsmith LJ and Kish VM (1995) Principles of Cell and Molecular Biology, Second edn, Harper Collins College Publishers, New York.

It is a comprehensive course that aims to give a basic understanding on the anatomical and physiological features of various organ systems like digestive, respiratory, circulatory, nervous, endocrine, excretory and reproductive systems in human beings. This course also deals with some areas in health and hygiene.

**Specific Learning Outcome:**

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

- the organization of human body
  - the functioning of various organs
  - the clinical biology of important diseases
1. **Nutrition, diet and digestive system:** Carbohydrates - Fats - Proteins - Caloric values of food - Obesity & BMI. Minerals - Vitamins - Deficiency disorders. Organs of digestive system - digestion and absorption.
  2. **Skeletal, muscular and nervous systems:** Bones - cartilage - ligaments - tendons - muscles - disorders. Nervous system - brain, sensory organs - skin, tongue, nose, eye and ear.
  3. **Respiratory and circulatory systems:** Lungs - respiration - heart - structure & functions - cardiac & respiratory disorders (myocardial infarction and tuberculosis). Blood - composition - blood groups - Rh factor - blood clotting - transfusion - blood Bank - heart.
  4. **Excretory and reproductive systems:** Kidney - structure and function - disorders. Male and female reproductive organs - hormones - IVF - Sexually transmitted diseases.
  5. **Health and Hygiene:** Environment and health - Sleep and sleep disorders - World awareness days on health - silent killer disorders - Nosocomial infections - Personal hygiene and occupational disorders - stress.

**Textbook**

Mader SS and Windelspecht M (2018) Human Biology, Fifteenth edn, McGraw-Hill Education, New York.

**References**

1. Hall JE (2015) Guyton and Hall textbook of medical physiology, Thirteenth edn, Saunders (Elsevier), Canada.
2. Taylor DJ, Green NPO and Stout SW (2005) Biological Science, R. Soper (ed.), Third edn, Cambridge University Press, UK.
3. Vander AJ, Sherman JH and Luciano DS (2001) Human Physiology: The Mechanism of Body Function, Eighth edn, McGraw Hill Inc. New Delhi.

PGZ 4439

Microbiology

(5h/wk) (4cr)

This course is designed to promote the interest of basic and applied areas of microbiology. It deals with detailed classification of bacteria, algae, fungi, protozoa and viruses. It imparts knowledge of microorganisms in industrial, food and agricultural microbiology. It emphasizes primary and secondary screening of microbes linked with fermentation industry. The course also deals with medically important microbes, diseases and control measures in terms of public health.

**Specific Learning Outcome:**

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

- understand the importance of microorganisms and their role in human welfare
- know the classifications of microorganisms and sterilization techniques
- appreciate the knowledge of microbiology in the areas of agriculture, industry and medical fields

- 1. Introduction, Microbial taxonomy and Microscopy:** Structure & function of bacterial and Archaeobacterial cells - Taxonomy ranks - techniques for determining microbial taxonomy - Phylogenetic trees - concept of microbial species - Bergey's classification of bacteria - classification of algae, fungi, protozoa and viruses. Components and working principles of microscope - light, phase contrast, electron and fluorescence microscope.
- 2. Microbial Physiology and Biochemistry:** Nutritional types - Growth curve - Culture media - Bacterial cell cycle - Measurement of microbial growth - Pattern of microbial death - Chemotaxis and endospore formation - Microbial metabolism - Oxidation-reduction reactions - Physical and chemical methods of sterilization.
- 3. Microbial Ecology:** Global climate changes - Assessing microbial diversity - Microbial community activity. Water as a microbial habitat - Marine and freshwater ecosystems - Coliform analysis. Soil as a microbial habitat - Plant-microbe associations - Nitrogen fixation - Mycorrhizae. Water purification and sanitary analysis - Sewage treatment and recycling of wastes.
- 4. Food and Industrial Microbiology:** Food spoilage, food poisoning and preservation - food borne diseases - detection of food borne pathogens. Microorganisms used in industry - Downstream processing - Production strains - Primary, secondary screening of microbes and scale up fermentations - Types of fermentors - raw materials. SCP and applications of microbial products in human welfare - Production of antibiotics (Penicillin, Streptomycin), vitamins, enzymes and vinegar.
- 5. Medical microbiology and Public health:** Human microbiome - Antimicrobial drugs and chemotherapy - Epidemiology - infectious diseases in human population - Nosocomial infections - Control of epidemics - Bioterrorism - Global health

considerations – Air borne, Zoonotic, Prion, direct, contact and opportunistic diseases and diagnosis. Causative agents, symptoms, transmission and control measures of tuberculosis, typhoid, Aspergillosis, malaria and AIDS.

**Textbook**

Willey JM, Sherwood LM and Woolverton CJ (2016) Prescott's Microbiology, Tenth edn, McGraw Hill International publication, New York.

**References**

1. Kapil A and Bhaskaran CS (2013) Ananthanarayan and Paniker's Textbook of Microbiology, Ninth edn, University Press.
2. Kingsbury DT and Wagner GE (1990) Microbiology, NMS (series), Second edn, National Medical Series.
3. Pelczar MJR, Chan ECS and Krieg NR (1993) Microbiology, Fifth edn, Tata McGraw-Hill, New Delhi.

**PGZ 4341 Lab. in Cell Biology, Biological Chemistry & Microbiology  
(6h/wk) (3cr)**

The Cell Biology laboratory component emphasizes on the working principle of compound microscope, observation of specialized cells, micrometry, permanent slide preparation, observation of mitosis in onion root tip and polytene chromosomes in Chironomus larva. Biological Chemistry laboratory component includes pH metry, colorimetric estimation of biomolecules, centrifugation, chromatographic separation of amino acids, electrophoresis and enzyme kinetics. Microbiology laboratory skills will train the students to maintain pure culture from various sources under aseptic condition, staining and biochemical tests. It also includes isolation of ubiquitous organisms from sewage, soil, plants and hospital environment. Use of microorganisms in wine production and quality analysis of milk will also be carried out.

**Specific Learning Outcome:**

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

- develop skill in preparation of permanent slide
- appreciate the various specialized cells
- draw and measure the exact size of cell
- know the concept of plasmolysis and hemolysis
- appreciate the organization of giant chromosome in chironomous larva
- appreciate the importance of pH in doing experiments

- prepare buffers
- perform chromatography and electrophoresis
- estimate the quantity of biomolecules
- perform enzyme assay
- do pure culture techniques.
- perform various staining and biochemical tests
- characterize industrially important organisms
- isolate and characterize microbes from soil and plant.
- identify clinically important organisms.

**Laboratory Experiments in Cell Biology:**

1. Microscopic observation of specialized cells (nerve cell, muscle cell etc)
2. Outline sketch of cells using Camera Lucida
3. Micrometry
4. Permanent slide preparation I – principle, fixation, dehydration, embedding
5. Permanent slide preparation II – sectioning, staining, mounting
6. Study of mitosis using onion root tip
7. Preparation of polytene chromosomes from salivary glands of Chironomus larvae
8. Plasmolysis – with different plant cells with different NaCl and sucrose solution concentration
9. Hemolysis I – Principle, influence of NaCl solution of various concentrations
10. Hemolysis II – Influence of temperature, molecular size, organic solvents
11. Observation of cell division stages using permanent slides

**Laboratory Experiment in Biological Chemistry:**

1. pH metry.
2. Preparation of biological buffer.
3. Colorimetry.
4. Estimation of Glucose -Anthrone method.
5. Estimation of Protein - Lowry's method.
6. Estimation of DNA by Diphenylamine reaction.
7. Estimation of RNA by Orcinol reagent.
8. Centrifugation technique.
9. Electrophoresis
10. Chromatography: Paper and Thin Layer
11. Enzyme assay - alkaline phosphatase activity
12. Enzyme kinetics using alkaline phosphatase

**Laboratory Experiments in Microbiology**

1. Aseptic techniques - sterilization methods and preparation of media (selective and differential).
2. Pure culture isolation from air - water - soil.
3. Staining techniques and biochemical tests to classify microbes.

4. Cultivation and identification of unknown Fungi from various sources.
5. Antimicrobial susceptibility test using Kirby Bauer method.
6. Methylene blue reductase test of milk.
7. Wine Production
8. Primary and secondary screening of industrially relevant microbes.
9. Immobilization of microbial products.
10. Isolation and characterization of microbes from sewage sample.
11. Isolation and maintenance of pure culture for actinomycetes.
12. Isolation of antibiotic producing organism from soil.
13. Isolation of Nitrogen fixing bacteria from Root nodule.
14. Isolation of Normal microflora of Human body.
15. Identification of Nosocomial infection causing organisms.
16. Visit to Industry/Hospital/fermentation unit

### **References**

1. Aneja RK (2014) Laboratory Manual of Microbiology and Biotechnology, First edn, MEDTECH Publication.
2. Cappucino GS and Sherman N (2013) Microbiology-A Laboratory Manual, Tenth edn, Pearson Education.
3. Gasque EA (1992) Manual of laboratory experiences in Cell Biology, Universal Bookstall, New Delhi.
4. Gunasekaran P (1995) Laboratory manual in Microbiology, New Age International Pvt. Ltd, New Delhi.
5. Jayaraman J (2011) Laboratory manual in Biochemistry, Second edn, New Age International Publishers, New Delhi.
6. Karp G (1996) Cell and Molecular Biology-concepts and experiments, John Wiley and Sons Inc. New York.
7. Palanivelu P (2009) Analytical Biochemistry and Separation Techniques, Fourth edn, Twenty first Century Publications, Madurai.
8. Plummer DT (1997) An introduction to practical Biochemistry, Tata McGraw Hill Publishing Company, New Delhi.



This course deals with principles and basic facts of Animal Physiology. It also emphasize on mammalian physiology and other vertebrate taxa. It deals with diverse of functions of the living organisms encompassing digestive, respiratory, cardiovascular, muscular, nervous, renal and endocrine physiology.

**Specific Learning Outcome:**

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

- the various organ-systems and their functions
- structure and function of muscle and muscle contraction
- structure and functions of kidney
- functions of endocrine glands and sense organs
- the concept of homeostasis, osmoregulation and thermoregulation

1. **Digestion and respiration:** Digestive function - assimilation & absorption, unique food and feeding mechanisms in animals. Mechanism of respiration - respiratory pigments - transport of respiratory gases in the blood - air breathing in fishes - hypoxia - oxygen therapy - control of respiration.
2. **Circulation and excretion:** General pattern and principles of vertebrate circulation -blood coagulation - ECG - cardiodynamics - haemodynamics - microcirculation - tissue fluid exchange - lymphatic circulation - control of heart beat and circulation. Kidneys of vertebrates - body fluids - nitrogen excretion - physiology of urine formation - renal clearance - control of micturition.
3. **Muscle, nerve cell and signals:** Structure of muscle cell - sliding filament theory - cross - bridge function and production of force - role of calcium - electrochemical coupling - neural control of muscle contraction. Components of nervous system - functional morphology of synapse, Impulse - types and transmission, Chemical transmitters - excitation, inhibition and computation.
4. **Endocrine and sensory physiology:** Endocrine systems in vertebrates - Endocrine function - hormones - target tissues - mechanism of hormone action - endocrine disorders - hormone therapy - hormonal control on metabolism. Sensory qualities - principles - receptors - chemical senses - mechanical senses - optic sense - animal electricity - sorting of sensory information.
5. **Environmental physiology:** Adaptation to the environment - temperature regulation -Osmo-iono regulation. Physiological time - Effect of high altitude - Problems of diving - adaptations - stress physiology.

**Textbook**

Nielson KS (1997) Animal Physiology - Adaptation and Environment, Fifth edn, Cambridge University Press, London.

## References

1. Eckert R (1982) *Animal Physiology*, Surjeet Publications, New Delhi.
2. Gordon MS (1968) *Animal Structure and function*, Amerind Publishers.
3. Hoar WS and Hikman CP (1967) *General and comparative Physiology*, Prentice Hall India, New Delhi.
4. Pocock G, Richards GD and Daly MDB (1999) *Human Physiology*, Oxford University Press, London.
5. Widmaier E, Raff H and Strang K (2013) *Vander's Human Physiology: The Mechanisms of Body Function*, Thirteenth edn, Mc Graw Hill Education, New York.

## PGZ 4334

## Biostatistics and Bioinformatics

(4h/wk) (3cr)

This course is designed to impart a fundamental knowledge on data, sources & acquisition, organization & presentation of data. It targets at teaching certain important biostatistical analyses such as measures of central tendencies, dispersion of data and tests of significance. It also gives an introduction to the usage of SPSS package in biostatistical analysis. Second part of the course deals with the information of biological databases and file format. It emphasizes the concept of sequence analysis, sequence alignment tools & algorithm, a special attention given to phylogenetic analysis methods.

### Specific Learning Outcome:

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

- identify the sources and methods of data collection
  - carryout appropriate statistical analyses for the data
  - gain knowledge on bioinformatics tools and resources
  - understand sequence similarity alignment and phylogenetic analysis
1. **Introduction, data and collection methods:** Biostatistics - introduction, definition, basic concepts, terminologies. Data - types and sources, collection methods, sampling - random & non-random, classification of data - Sturge's rule. Presentation of data - tabulation, graphical and diagrammatic representation.
  2. **Descriptive statistics:** Measures of central tendency - arithmetic mean, median and mode. Measures of dispersion - standard deviation and Standard error - linear regression and simple correlation.
  3. **Tests of significance:** Students *t*-test (simple, paired), *F*-test - applications of  $\chi^2$  (chi-square) test in biology & testing the goodness of fit - Analysis of Variance (ANOVA). Introduction to statistical software - SPSS - data editor - creating coding variables - output viewer - graphic & diagrammatic representations - Elements of Probit analysis.

4. **Introduction and Bioinformatics Resources:** Computational Biology and Bioinformatics - definition - Biological databases - Nucleic acid sequence databases - GenBank, EMBL and DDBJ. Protein sequence databases - SWISS-PROT, TrEMBL, PIR and PDB. Genome Databases - NCBI, EBI, TIGR and SANGER. Other Databases - Patterns/Motifs/System Biology.
5. **Sequence Similarity Searches:** Basic concepts of sequence similarity, identity and homology. Scoring matrices - PAM & BLOSUM series - local versus global alignment. Needleman-wunsch and Smith-waterman algorithms. Heuristic Methods of sequence alignment - FASTA, BLAST & PSI BLAST, Software tools for pairwise & multiple sequence alignment. Phylogenetic Analysis - Phylogenetic tree, Comparative genomics, orthologs and paralogs. Methods of phylogenetic analysis - UPGMA, WPGMA and neighbour joining method.

### **Textbooks**

Rastogi VB (2015) Biostatistics, Third edn, MEDTECH publishers, New Delhi.

Attwood KT, Pettifer RS and D Thorne (2016) Bioinformatics Challenges at the Interface of Biology and Computer Science: Mind the Gap, First edn, John Wiley & Sons, New York.

### **References**

1. Ignacimuthu S (2005) Basic Bioinformatics, Second edn, Narosa Publishing House, New Delhi.
2. Landau S and Everitt BS (2003) A Handbook of Statistical analyses using SPSS, Chapman & Hall/CRC Press, London.
3. Le CT and Eberly LE (2016) Introductory Biostatistics, Second edn, John Wiley and Sons, New Jersey.
4. Lesk AM (2002) Introduction to Bioinformatics, First edn, Oxford University Press, London.
5. Stanton GA (2002) Primer of Biostatistics, Fifth edn, McGraw-Hill, New York.
6. Zar JH (2005) Biostatistical Analysis, Fourth edn, Pearson Education Inc., New Delhi.

This course focuses on the basic principles of genetics by presenting the important concepts of classical, microbial and population genetics. Study on Mendelian genetics introduces the basic concepts and history of genetics. It also gives an overview on genetic map and linkage. A section on microbial genetics helps to understand the mechanisms of genetic exchange. Human genetics deals with karyotyping and pedigree analysis.

**Specific Learning Outcome:**

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

- understand the basic concepts of Mendelian genetics
- gain in depth knowledge on linkage & mapping
- acquire basic knowledge on genetic structure of population and genetic variation
- gain better understanding of the genetics of bacteria & virus
- develop better appreciation of human genetics

1. **Mendelian principles and chromosomal basis of inheritance:** Study of heredity, testing genetic hypotheses, multiple alleles, gene interactions, chromosome theory of heredity, extra nuclear inheritance, sex chromosome & sex determination, sex linked, sex influenced genes, rearrangement of chromosome structure and dosage compensation.
2. **Linkage, crossing over and chromosome mapping:** Linkage - types - an exception to Mendel's principle of independent assortment, crossing over as physical basis of recombination, chromosome mapping using recombination frequency, linkage maps using ordered tetrad data.
3. **Microbial genetics:** Mechanisms of genetic exchange in bacteria through transformation, conjugation and transduction - use of partial diploids to map closely linked genes. Bacteriophage T<sub>4</sub> and lambda, rII locus of bacteriophage T<sub>4</sub>, evolution of the concept of gene as a unit of structure, function, and complementation test as an operational definition of the gene.
4. **Quantitative and population genetics:** Genetic analysis of quantitative traits, polygenic inheritance, Hardy-Weinberg equilibrium, estimating allele frequencies, factors affecting, inbreeding and out breeding.
5. **Human Genetics:** Human karyotype, banding techniques, genetic traits and inborn errors in man. Variations in chromosome number - Genetics of human behavioural traits. Twin studies - Pedigree analysis - symbols - sex linked and autosomal pedigree. Eugenics, Euthenics and genetic counselling.

**Textbook**

Snustad DP and Simmons MJ (2010) Principles of Genetics, Fifth edn, John Wiley & Sons, Inc, New York.

**References**

1. Brooker RJ (2005) Genetics- Analysis and Principles, Second edn, McGraw-Hill Book Company, Boston, USA.
2. Hartl DL and Jones WJ (2005) Genetics - Analysis of Genes & Genomes, Sixth edn, Jones & Barlett Publishers, Massachusetts.
3. Hexter W and Yost HT (1977) The Science of Genetics, Prentice Hall of India Private Ltd., New Delhi.
4. Levine L (1969) Biology of the Gene. The CV Mosby Company, St. Louis, USA
5. Rothwell NV (1977) Understanding Genetics, Second edn, Oxford University Press, London.

**PGZ 4438****Molecular Biology****(6h/wk) (4cr)**

This course emphasizes the molecular basis of life and it forms the blueprint of life. It deals mainly with nucleic acids, proteins and their interactions. It covers the detailed molecular mechanisms involved in DNA replication, recombination, transcription and translation. A special emphasize is given to post- transcriptional and -translational modifications. It also includes an in depth study on mutations, DNA damage and repair mechanisms. Current understanding on the gene regulatory mechanisms is also focused.

**Specific Learning Outcome:**

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

- understand how DNA topology and chromatin structure influence the processes of DNA replication, recombination and repair
- appreciate the events involved in transcription and post transcriptional modifications
- appreciate the stages involved in translation and the various post translational modifications
- gain an in depth knowledge on the origin of mutation, its types and mechanisms involved and the role of transposons
- understand the mechanisms involved in gene regulation

1. **DNA structure, replication and recombination:** Structure and forms of DNA, Replication - Semi conservative, rolling and D-loop models, mechanisms of replication. Homologous and site specific recombination.

- 2. Transcription in prokaryotes and eukaryotes:** Structure and types of RNA - RNA polymerases - stages of transcription - transcriptional factors - Post transcriptional modifications - RNA processing - capping, splicing, polyadenylation and RNA editing.
- 3. Translation in prokaryotes and eukaryotes:** Genetic code - properties - deciphering and exceptions to universality - stages of translation - translation factors - aminoacylation of tRNA - aminoacyl tRNA synthetase - translational proofreading - translational inhibitors - Post translational modifications of proteins.
- 4. Gene regulation in prokaryotes and eukaryotes:** Inducible and repressible systems -*Lac* operon system - *Lac* positive and negative control mechanisms - *trp* operon - DNA binding proteins - galactose metabolism in Yeast - DNA looping and homeobox - Gene Silencing.
- 5. DNA damage, repair mechanisms, mutation and transposons:** Types of DNA damage and repair mechanisms - spontaneous and induced mutations - molecular and biochemical basis of mutation. Transposable elements - Tn3, Tn5, Tn10, *Mu* phage, LINES, SINES, copia and P-element - significance and mechanism of transposition.

### Text book

Watson JD, Baker TA, Bell SP, Alexander G and Levine M (2013) *Molecular Biology of the Gene*, Seventh edn, Benjamin-Cummings Pub Co., San Francisco, USA.

### References

1. Brown TA (2017) *Genomes 4*, Fourth edn, Garland Science (Taylor & Francis Group), New York.
2. Friefelder D (1987) *Molecular Biology*, Narosa Publishing House, New Delhi.
3. Hartl DL and Jones WJ (2005) *Genetics - Analysis of genes and genomes*. Sixth edn, Jones & Barlett Publishers, Massachusetts.
4. Krebs JE, Goldstein ES and Kilpatrick ST (2014) *Lewin's Genes XI*, Jones and Barlett learning, Burlington, MA.

**PGZ 4340**  
**(CBCS)**

**Poultry Farming**

**(4h/wk) (3cr)**

This course aims to develop human resource in the area of poultry farming. It will impart knowledge in poultry industry, farming, breeding, housing, nutrition, disease and management. This course will also help to understand the various aspects of poultry rearing.

**Specific Learning Outcome:**

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

- start poultry farm and provide jobs as an entrepreneur
- gain knowledge in breeds of layers and broilers
- appreciate the concept of poultry housing, equipment, nutrition and management
- monitor poultry diseases and control mechanism

1. **Poultry industry & biology:** History of poultry industry in India - 5 year plans - NECC - entrepreneurship - funding agencies - role of egg and meat in human nutrition - poultry manure and byproducts. External features - digestive and reproductive systems - egg formation - feather sexing - feather tracts.
2. **Breeds of layers and broilers:** Classification - Indian and exotic breeds - production of commercial laying stock - cross breeds - sexing in one day old chicks - popular breeds of layers and broilers in India.
3. **Housing and Equipment:** Location of the farm - construction of poultry sheds - layout of broiler and layer farms - 1+3 housing system, all in and all out system - deep litter system - cage rearing - incubator - waterer - feeder - nest box - brooder - dropping pit - disposal pit.
4. **Nutrition and Management:** Energy - carbohydrates - fats - proteins - vitamins - minerals - feed stuff - feed formulation - non-nutritive feed additives - feed grinder - home made mineral mixture of feed for chick - grower - layer - broiler and finisher - Incubation - management of growers - layers - summer and winter management - forced moulting - debeaking - culling - marketing.
5. **Diseases and control measures:** Bacterial (Infectious coryza), viral (Newcastle, bird flu), fungal (Mycotoxicosis) and parasitic (Coccidiosis) – transmission, symptoms & treatment. Vaccination - antibiotics - nutritional deficiencies.

**Textbook**

Gnanamani MR (2003) Modern Aspects of Commercial Poultry Keeping, Ninth edn, Giri Publications, Madurai.

## **References**

1. Chauhan HVS and Roy S (2007) Poultry Diseases, Diagnosis and Treatment, Third edn, New Age International, New Delhi.
2. Jaiswal V and Jaiswal KK (2014) Economic Zoology, PHI Learning Private Limited, New Delhi.
3. Jull MA (1976) Poultry Husbandry, Third edn, Tata McGraw Hill Publishing Company Ltd. New Delhi.

## **PGZ 4342          Lab. in Animal Physiology and Molecular Biology    (4h/wk) (3cr)**

Animal Physiology part of the laboratory course deals with exercises on digestion, osmo-iono regulation, thermoregulation, nitrogen excretion, respiration, circulation and chronobiology.

Molecular Biology part of the laboratory course deals with basic molecular biology laboratory exercises such as isolation of DNA and RNA from eukaryotic cells, and plasmids from bacteria. Experiments using *E. coli* such as mutagenesis, transformation, conjugation and  $\beta$ -galactosidase assay will also be carried out.

### **Specific Learning Outcome:**

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

- understand physiological principles, function, integration and homeostasis of the human body at the cellular, tissue, organ, organ system and organism level
- demonstrate a coherent understanding of the relationship between tissues, organs, and organ systems from a structural and functional perspective
- locate, identify, and functionally describe the structures of the human body at all levels of organization
- extract and quantify nucleic acids
- gain essential skills, to design and perform experiments on mutation
- independently carry out bacterial mediated gene transfer techniques
- understand *Lac* operon

### **Laboratory Experiments in Animal Physiology**

1. Factors affecting salivary amylase activity
2. Analysis of human blood - total and differential count of RBC, WBC
3. Plasticity of pulse rate and heart beat
4. Experiments on sensory organs - vision, hearing and taste
5. Effect of insulin level on vertebrate blood glucose
6. Qualitative analysis of excretory products
7. Osmoregulation in an aquatic animal



8. Estimation of oxygen consumption under stress
9. Determination of  $Q_{10}$  in freshwater mussel and fish

### Laboratory Experiments in Molecular Biology

1. Isolation of genomic DNA from bacteria
2. Isolation of plasmid DNA
3. RNA extraction from chick liver
4. Isolation of DNA from plant tissue and human blood
5. Agarose gel electrophoresis of DNA
6. Mutagenesis using chemical mutagens
7. Physical mutagenesis (UV-induced)
8. Quantification of nucleic acids
9. Bacterial transformation
10. Bacterial Conjugation
11. Transduction using bacteriophages
12. Study of *Lac* operon ( $\beta$ -galactosidase assay)

### References

1. Amrit K (2006) Laboratory manual of animal physiology and Biochemistry, First edn, CBS Publishers & Distributors Pvt. Ltd, New Delhi.
2. Durairaj G (1987) Animal physiology - A laboratory manual, COSIP-ULP Publications, Dept. of Zoology, University of Madras, Chennai.
3. Rajamanickam C (2000) Laboratory Protocols in Molecular biology and Biochemistry. Osho science Publishers, Madurai.
4. Sambrook J and Russell DW (2001) Molecular cloning: A Laboratory Manual. Third edn, Cold Spring Harbor Press, New York.

**PGZ 5531**

**Entomology**

**(6h/wk) (5cr)**

This course is designed to understand the structure and functional aspects of insects and their economic importance. This course covers the four major aspects: insect taxonomy, functional morphology, impact of insects in human welfare and pest control measures.

### Specific Learning Outcome:

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

- understand key concepts in insect systematics, biology and physiology
- appreciate the importance of insects
- adopt pest management strategies
- appreciate the role of beneficial insects

- 1. Insect body Plan:** External morphology - head, sutures, photoreceptor organs, antennae structure, diversity, mouth parts - types. Thorax - tergum - sternum - pleuron - leg & wing modifications - coupling mechanism - abdomen - modification - genital structures.
- 2. Insect taxonomy:** Insects as most successful group of organisms - Apterygota - Protura - Diplura - Archaeognatha - Thysanura. Exopterygota - Paleopterous - Neopterous. Endopterygota - Coleopterous - Neopterous - Hymenopterous insects - economic importance.
- 3. Organ systems:** Digestive system - glands - mechanism of digestion. Excretory system - malpighian tubules and other organs - mechanism. Circulatory system - pumping organs - mechanism - haemolymph - haemocytes - functions. Respiratory system - structure - aquatic respiration - respiration of endoparasitic insects. Endocrine glands - corpora cardiaca - corpora allata - thoracic glands - molting - functions.
- 4. Insects of economic importance:** Harmful insects - feeding injury - agricultural pests - major pests of paddy, sugar cane, cotton, coconut and vegetable crops - damage, symptoms and control measures. Domestic pests - lice, bed bugs, mosquitoes, and housefly - vector status and control. Beneficial insects - honey bee - diversity, structural adaptations, colony and management. Sericulture - moriculture - silkworm - diversity - life cycle - rearing - grainage - diseases.
- 5. Pest control and integrated pest management:** Pesticides - I, II, III and IV generations. Insecticides - nomenclature - classification - natural products - formulations. Biological control - parasitoids, parasites, predators and microbes. Pest management - IGR - synthetic hormones - pheromones - allelochemicals - genetic control - IPM in paddy field.

**Textbook:**

Ambrose DP (2004) The Insect Structure, Function and Biodiversity, Kalyani publications, New Delhi.

**References**

1. Chapman RF, Simpson SJ and Douglas AE (2012) The Insects: Structure and Function, Fifth edn, Cambridge University Press, London.
2. David BV and Ananthakrishnan TN (2004) General and Applied Entomology, Tata McGraw-Hill publishing Company Limited, New Delhi.
3. David BV and T Kumarasamy (1982) Elements of Economic Entomology, Popular Book Depot, Chennai.

4. Fennemore PG and Alka Prakash (1992) Applied Entomology, Wiley Eastern Ltd, New Delhi.
5. Fox RM and Fox JW (1964) Introduction to Comparative Entomology, Chapman and Hall, London.
6. Richards OW and Davies RG (1977) Imm's General Textbook of Entomology, Vol- 1 & 2, Tenth edn, BI Publications Pvt. Ltd, New Delhi.
7. Robert HR (1959) A Textbook of Entomology, Second edn, John Wiley & Sons Inc., New York.
8. Snodgrass RE (1935) Principles of Insect Morphology, McGraw Hill Book Company Inc., New York.

**PGZ 5533****Evolution****(6h/wk) (5cr)**

This course provides an insight of human existence on earth. It includes origin of life, history of evolutionary thought, Darwinism & current challenges, molecular phylogeny and evolutionary clock, isolating mechanisms, speciation and transspecific. It also deals with human evolution, phylogeny and cultural way of living.

**Specific Learning Outcome:**

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

- understand the biological evolution of organisms
  - understand natural selection as one of the several processes of evolution
  - appreciate the four propositions underlying Darwin's theory of evolution
  - comprehend isolation and speciation
  - have an insight regarding human evolution and transspecific evolution
1. **Origin of life and history of evolutionary thoughts:** Life - origin of life - theories - abiogenesis, cosmozoic & naturalistic theories. Chemical evolution - concept of Oparin & Haldane, and experiment of Urey & Miller - evidences and objections. Lamarckism & Darwinism - modern synthesis.
  2. **Darwinism:** HMS Beagle - Darwinian syllogism - natural selection in nature and laboratory, modes of selection - adaptive radiation. Modern understanding of natural selection - polymorphism - coloration - mimicry.
  3. **Challenges to Darwinism:** DNA and protein phylogenies - protein evolution and neutrality theory - molecular evolutionary clock. Group selection - altruism, kin, sexual, group & directional selection - punctuated equilibria.

4. **Isolation and speciation:** Isolating mechanism - pre and post zygotic - origin of isolation. Speciation - definition - modes - sympatric, allopatric and quantum speciation. Concept of adaptive peaks and valleys.
5. **Evolution of higher taxa and trans-specific evolution:** Uniqueness of man - fossil history & phylogeny of man - cultural evolution and evolutionary future of mankind. Macroevolution - recognition of higher taxa - origin - saltation theory - adaptive grid hypothesis - trends and rate of evolution - Zoological time scale - evolution of horse.

### **Textbook**

Dobzhansky T, Ayala FA, Stebbins GL and Valentine JW (1977) Evolution, Surjeet Publishers, New Delhi

### **References**

1. Dodson EO (1960) Evolution: Process and Product, Affiliated East-West Press, New Delhi.
2. Stebbins GL (1966) Process of organic evolution, Prentice Hall, New Delhi.
3. Strickberger MW, Hall BK and Hallgrimsson B (2007) Strickberger's Evolution, Fourth edn, Jones and Bartlett, Sudbury, MA, USA.

### **PGZ 5535**

### **Immunology**

**(6h/wk) (5cr)**

This theory course provides a comprehensive coverage of the essential concepts and the current understanding of cellular and molecular events underlying immunity. This course on Immunology deals with cells and organs of immune system, antigen, antibody - structure & diversity and antigen-antibody interactions. It also includes major histocompatibility complex, immunoregulation, immunotolerance and complement. Clinical aspects such as hypersensitivity reactions, autoimmunity, disorders of immune response, transfusion, transplantation and tumour Immunology are also dealt.

### **Specific Learning outcome:**

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

- appreciate the cells, organs, antigens, antibody, antibody diversity and antigen-antibody interactions
- explain MHC, maturation, activation and differentiation of T & B cells, cytokines and cytokine receptors
- demonstrate antibody & cell mediated effector functions, immunotolerance and complement

- discuss hypersensitivity reactions, autoimmunity and immunodeficiency diseases
  - appreciate transfusion, transplantation and tumor immunity
- 1. Cells, lymphoid organs, antigens and antibody:** Cells and organs of the immune system - antigens - adjuvants. B cell antigens & B cell epitopes, T cell antigens & T cell epitopes - Distribution and production of antibodies. Molecular structure of antibodies - Ig isotypes - biological properties - Ig super family - multigene organization of Ig genes, gene rearrangements - mechanism of variable region rearrangements, productive and non productive rearrangements - allelic exclusion - generation of antibody diversity - strength of antigen-antibody interactions - affinity - avidity- cross-reactivity - precipitation and agglutination reactions.
  - 2. MHC, maturation, activation and differentiation of T & B cells:** MHC - General organization, genes, inheritance, molecules, immune responsiveness and MHC & disease susceptibility. T & B cells - maturation, activation and differentiation - T & B cell co-operation - superantigens - T independent B cell activation - cytokines and cytokine receptors.
  - 3. Antibody and cell mediated effector functions, immunoregulation and complement:** Antibody mediated - neutralization, opsonization, complement fixation and antibody-dependent cell mediated cytotoxicity - cell mediated - cytotoxic T cell response and Natural Killer cell activity. Regulation of immune response - age - nutrition and other factors - immunotolerance - complement system - classical and alternative pathways - complement fixation test and complement deficiency diseases.
  - 4. Hypersensitivity reactions, autoimmunity, and immunodeficiency disorders:** Gell and Coombs classification - Hypersensitivity reactions – Ig E mediated (Type I), Antibody mediated (Type II), immune complex mediated (Type III), Cell mediated (Type IV). Organ specific and systemic autoimmune diseases - mechanisms - treatment of autoimmune diseases. Primary immunodeficiencies - defects in lymphoid lineage, myeloid lineage and complement systems - treatment of immunodeficiency - AIDS and other acquired or secondary immunodeficiencies.
  - 5. Transfusion, transplantation and tumor immunology:** ABO system - ABO antigens - isohaemagglutinins - Rh antigens - transfusion reactions - transfusion transmitted infections - cross-matching. Immunologic basis of graft rejection - clinical manifestations of graft rejections - general and specific immunosuppressive therapy - clinical transplantation. Tumours of the immune system - tumour antigens - immune response to tumours - tumour evasion of the immune system - cancer immunotherapy.

**Textbook**

Punt J, Stranford S, Jones P and Owen J (2018) Kuby Immunology, Eighth edn, W.H. Freeman and Co., New York

**References**

1. Coico R and Sunshine G (2009) Immunology: A short course, Sixth edn, Wiley Blackwell, New York.
2. Delves PJ, Martin SJ, Burton DR and Roitt IM (2006) Essential Immunology, Eleventh edn, Blackwell Publishers Ltd, UK.
3. Khan FH (2009) The Elements of Immunology. First edn, Pearson Education, New Delhi.

**PGZ 5537**

**Methods in Biology**

**(6h/wk) (5cr)**

The aim of the course is to give a comprehensive knowledge about the methods used in biology such as histochemical, biophysical, electrophysiological, molecular, radiolabeling and immunotechniques. The course also deals with the methods in recombinant DNA technology and topics related to field biology such as estimation of population, sampling methods in behavior and habitat characterization using remote sensing.

**Specific Learning Outcome:**

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

- acquire a basic knowledge of biological methods
- understand the principles of microscopy, spectrophotometry and radiolabeling techniques
- appreciate techniques involved in molecular biology and recombinant DNA methods
- apply their skills in field biology to investigate behavior of animals and to characterize habitats using remote sensing

1. **Molecular biology and recombinant DNA methods:** Isolation and purification of Nucleic acids and proteins - Electrophoresis - one and two-dimensional, PAGE and Isoelectric focusing - MALDI TOF - Generation of genomic and cDNA libraries in plasmid, phage, Cosmid, BAC and YAC vectors - *in vitro* mutagenesis - gene knock out - - Transcript and Translation product analysis - Detection of post-translational modifications in proteins - RAPD - RFLP - AFLP - Microarray.
2. **Histochemical techniques and Immunotechniques:** Detection of molecules in living cells - *in situ* localization - FISH and GISH. Antibody generation - detection

of molecules using ELISA, RIA, Immuno blot, immunofluorescence microscopy, flow cytometry & cytofluorometry.

3. **Biophysical and radiolabeling techniques:** Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy. Molecular structure determination using X-ray diffraction and NMR - different types of mass spectrometry and surface plasma resonance methods. Detection and measurement of different types of radioisotopes - GM counter, scintillation counter, autoradiography - incorporation of radioisotopes in biological tissues and cells - molecular imaging of radioactive material - safety guidelines.
4. **Electrophysiological and microscopic techniques:** Single neuron recording - patch-clamp recording - EEG - Brain activity recording - lesion and stimulation of brain - Pharmacological testing - tomography (PET, MRI, fMRI, CAT). Visualization of cells and subcellular components by light microscopy - scanning and transmission microscopes - different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods - image processing methods in microscopy.
5. **Methods in field biology:** Methods of estimating population density of animals and plants, ranging patterns through direct, indirect and remote observations - sampling methods in the study of behavior - habitat characterization: ground and remote sensing methods.

### Textbook

Ghatak, KL (2011) Techniques and methods in biology, Prentice Hall India Learning Private Limited, New Delhi.

### References

1. Brown, TA (2017) Gene cloning and DNA analysis: an introduction, Seventh edn, John Wiley & Sons, USA.
2. Kumar, P (2016) Fundamentals and techniques of biophysics and molecular biology. Pathfinder Publications, New Delhi.
3. Kandel ER, Schwartz JH and Jessell TM (2000) Principles of Neural Science, Fourth Edn, McGraw-Hill, New York.
4. Primrose SB and Twyman R (2006) Principles of Gene Manipulations and Genomics, Seventh edn, Blackwell Publishing, Massachusetts, USA.
5. Rees PA (2015) Studying Captive Animals: A Workbook of Methods in Behaviour, Welfare and Ecology, First edn, John Wiley & Sons, UK.
6. Swargiary, A (2017) Biological tools and techniques. Kalyani Publications, New Delhi.
7. Wilson, K and Walker, J (2010) Principles and techniques of biochemistry and molecular biology, Seventh edn, Cambridge University Press, London.

This course highlights the collection, identification and preservation of insects. It also includes the study of various systems and physiology of insects.

**Specific Learning Outcome:**

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

- collect, identify and preserve insects
- gain in depth knowledge about various organ systems in different insects
- understand about pest populations in different habitats
- appreciate prey and predator relationships
- realize the importance of insects

**Laboratory experiments**

1. Collection, preservation and identification of insects.
2. Preparation of dichotomous key.
3. *Mylabris* – digestive and reproductive system.
4. *Chrysocoris* – mouth parts and reproductive system.
5. Survey of insect fauna in The American College/Alagar hills/Kodaikanal hills.
6. Collection and identification of soil micro-arthropods (Berleese funnel method).
7. Survey of insect fauna of an Agro-ecosystem.
8. Culture and damage assessment of a polyphagous pest (*Spodoptera litura*).
9. Evaluation of efficacy of a stomach poison on a polyphagous pest.
10. Evaluation of efficacy of a chitin inhibitor.
11. Study of predatory potential.
12. Maintenance of a parasitoid on an alternate host.
13. Rearing of silkworm.
14. Insect box/arrangement/submission.
15. Maintenance of butterfly garden.

**Textbook**

Fennemore PG and Alka Prakash (1992) Applied Entomology, Wiley Eastern Ltd, New Delhi.

**References**

1. Richards OW and Davies RG (1977) Imm's General Textbook of Entomology, Vol-1 & 2, Tenth edn, BI Publications Pvt. Ltd, New Delhi.



PGZ 5341

Lab. in Immunology and Methods in Biology

(4h/wk) (3cr)

Immunology laboratory part includes antigen administration, bleeding techniques and agglutination assays. It also includes lymphoid organs in vertebrates, complement mediated lysis, hypersensitivity reactions and cellular immune response in fish. Laboratory methods in biology includes exercises on microscopy, protein purification, DNA fingerprinting, gel electrophoresis techniques and field experiments involving population size estimation & sampling methods to study behaviour of animals.

**Specific Learning outcome:**

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

- do bleeding techniques and antigen administration
- survey the lymphoid organs in selected vertebrates
- perform complement mediated lysis
- investigate hypersensitivity reactions
- appreciate cellular immune response
- understand the basic techniques of microscopy
- isolate and purify proteins
- do electrophoresis, RAPD & RFLP analysis and blotting techniques
- do field experiments to study animal behaviour

**Laboratory Experiments in Immunology:**

1. Preparation of soluble – particulate and cellular antigens
2. Repetitive bleeding techniques and routes of antigen administration
3. Direct haemagglutination assay
4. Passive haemagglutination assay
5. Lymphoid organs in fish and calotes and preparation of single cell suspension
6. Lymphoid organs in chick and mouse
7. Complement mediated lysis
8. Peritoneal lavage – isolation of macrophage from fish/mice
9. Hypersensitivity – foot pad thickening
10. Cellular immune response – scale transplantation in fish.
11. Immunodiffusion techniques.
12. Immunoelectrophoresis.
13. Laboratory visit

**Laboratory Experiments in Methods in Biology**

1. Microscopy-I: Staining and observation of macrophages from mouse blood
2. Microscopy-II: observation of phagocytosis by macrophages
3. Purification of proteins-I: Ammonium sulphate precipitation of IgG antibodies
4. Purification of proteins-II: Sucrose gradient centrifugation (e.g. for milk proteins)
5. Isoelectric focusing gel electrophoresis for separation of serum proteins
6. 2D gel immunoelectrophoresis

7. Polyacrylamide gel electrophoresis
8. Immunoblotting
9. ELISA
10. Quantification of nucleic acids by UV spectrophotometer
11. RAPD analysis to study genetic variation between species (e.g. Grasshopper)
12. DNA fingerprinting by RFLP analysis
13. Estimation of population density of grassland insect by sweep net method
14. Study of sex ratio in insects, fishes etc.
15. Study of learning in rat through T-maze technique
16. Study of behavioural catalogue and ethogram

### **References**

1. Becker JM, Caldwell GA and Zachgo EA (1996) *Biotechnology - A Laboratory Course*. Second edn, Academic Press, San Diego, USA.
2. Garvey JS, Cremer NE and Sussdorf DH (1977) *Methods in Immunology*, Third edn, Benjamin Cummings Publishing Co, Massachusetts, USA.
3. Harisha S (2007) *Biotechnology Procedures and Experiments Handbook*. Infinity Science Press LLC, New Delhi.
4. Hudson L and Hay FC (1989) *Practical Immunology*, Third edn, Blackwell Science Publishing, London.
5. Myers RL (1989) *Immunology - A laboratory Manual*, Wm C Brown Publishers, Dubuque, Iowa, USA.
6. Palanivelu P (2009) *Analytical Biochemistry and Separation Techniques*, Fourth edn, Twenty first Century Publications, Madurai.
7. Sadasivam S and Manickam A (2008) *Biochemical methods*, Third edn, New Age International Publishers, New Delhi.
8. Sinha J, Chatterjee AK and Chattopadhyay P (2010) *Advanced Practical Zoology*, First edn, Books and (P) Ltd, Kolkata.

### **PGZ 5532**

### **Biotechnology**

**(6h/wk) (5cr)**

This course emphasizes recombinant DNA technology, the importance of animal and plant tissue culture, production and applications of transgenic animals and plants. Disease diagnosis and therapeutics using biotechnology tools and industrial applications of genetically modified organisms will also be dealt. It also deals with the environmental pollution remedies using recombinant strains and bioethics of biotechnological products.

#### **Specific Learning Outcome:**

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

- use the tools and techniques in rDNA technology
- understand animal cell culture techniques and transgenesis of animals

- appreciate the gene transfer in plants and their applications
  - understand the role of biotechnology in human welfare and industrial products
  - explore genetically modified strains in pollution control and bioremediation
1. **Introduction and Recombinant DNA Technology:** History and Scope of Biotechnology - Restriction endonucleases - linkers & adaptors - vectors (*E. coli*, phage yeast, plant & animal viral vectors) - gene transfer methods - gene cloning strategies. Techniques in genetic engineering - blotting techniques - PCR and its types - DNA sequencing - Human Genome Project.
  2. **Animal Biotechnology:** Animal cell culture media - Biology and characterization of cultured cells - Primary & secondary cell culture - Tissue and stem cell engineering - Transgenic animals - fish, cattle and gene knockout mice - applications. Cloning - mechanism - Dolly - Ploidy induction method in fish. Hybridoma technology - Monoclonal antibody production.
  3. **Plant Biotechnology:** Basic concepts in plant tissue culture - micropropagation - protoplast culture and somatic hybridization - haploid plant production - gene transfer in plants - vector mediated (Ti plasmid) and virus mediated. Transgenic plants - resistance to biotic stress (insect and microbes) and abiotic stress (phosphinothricin and glyphosate) - improvement of crop yield, quality and nutrition.
  4. **Pharmaceutical and Industrial Biotechnology:** Gene therapy - *ex vivo* & *in vivo*. DNA assay for disease diagnosis and DNA profiling in forensics. Pharmaceutical products - insulin, tissue plasminogen activator, recombinant vaccines. Bioprocess and enzyme technology - production and immobilization of enzymes - biosensors. Biomass production - citric acid, alcohol, bio-fuel (hydrogen and methane).
  5. **Environmental Biotechnology and Society:** Environmental pollution - biotechnological methods for monitoring and management. Biodegradation & Bioremediation - Xenobiotics - Genetically engineered microorganism in bioremediation. Biotechnology - risks, ethics and patenting biotechnology inventions.

### Textbook

Satyanarayana U (2012) Biotechnology, First edn, Books and Allied (P) Ltd, Kolkata.

### References

1. Dubey RC (2006) A Textbook of Biotechnology, First multicolour illustrative edn, S. Chand & Company Ltd, New Delhi.
2. Glick RB and Pasternack JJ (2002) Molecular Biotechnology - Principles and Application of Recombinant DNA, Panima publishing corporation, New Delhi.

3. Brown, TA (2017) Gene cloning and DNA analysis: an introduction, Seventh edn, John Wiley & Sons, USA.
4. Brown TA (2017) Genomes 4, Fourth edn, Garland Science (Taylor & Francis Group), New York.
5. Primrose SB and Twyman R (2006) Principles of Gene Manipulations and Genomics, Seventh edn, Blackwell Publishing, Massachusetts, USA.

**PGZ 5534**

**Developmental Biology**

**(6h/wk) (5cr)**

The course aims at imparting knowledge on various aspects and concepts in ontogenetic development of animals that include gametogenesis, fertilization, cleavage, gastrulation and organogenesis. It exclusively discusses the process of human development.

**Specific Learning Outcome:**

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

- appreciate specialized cells of gonads and the process of gametogenesis
  - understand fertilization process, events occurring during and after fertilization and the mechanism of cleavage and pattern formation
  - explain gene involvement in gastrulation and the experimental proofs
  - elucidate embryonic induction, nature of inducers, stem cells and their applications
  - appreciate human development, abnormalities in pregnancies and human interventions
1. **Spermatogenesis and oogenesis:** Structural and functional relation among cells of testis and ovary - spermatogenesis and oogenesis - process and biochemical changes - hormonal regulation - gene expression and control.
  2. **Fertilization and cleavage:** Process and mechanism - activation of egg and sperm - essence of activation program - ionic fluxes and inhibition of polyspermy - changes in egg organization after fertilization - parthenogenesis and development - types, patterns and molecular changes during cleavage - maternal gene action and morphogenetic movements - cells-adhesion molecules & pattern formation.
  3. **Gastrulation and nucleocytoplasmic interaction in development:** Role of paternal genes during gastrulation - organogenesis - nuclear control of development - nuclear transplantation and enucleation experiments - regional differences in egg cytoplasm - cytoplasmic determinants - cytoplasmic control over nucleus.
  4. **Induction, differentiation, metamorphosis and regeneration:** Types of embryonic induction - chemical properties and role of inducers - Spemann's organizer - embryonic cell differentiation - metamorphosis in frog - regeneration in hydra and earthworm - stem cells and their applications - homeotic gene in *Drosophila* and axis formation.

5. **Human development:** Puberty - hormonal regulation of menstrual cycle - ovulation - organization of sperm and egg - fertilization - blastocyst formation - implantation - pregnancy changes and foetal growth - placenta - multiple and abnormal pregnancies - parturition - birth defects - teratology- *in vitro* fertilization techniques.

### Textbook

Balinsky BI (2012) An introduction to Embryology, Fifth edn, Cengage Learning India.

### References

1. Gilbert SF (1997) Developmental Biology, Fifth edn, Sinauer Associates Inc Publishers, Sunderland, Massachusetts, USA.
2. Wolpert (1998) Principles of Development, Oxford University Press, London.
3. Browder LW, Drickson CA and Jeffery WR (1991) Developmental Biology, Third edn, Saunders College Publishing, USA.

### PGZ 5536

### Environmental Biology

(6hr/wk) (5cr)

This course deals with the principles and scope of environmental biology. Special emphasis is given to environmental chemistry, geosciences, energy resources & conservation.

### Specific Learning Outcome:

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

- understand the interaction between man and environment with natural resources
- appreciate the impact of pollutants in air, water and land including their toxicity
- describe structure and function of ecology and their current issue
- understand the various energy resources that are available, level of exploitation and their conservation strategies

**1. Principles and scope of environmental studies:** Earth and man - physico-chemical and biological factors in environment - geographical classifications and zones - natural resources, conservation & sustainable development.

**2. Environmental chemistry:** Stoichiometry of air and water pollutants - Gibbs energy - acid base reactions - water chemistry - natural and anthropogenic sources of pollution - soil chemistry - toxic chemicals - principles of analytical methods.

**3. Ecosystem:** Structure and function - ecological succession - flora & fauna in India - endangered & threatened species - environmental issues in India - Bhopal tragedy,

Ennore oil spill, water depletion, climate change - Indian case studies on conservation & management strategies - models of population growth and interaction.

4. **Environmental geosciences:** Energy budget of earth - ecosystem flow of energy & matter - climates of India & Indian monsoon - El nino, La nino and droughts - global warming - land use planning – geochemical cycles - water, carbon, oxygen, nitrogen, sulphur, phosphorus - trace elements and human health - principles of remote sensing and its applications.
5. **Energy resources and conservation:** Renewable & non-renewable energy resources - environmental implication of energy use - environmental auditing - disaster management - restoration and rehabilitation technologies - environmental policy regulation-strategies and legislation.

### **Text book**

Verma PS and Agarwal VK (2000) Environmental Biology- Principles of Ecology, S. Chand & Co Ltd, New Delhi.

### **References**

1. Cox GW (1997) Conservation Ecology - Concepts and application, Appleton Century Crofts, USA.
2. Curtis LF and Barrett EC (1992) Introduction to Environmental Remote Sensing, Springer, Netherlands.
3. Dwivedi OP (2016) India's Environmental Polices, Programmes and Stewardship, Macmillan Press Ltd, Chennai.
4. Keller EA (2012) Environmental Geology, Eighth edn, Pearson Prentice Hall, USA.
5. Odum EP and Barret GW (2004) Fundamentals of Ecology, Fifth edn, Brooks/Cole, USA.
6. Sodhi GS (2000) Fundamental Concepts of Environmental Chemistry, Third edn, Alpha Science International Ltd, UK.
7. Stiling P (2009) Ecology: Theories and Applications, Fourth edn, PHI Learning Pvt. Ltd, New Delhi.

**PGZ 4238      Lab. in Biotechnology and Developmental Biology    (4h/wk) (3cr)**

Biotechnology Laboratory course includes the basic animal and plant biotechnology experiments. It deals with extraction & manipulation of DNA, PCR analysis, microbial degradation of pollutants, animal & plant tissue culture. Laboratory course in Developmental Biology will impart knowledge and hands on training in the study of various aspects of development.

**Specific learning outcome:**

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

- perform experiments such as PCR analysis, restriction digestion, ligation as well as electrophoretic techniques
- design basic animal and plant tissue culture experiments such as preparation of monolayer, suspension cell cultures, induction of callus and formation of shoot and root
- do microbial degradation of pollutants
- differentiate gametes of various species
- identify the developmental stages of gametes
- observe the chromosomal activity during oogenesis
- characterize and identify in detail the developmental stages during early-to-mid embryogenesis
- study the steps and process involved in regeneration and metamorphosis

**Laboratory Experiment in Biotechnology**

1. Isolation of plasmids from bacteria
2. Agarose gel electrophoresis of DNA and RNA
3. DNA amplification by PCR method.
4. Restriction enzyme digestion of DNA.
5. DNA Ligation
6. Polyacrylamide gel electrophoresis
7. Western blotting
8. Preparation of primary suspension culture of liver tissue
9. Chick embryo fibroblast- monolayer and suspension culture (Trypsinization)
10. Induction of callus from leaf discs
11. Formation of shoot and root of *Oryza sativum*
12. Pesticide degradation using microbes
13. Degradation of cellulose using microbes.
14. Biogas production.
15. Visit to industries.

**Laboratory Experiments in Developmental Biology:**

1. Microscopic observation of spermatozoa and ova.
2. Microscopic observation of development of gametes.

3. Effect of ablation of pituitary gland.
4. Role of retinoic acid in development of ornamental fish embryo.
5. Early stages of development in chick – cleavage, blastula and gastrula
6. Late stages of development in chick – organogenesis.
7. Regeneration in earthworm and tadpole.
8. Role of thyroxine on the metamorphosis of tadpole.
9. Role of juvenile hormones and ecdysone in insect larval development.
10. Hospital visit to learn IVF techniques.

### **References**

1. Becker JM, Caldwell GA and Zachgo EA (1996) Biotechnology - A Laboratory Course, Second edn, Academic Press, San Diego, USA.
2. Harisha S (2007) Biotechnology Procedures and Experiments Handbook. Infinity Science Press LLC, New Delhi, India.
3. Laura RK, Evans JH and Keller TCS (1999) Experimental Developmental Laboratory: A Laboratory Manual, Academic Press, UK.
4. Rajamanickam C (2001) Experimental Protocols in Basic Molecular Biology. Osho Scientific Publishers, Madurai.
5. Sambrook J and Russell DW (2001) Molecular cloning: A Laboratory Manual, Third edn, Cold Spring Harbor Press, New York.
6. Tyler MS (2010) Developmental Biology, A Guide for Experimental Study, Third edn, Sinauer Associates. Sunderland, Massachusetts, USA.

### **PGZ 5140**

### **Lab. in Environmental Biology**

**(2h/wk) (1cr)**

Laboratory course in Environmental Biology involves exercises to understand the principles and concepts of ecosystem, habitat, and their interaction with abiotic components, population and community.

### **Specific Learning Outcome:**

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

- examine the flora and fauna in surrounding ecosystem
- analyse the various physico-chemical parameters of water
- impart knowledge about environmental pollutants
- apply their knowledge and skills to collect and present information on environmental / climate change



**Laboratory experiments**

1. Identification of fauna and flora of terrestrial and freshwater ecosystem in the American College campus
2. Qualitative estimation of phytoplankton by Luky's drop method and zooplankton by Sedgwick-Rafter cell method.
3. Estimation of primary productivity: light and dark bottle method – effect of depth and light
4. Toxicity test – estimation of LC<sub>50</sub> values
5. Analysis of BOD and COD in water samples
6. Determination of portability of water by using coagulant demand, chlorine demand and residual chloride methods.
7. Analysis of heavy metals and pesticides in water by using spectrophotometry.
8. Analysis of particulate (dust fall methods) and gaseous components oxides of carbon/nitrogen/sulphur in traffic congested areas.
9. Organize and analyse environmental data from remote sensing and GIS.
10. Visiting environmentally relevant areas such as industries and prepare a report

**References**

1. Agarwal SK (2002) Industrial environment: assessment and strategy, APH Publishers, New Delhi.
2. Allen JRL (1977) Physical Process of Sedimentation, Allen & Unwin, London.
3. Odum EP and Barrett GW (2005) Fundamentals of Ecology, Fifth edn, East West Press Pvt. Ltd, New Delhi.
4. Eaton, AD and Franson MAH (2005) Standard methods for the examination of water and waste water. American Public Health Association, American Water Works Association, the Water Environment Federation, Washington DC.
5. Subramanyam NS and Sambamurty AVSS (2000) Ecology, Narosa Publishing House, Chennai.
6. Lynn LM (2010) Environmental Biology and Ecology Laboratory manual, Fifth edn, Kendall Hunt Publishing, USA

**PGZ 5642****Research Project****(6h/wk) (6cr)**

The Research Project aims at sharpening the student's spirit of scientific inquiry and to train the students in analyzing, interpreting the data and drawing valid conclusions. The students are allowed to choose the problems in subject areas of their own interest. The student's initiative and inventiveness in designing experiments are encouraged. The research project will be carried out in the fourth semester and evaluated at the end of the fourth semester.

**Program of Courses for the M.A Degree in Economics under CBCS  
(With effect from 2018-19)**

Course Code	Course Title	Contact Hours	Credits	Max Marks
<b>I SEMESTER</b>				
PEC 4431	Price Theory I	6	4	080
PEC 4433	Macro Economic Analysis I	6	4	080
PEC 4435	Public Economics	6	4	080
PEC 4337	Mathematical Methods and Applications	4	3	060
PEC 4339	Statistical Methods and Applications	4	3	060
PEC 4341	Globalization and Economic Reforms	4	3	060
	Buffer course : Human Development			
	Total	30	21	
<b>II SEMESTER</b>				
PEC 4432	Price Theory II	6	4	080
PEC 4434	Macro Economic Analysis II	6	4	080
PEC 4436	Econometric Theory and Applications	6	4	080
PEC 4338	Research Methodology	4	3	060
PEC 4340	Agriculture and Rural Development	4	3	060
PEC 4342	China and Global Economy	4	3	060
	Buffer course : Small Business Management			
	Total	30	21	
<b>III SEMESTER</b>				
PEC 5431	Environmental Economics	6	4	080
PEC 5433	Financial Markets and Services	6	4	080
PEC 5435	Advanced Econometrics	4	4	080
PEC 5437	Actuarial Economics	4	4	080
PEC 5439	Computer Applications in Economics (Lab)	4	4	080
PEC 5400	Special Area Study	6	4	--
	Total	30	24	
<b>IV SEMESTER</b>				
PEC 5632	International Economics	7	6	120
PEC 5634	Indian Economics	7	6	120
PEC5436	Development Economics	6	4	080
PEC 5438	Gender Economics	4	4	080
PEC5400	Project	6	4	160
	Total	30	24	
	Grand Total	120	90	

Special Area Study and Project are sequential courses

**Learner Outcome:** The student's get trained with the knowledge to handle tools of price theory in Economic Analysis

**Unit I: Models and Demand Analysis**

**Models:** Relevance of Economic Models – Types – Markets: Classification – Criteria - Consumer Behaviour: Cardinal Utility Theory – Indifference Curve Theory – Revealed Preference Hypothesis – Determinants and Exception to Law of demand – Elasticity of demand

**Unit II: Cost and Production Theories**

Cost – Types – Traditional vs. Modern Theories – Scale Economies - Production Function – Technical Progress and Production Function – Equilibrium of the Firm – Laws of Production: Law of Variable Proportion – Returns to Scale

**Unit III: Firms and Market Structure**

Perfect Competition: Short and Long Run Equilibrium - Monopoly: Short and Long Run Equilibrium – Comparison with Pure Monopoly – Bi-lateral Monopoly – Price Discrimination – Effects of Discrimination – Monopoly power - Monopolistic Competition: Product Differentiation - Equilibrium of the Firm

**Unit IV: Oligopolistic Models**

Non-Collusive Oligopoly: Cournot's Duopoly Model – Bertran's Duopoly – Chamberlin's Oligopoly – Kinked Demand Curve Model – Stackelberg's Duopoly Model - Collusive Oligopoly: Cartels – Joint Profit Maximisation – Market Sharing Cartels – Price Leadership – Low Cost Firm Leader – Dominant Firm Price Leader – Barometric Price Leadership

**Unit V: Critique on Marginalism**

Assumptions of Neo Classical Theory – Hall and Hitch Report and the Full-Cost Pricing Principle – Gordon's Attack on Marginalism – In Defense of Marginalism

**Text Books**

1. Koustoyiannis. A, (2003), Modern Micro Economics, Mac Millan Press Limited, London.

2. Ahuja, H.L. (2000), Advanced Economic Theory, Chand and Company Limited, New Delhi.

### References

1. Robert S. Pindyck and Daniel L. Rubengeld, (2006), Micro Economics, Prentice Hall of India Limited, New Delhi.
2. Gould, J.P. and C.E. Ferguson, (2003), Micro Economic Theory, AITBS, New Delhi.
3. Peter Pashigian, B. (1999), Price Theory and Applications, Irwin Mc Graw Hill, Boston, USA.
4. Watson, D.S., and Getz, M. (1996), Price Theory and its Uses, AITBS Publishers and Distributors, New Delhi.
5. Joshi, J.M. and Joshi, R. (1994), Micro Economic Theory: Analytical Approach, Vishwa Prakashan, New Delhi.

**PEC 4433**

**MACRO ECONOMIC ANALYSIS – I**

**6 Hrs/4 Cr**

### Learner Outcome:

Theoretically and empirically, Macro Economic behaviour in its facts the behaviour of aggregative variables related to macro policy. National income accounting as the basis for aggregative supply and aggregative demand, consumption function, multiplier, supply and demand for money

### Unit I: National Income and Account

Income and related concepts - Circular Flow of Income in two - three - and four - sector economy; different forms of national income accounting — social accounting, input-output accounting, flow of funds accounting and balance of payments accounting

### Unit II: Consumption Function

Consumption – classical Vs modern - Keynes' psychological law of consumption — implications and Empirical evidence on - Determination of Income, Output, and Employment - Aggregate demand function and Aggregate supply function - Income-consumption relationship — absolute income, relative income, life cycle and permanent income hypotheses

### Unit III: Investment Function

Investment – types - Marginal efficiency of investment - Marginal efficiency of capital — Investment behavior – accelerator, multiplier and super multiplier - effect of policy measures on investment

### Unit IV: Supply of Money

Money – types – monopoly as financial intermediation — a mechanistic model of bank deposit determination - A behavioral model of money supply determination, a demand determined money supply process, RBI approach to money supply, High powered money and money multiplier - budget deficits and money supply - money supply and open economy - control of money supply

### Unit V: Demand for Money

Classical approach to demand for money — Quantity theory approach, Fisher's equation, Cambridge quantity theory, Keynes's liquidity preference and demand for money — aggregate demand for money; Derivation of LM curve

### Text Books

1. Edward Shapiro, (1999), Keynes and Post – Keynesian Economics, Kalyani Publishers, New Delhi.
2. Rana and Verma, (2007), Macro Economic Analysis, Vishal Publication, Jalandhar.

### References

1. Rana and Verma, (2007), Macro Economic Analysis, Vishal Publication, Jalandhar.
2. Branson, (2003), Macro economic theory and policy, AIMBS, New Delhi..
3. Gupta, R D and A.S. Rana, (1997), Keynes and Post-Keynesian Economics, Kalyani Publishers, New Delhi.
4. Campbell R Mconnel and Harish C Gupta, (1987), Introduction to Macro Economics, Tata Graw Hill Publishing Company Limited, New Delhi.
5. Brooman, F.S., (1976), Macro Economics, Blackie and Son Limited, London.
6. Danlio, EA. (1974), Macro Economic Theory, Prentice Hall of India, New Delhi
7. Richard T. Froyen, (2003) Macro Economics – Theories and Policies, Pearson Education, New Delhi

**PEC 4435****PUBLIC ECONOMICS****6 Hrs/4 Cr**

**Learner Outcome:** Students can acquaint and understand with the changing role and functions of government in economic transition. Students will learn the knowledge of relative roles of government and the market in matters related to public goods, finance, enterprise and social welfare

**UNIT I: Public Goods and Welfare**

The Value Judgments, Inter-Personal relationship and Social Welfare –Spillover Benefit and Cost-Efficient Provision of Public Goods and Private Goods – Principle of Exclusion and Consumption, Classification of Goods: Private, Toll, Collective and common pool Goods – Merit Goods, Demerit Goods -Economic and Social Goods – Mixed Goods

**UNIT II: Economic Governance**

Demand for and Supply of Government Services – Role of Government in a Mixed Economy onto market economy - Corporate Governance and Forms of Economic Governance – E-Governance – Privatization- PPP Model – Laffer Curve analysis

**UNIT III: Public Activities**

Engle's Law – Application of Wagner's Law of Increasing State Activities – Peacock-Wiseman Hypothesis – Lindhal, Samuelson Views on Benefit Principle – Evaluation and Project Expenditure Evaluation

**UNIT IV: Public Policy**

Rationale of Public Policies - Poverty Alleviation and User Price - Provision of Infrastructure, Correcting Regional Imbalance – Balanced Budget Multiplier – Automatic and Discretionary Stabilizers – Built-in-Flexibility – Functional Finance – Fiscal Policy for Economic Development

**UNIT V: Government Finance**

Concept of Tax Incidence – Fiscal Incidence - Public Debt Redemption – Theories of Budgets – Performance Budgeting – Programme Budget – Zero Base Budgeting – Budget as the means of operationalising the Planning Process – Fiscal Federalism and Cooperative Federalism- GST - Local Finance .

**Text Books**

1. Musgrave, R. A. and Peggy B. Musgrave, (1995), Public Finance in Theory and Practice, Mc Graw Hills, New York.
2. Tyagi, B. P. (2001), Public Finance, Jai Prakashnath Meerut.
3. Maria John Kennedy (2012), Public Finance, PHI Learning Private Limited, New Delhi.

**References**

1. Atkinson, A. B. and J. Estiglitz, (1989), Lecturers on Public Economics, McGraw Hill, New York.
2. Mishra, D. K., (1985), Public Debt and Economic Development of India, Prince House, Lucknow.
3. Buchanan, J. M., (1980), Fiscal Theory and Political Economy, Selected Essays, University of North Carolina Press, Chapel Hill.
4. Muller, D. C., (1979), Public Choice, Cambridge University Press, Cambridge.
5. Musgrave, R. A., (1977), Essays in Fiscal Federalism, Greenwood Press, Westport.
6. Peacock, A. and G. K. Shaw (1976), The Economic Theory of Fiscal Policy, George Allen and Unwin, London.
7. Dates, W. E. (1972), Fiscal Federalism, Harcourt Brace and Jovanowich, New York.
8. Chelliah, R. (1971), Fiscal Policy in Underdeveloped Countries, George Allen and Unwin, Bombay.

**PEC 4337 MATHEMATICAL METHODS AND APPLICATIONS 4 Hrs/3Cr**

**Learner Outcome:**

Students can benefit and training to use the techniques of mathematical methods which are commonly applied to understand and analyze economic problems

**Unit – I: Differential Calculus**

Concept and Rules of Differentiation – Derivatives of Higher Order – Maximum and Minimum Values of a Function – Partial Derivatives – Applications – Utility, Production and Cost Functions with and without Constrained Optimization and Determination of Output and Profit Under Different Market Structures

**Unit – II: Integral Calculus**

Concept of Integration – Basic Rules and Methods of Integration – Applications in Economics – Consumer Surplus and Producer Surplus

**Unit – III: Difference Equation**

First Order Difference Equation and Applications – Cobweb Model – Market Model with Inventory – Multiplier and Accelerator Model

**Unit – IV: Matrices and Linear Programming**

Matrices – Types – Application of Matrices to the Solution of Linear Equations – Input-Output Analysis – Formulation of LP Problem – Concept of Duality – Graphical Solutions – Simplex Method

**Unit – V: Game Theory**

Concept of Game – Two-Person Zero-Sum Game - Pay-Off Matrix - Pure and Mixed Strategies, Maximum and Minimax Solutions – Graphical method -Saddle Point Solution – Non-Constant Sum Game – Prisoner’s Dilemma

**Text Books:**

1. Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
2. Henderson, J.M and R.E Quandt (1980). Micro Economic Theory: A Mathematical Approach, McGraw Hill, New Delhi.

**References:**

1. Allen, R.G.D.(1976), Mathematical Economics, Macmillan, London.
2. Kothari, C.R (1982) , An Introduction to Operations Research, Vikas Publishing House, New Delhi.
3. Carl P Simson and Lawrence Blume, (2006), Mathematics for Economists, Viva Books (P) Ltd., New Delhi.



**Learner Outcome:**

Learners will get training in the application of statistical methods to enrich the understanding of economics and instill the scientific rigor in economic thinking and they can equip in use of the statistical tools to understand the economic theory better.

**Unit-I: Introduction to Statistics**

Meaning of Statistics - Characteristics – Functions – Importance – Limitations – Methods of Sampling – Sources of Data – Methods of Collecting data

**Unit – II: Distributional Characteristics**

Central Tendencies – Mean, Median, Mode – Measures of Dispersion – Range, Mean Deviation, Standard Deviation, Co-efficient of Variation, Quartile Deviation, Skewness and Kurtosis

**Unit –III: Association Attributes**

Correlation – Types – Karl Pearson Coefficient – Spearman Rank Correlation - Regression – Regression Co-efficient – Correlation Vs Regression-Attributes – Difference between Correlation and Attributes – Methods of Studying Association-Non-Parametric methods – Chi-square Test – Sign Test

**Unit-IV: Time Series and Index Numbers**

Time series analysis and its Components --Index Numbers – Importance and Classification of Index numbers – Price, Quantity, Value: Laspeyer's, Paasche's and Fisher, Family Budget Method – Problems and Limitations of Index Number

**Unit- V: Probability and Hypothesis testing**

Probability and its related Concepts – Theorems of Probability – Addition and Multiplication-Theoretical Distribution – Binomial, Poisson and Normal: their Properties and Uses- Hypothesis testing – type I and II errors Z-test, t-test, F-test and ANOVA

**Text Books**

1. Gupta S P (2008), Statistical Methods, Sultan Chand & Sons, New Delhi.

2. Pillai R S N and Bagavathi , Statistics: Theory and Practice,(2009), S.Chand & Company Pvt.Ltd. New Delhi.

### References

1. Gupta, S.C and Kapoor, V.K (2007), Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.
2. Arora.P.N, Sumeet Arora and S.Arora (2007), Comprehensive Statistical Methods, Sultan Chand and Sons, New Delhi.
3. Elhance, D.N and Aggarwal, B.M (2006), Fundamentals of Statistics, Kitab Mahal, Allahabad.

## PEC 4341 GLOBALISATION AND ECONOMIC REFORMS 4 Hrs/3 Cr

**Learner Outcome:** The course enables students to acquaint with contemporary global economic affairs concerning economic, political and cultural dimensions of globalization, country experiences and economic reforms in India

### UNIT I: Introduction to Globalization

Meaning and Definition- Origin- Related Concepts- Profile of the World- Economic System- Features of Globalization – Process- Causes- Stages – Major Players-Ideology of Globalization: Economics, Political and Religious Dimensions – Globalization at the Firm and Corporate Level – Cross Border Mergers and Acquisitions – Advantages and Disadvantages – Essential Conditions for Globalization

### Unit II: International Organisation and Globalisation

IBRD, IMF, WTO – Origin, Objectives, Functions – WTO Agreements- Basic Principles – Main Elements- Agreements on Agriculture – Industry – Trade – Services – Property Rights – Rules of Origin

### UNIT III: Globalization Issues and Challenges

State Vs Market – Deregulation and Decontrol – Investment: MNC's FDI and Capital Flows – Global Financial Crisis – Technology Transfer – Privatization – Factor Mobility - Alternatives to Globalization - Challenges

**UNIT IV: Experiences of Countries on Globalization**

Benefits of Globalization across Countries - Developed Vs. Developing, Small Vs. Large - Rich Vs. Poor - Experiences Asian Tigers

**UNIT V: Globalization and Economics Reforms in India.**

Economic Reforms – Origin – Features – Strategies (LPG) – Process - Agricultural and Industrial Sector Reforms - External Sector Reforms - Financial Sector Reforms – Fiscal and Banking Sector Reforms – Labour Reforms- Health and Education Sector Reforms

**Text Books:**

1. Datt, Ruddar (2008), Indian Economy, S. Chand and Company, New Delhi.
2. Radhakrishna, R (2008), India Development report, Oxford University press, NewDelhi.
3. Jagdish Gandhi, P. (2003), Globalised Indian Economy: Contemporary Issues and Perspectives, Deep and Deep Publications Private Limited, New Delhi..
4. Martin Hhor (2001), Rethinking Globalization: Critical Issues and Policy Choices, Zed Books, London.

**References**

1. Thomas Sebastian (2007): Globalization and uneven Development, Rawat Publications, New Delhi.
2. Stefano Pelle (2007) – Understanding Emerging Markets, Response Book, New Delhi.
3. Sumi Krishna (2004): Globalization and people’s development choices-Hivos- Netherlands.
4. Pranab Kanti Baxe (2008)- Globalization An Anti-Text- A local view, Aakar Books –New Delhi.
5. Marjan and H W Singer (1996): The World Economy: Challenges of Globalization and Regionalisation, Macmillan Press Ltd., London.
6. Greg Buckman (2004), Globalisation: Tame It or Scrap It? University Press, Dhaka

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**PEC                      HUMAN DEVELOPMENT                      4 Hrs/3 Cr**

**Learner Outcome:** The course enables students to acquaint Human Growth and Development is planned to acquaint you with developmental concepts in psychology and to give you an understanding of the basic dynamics, which underlie human behavior at various stages in the lifespan. Investigating these processes in relation to biological, psychological, socioeconomic and cultural factors

**Unit –I: Introduction to Human Development**

Human development and the need to study it; roles of heredity and environment in human development; concepts of growth and development; the life span approach to human development- Conception; physical and psychological care of the expectant mother-Prenatal development

**Unit-II Marriage and Family Relations**

Marriage – Definition, functions and changing trends. Marital-adjustment and its influencing factors - Family – Definition, composition, functions and types (with reference to India), changing trends of family in India and it's influencing Factors- Interpersonal relationships within the family – importance and types of family interaction and communication

**Unit III: Child Care and Development**

Birth of the baby – the characteristics of the neonate; care of the neonate. Infancy – highlights of development ; caring for the infant –feeding, weaning , supplementary feeding ; sleep routine ; bathing and clothing ; immunization schedule ; importance of toys.

**Unit IV: Psychological bases of human development**

Intelligence – Definition, nature of intelligence, origins of intelligence testing, types of intelligence tests. Emotion – Definition, adaptive functions, basic emotions of fear, anger and love, universal aspects of emotions. Personality – Definition, influencing factors, role of social norms impersonality development, tests of personality Socialization- Definition, agencies of socialization, gender differences in socialization.

**Unit V: Disabilities and Behavior problems in children**

Disability – Definition, characteristics of disabled children, major types of disabilities: causes, diagnosis and remedies. Adjustment at home and school. Behavior problems – Definition. Causes of and remedies for behavior problems in children: thumb sucking, bedwetting, fear, anxiety, shyness, temper tantrum, stealing, lying and truancy.3. Guidance

and counseling of disabled children and children with behavior problems through different stages of development

**Text Book**

1. Nag, Rathindranath. Ma o shishu-Papalia, D.E., Olds, S.W. and Feldman, R.D. (2006), Human Development. 9th Ed. New Delhi: Tata McGraw- Hill.-Roy, Sushil. Shiksha manavidya
2. Morgan, C.T., King, R. A., Weisz, J.R. and Schopler, J. (1987). Introduction to psychology 7th Ed., New York: McGraw – Hill.

**References:**

1. Arya, S.C. (1972).Infant and child care for the mother. New Delhi
2. Berk, L. E. (1996). Child development. New Delhi
3. Hurlock, E.B. (2007). Developmental psychology: A life – span approach-New Delhi: Tata McGraw Hill.
4. Kirk, S.A. (1970).Educating exceptional children. Indian Edition. New Delhi.

**PEC 4432**

**PRICE THEORY - II**

**6 Hrs/4Cr**

**Learner Outcome:** The students can understand the theoretical underpinnings of managerial and behavioral theories of firms, methods of factor pricing and decision making in the asymmetric realm.

**Unit 1: A Representative Model of Average Cost Pricing**

Goals of the Firm – Demand and Cost Schedules – Price and Mark-up Rule – Prediction of Average Cost Pricing Theory in Changing Market Conditions – Skimming and Penetrating Price

**Unit II: Limit Pricing**

Bain’s Model – Sylos Labini Model – Franco Modigliani Model – Bhagwati Model – Pashigian Model

**Unit III: Managerial Theories**

Baumol’s Theory of Sales Maximisation – Marris Model of Managerial Enterprise – Williamson’s Model of Managerial Discretion – Asymmetric Information and Markets – Market Signaling – Moral Hazards

**Unit IV: Factor Pricing**

Factor Pricing in Perfectly and Imperfectly Competitive Markets – Bilateral Monopoly – The Adding-up Problem

**Unit V: Welfare Economics**

Criteria of Social Welfare: Growth of GNP – Bentham's Cardinalist Criterion – Kaldor-Hick's Compensation Criterion – Bergson Criterion – Pareto Optimality – Welfare Maximisation and Perfect Competition

**Text Books:**

1. Koustoyiannis. A, (2003), Modern Micro Economics, Mac Millan Press Limited, London.
2. Ahuja, H.L. (2000), Advanced Economic Theory, Chand and Company Limited, New Delhi.

**References**

1. Robert S. Pindyck and Daniel L. Rubengeld, (2006), Micro Economics, Prentice Hall of India Limited, New Delhi.
2. Gould, J.P. and C.E. Ferguson, (2003), Micro Economic Theory, AITBS, New Delhi.
3. Peter Pashigian, B. (1999), Price Theory and Applications, Irwin Mc Graw Hill, Boston, USA
4. Watson, D.S., and Getz, M. (1996), Price Theory and its Uses, AITBS Publishers and Distributors, New Delhi.
5. Joshi, J.M. and Joshi, R. (1994), Micro Economic Theory: Analytical Approach, Vishwa Prakashan, New Delhi.

**PEC 4434      MACRO ECONOMIC ANALYSIS – II      6 Hrs/4Cr**

**Learner outcome:**

The Sequential course helps the students to evaluate macroeconomic policies and their impact on macroeconomic process, theories, and theory of investment, inflation and Phillip's curve.

**Unit I: IS – LM Model and its variants**

Keynesian and Neo-classical views on Interest; The IS-LM model; Extension of IS-LM model with Government Sector; Relative effectiveness of Monetary and Fiscal policies; Extension of IS-LM models with Labour Market and Flexible Prices

**Unit II : Post-Keynesian Demand For Money**

Post - Keynesian approaches to demand for money — Patinkin and the Real Balance Effect, Approaches of Baumol and Tobin; Friedman and the modern quantity theory; Crisis in Keynesian economics and the revival of monetarism

**Unit III: Macroeconomics in an Open Economy**

Mundell - Fleming model — Asset markets, expectations and Exchange Rates; Monetary approach to balance of payments

**Unit IV: Theory of Inflation**

Classical, Keynesian and Monetarist approaches to inflation; Structuralist theory of inflation; Philips curve analysis — Short run and long run Philips curve; Samuelson and Solow — the natural rate of unemployment hypothesis; Tobin's modified Philips curve; Adaptive expectations and rational expectations; Policies to control inflation

**Unit V: Business Cycles**

Theories of Schumpeter, Kaldor, Samuelson and Hicks, Goodwin's model; Control of business cycles — Relative efficacy of monetary and fiscal policies

**Text Books**

1. Edward Shapiro, (1999), Keynes and Post – Keynesian Economics, Kalyani Publishers, New Delhi.
2. Rana and Verma, (2007), Macro Economic Analysis, Vishal Publication, Jalandhar.

**References**

1. Rana and Verma, (2007), Macro Economic Analysis, Vishal Publication, Jalandhar.
2. Branson, (2003), Macro economic theory and policy, AIMBS, New Delhi..
3. Gupta, R D and A.S. Rana, (1997), Keynes and Post-Keynesian Economics, Kalyani Publishers, New Delhi.
4. Campbell R Mconnel and Harish C Gupta, (1987), Introduction to Macro Economics, Tata Graw Hill Publishing Company Limited, New Delhi.
5. Brooman, F.S., (1976), Macro Economics, Blackie and Son Limited, London.
6. Danlio, EA. (1974), Macro Economic Theory, Prentice Hall of India, New Delhi
7. Richard T. Froyen, (2003) Macro Economics – Theories and Policies, Pearson Education, New Delhi

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**PEC 4436            ECONOMETRIC THEORY AND APPLICATIONS            6 Hrs/4Cr**

**Learner Outcome:** This course aims at imparting analytical skill essential to validate economic phenomenon. It includes linear, multiple linear regression models, ANOVA, and violation of OLS assumptions.

**Unit I : Introduction**

Definition – Scope – Goals and Division of Econometrics – Methodology of Economic Research

**Unit II: Simple Linear Regression Model**

Simple Linear Regression Model – Assumption of the Linear Regression Model – Properties of OLS estimators – Sampling Distribution of OLS estimators – Statistical tests of Significance of the Estimates Confidence Intervals and Hypothesis Testing – Goodness of Fit with  $R^2$  – Applications.

**Unit III: Multiple Linear Regression Model**

Multiple Linear Regression Model – Assumptions of the Multiple Linear Regression Model – Properties of OLS estimators – Generalization to More Than Two Variables – Both Normal and Matrix Approach – Application.

**Unit IV: Violation of OLS Assumptions**

Tests of the Assumptions of the Linear Regression Model- Zero mean – Normality – Autocorrelation – Meaning , Consequences, Detections and Methods of Removal- Heteroscedasticity – Multi collinearity – Meaning – Consequences – Detections and methods of removal

**Unit V: Analysis of Variance and Regression Model**

Analysis of Variance – Difference between Regression and Analysis of Variance – Sampling Distribution of OLS Estimators – Statistical Tests of Significance of the Estimates – Confidence Intervals and Hypothesis Testing – Goodness of Fit with R – Applications.

**Text Books**

1. Gujarati,D (2009) , Basic Econometrics, Tata McGraw-Hill Education.



2. G M K Madnani (2005), Introduction to Econometrics, Oxford & IBH Publishing Co Pvt.Ltd, New Delhi, India.

**Reference**

1. Koutsoyiannis, A(2003), Theory of Econometrics, Harper and Row Publishers, Inc.,
2. Kements (2003), Elements of Econometrics, Harper and Row Publishers, New York.
3. Johnston (1985), Econometrics, McGraw Hill, New York.

**PEC 4338**

**RESEARCH METHODOLOGY**

**4 Hrs/3Cr**

**Learner Outcome:** students can get training in scientific thinking and helps to develop socially concerned and competent researchers, administrators and activists. Students also acquaints with the identification of researchable problem, hypothesis formulation, research methods and techniques and ultimately the method of report writing

**UNIT I: Introduction**

Meaning – criteria for good research – assumptions, objectives and difficulties of social research – qualities of a good research

**UNIT II: Dimensions of Research**

Classification of research - fundamental – applied – descriptive – historical – exploratory- experimental - case study – characteristics of case study- sources -utility and limitations of case study method - survey research - evaluation – comparative method – precautions used in comparative method and inter disciplinary research.

**UNIT III: Hypothesis and Research problem**

Selection of the research problem - types of research problem – sources-criteria of good research problem – justification of the problem evaluating the problem. Definition of hypothesis – types - functions, sources of hypothesis - criteria of usable hypothesis-utility - difficulties in formulation of hypothesis.

**UNIT IV: Sources of Data and Research Design**

Meaning of research design - concepts relating to research design - major steps in preparing a research design - factors affecting research design - evaluation and advantages of research design-Sources of data – primary and secondary data - census and sampling

method – essentials of a good sample - methods of sampling – observation - types of observation –merits and limitations

### **UNIT V: Statistical Applications and Techniques**

Processing, analysis and interpretation of data- - Statistical applications in research- scaling techniques - criteria of validity of a scale - difficulties in scaling - kinds of scales - point scales - Bogardus scale - intensity scale, ranking scale - Thurstan scale and Likert scale - meaning of research report -purpose and structure of research report

#### **Text Books**

1. Kothari, C.R, (1999), Research Methodology: Methods and Techniques, Wiley Eastern Limited, New Delhi.
2. Thanulingam, N., (2002), Research Methodology, Himalaya Publishing House, Mumbai.

#### **References**

1. Loraine Blaxter, Christina Hughes and Malcom Tight, (1999), How to Research, Viva Books Private Limited, New Delhi.
2. Martyn Denscombe, (1999), The Good Research Guide for Small-Scale Social Research Projects, Viva Books Private Limited, New Delhi.
3. Sarvanavel, P., (1999), Research Methodology, Kitab Mahal, Allahabad.
4. Diwivedi, R.S., (1997), Research Methods in Behavioral Sciences, Macmillan, New Delhi.
5. Sonachalam, K.S., (1988), Research Methodology of Social Sciences, Emerald Publication, Madras.
6. Goode, William J. and Hatt, Paul K (1987), Methods in Social Research, Mc Graw Hill, London.
7. Wilkinson and Pandarkar, (1984), Methodology and Techniques of Social Research, Himalaya Publishing House, Bombay.
8. Kurein, C.T., (1973), A Guide to Research in Economics, Sangam Books, Madras.
9. Uma Sekaran, (2006), Research Methods for Business- A skill building Approach, Wiley India (P) ltd, New Delhi.

**Learner Outcome:** This course enables the students to obtain a detailed treatment of issues in agricultural economics and to get familiarized with policy issues that are relevant to Indian agricultural economics.

**Unit I: Agriculture and Economic Development:** Nature and Scope of Agricultural and Rural Economics - Traditional Agriculture and Its Modernization - Role of Agriculture in Economic Development - Interdependence between Agriculture and Industry - Models of Interaction between Agriculture and the Economy

**Unit II: Agricultural Production and Productivity:** Agricultural Production - Agriculture Growth Debate - Farm Size and Laws of Returns – Size-Productivity Debate - Farm Budgeting - Resource Use Efficiency in Agriculture – Impact of Modernization and Mechanization on Agriculture - Reforms and Revolutions - Labour Absorption - Gender Issues in Agriculture

**Unit III: Diversification of Rural Economic Activities:** Rural Livelihood System - Nature and Types of Rural Economic Activities - Livestock and Animal Husbandry Activities - Livestock Resources and Their Productivity - White Revolution - Fishery and Poultry Development - Blue Revolution- Forestry - Horticulture and Floriculture - Issues and Problems in Rural Industrialization - Development of Agro-based Industries - Problems of Agricultural Marketing

**Unit IV: Agriculture and Rural Infrastructure:** Importance of Economic and Social Infrastructures - Land Resources, Water Resources - Energy Resources - Rural Transport - Communication - Banking - Extension Services - Rural Electrification - Rural Social Infrastructure: Education - Health - Information Dissemination

**Unit V: Rural Finance:** Rural Indebtedness: Status, Causes and Remedies - Role of Capital and Rural Credit - Organized and Unorganized Capital Market - Rural Savings and Capital Formation - Characteristics and Sources of Rural Credit — Institutional and Non-Institutional - Reorganization of Rural Credit — Cooperatives, Commercial Banks, Regional Rural Banks- Role of NABARD - Self-Help Groups (SHGs) - Micro Units Development and Refinance Agency Bank (MUDRA Bank)

**Text Books:**

1. Subba Reddy S, P.Raghu Ram, T.V.Neelakanta Sastry and I. Bhavani Devi (2010), Agricultural Economics, Oxford & IBH Publishing Co Pvt. Ltd, New Delhi.
2. Tyagi B.P (2005), Agricultural Economics and Rural Development, Jai Prakash Nath & Co, Meerut

**References:**

1. Bhaduri, A. (1984), The Economic Structure of Backward Agriculture, Macmillan, Delhi.
2. Bilgrami, S.A.R. (1996), Agricultural Economics, Himalaya Publishing House, Delhi.
3. Chaudhary, P. (1972), Readings in Indian Agricultural Development, George Allen & Unwin, London.
4. Soni, R.N. (1995), Leading Issues in Agricultural Economics, Arihant Press, Jalandhar.
5. Brahmananda, P.R. and V.R. Panchumukhi (Eds.) (1987), The Development Process of the Indian Economy, Himalaya Publishing House, Bombay.
6. Raj, K.N. et.al. (1988), Essays in the Commercialisation of Indian Agriculture, Oxford University Press, New Delhi.
7. Vaidyanathan, A. (1995), The Indian Economy: Crisis, Response and Prospects, Orient Longmans, New Delhi.
8. Rao, C.H. Hanumantha (1994), Agricultural Growth, Rural Poverty and Environmental Degradation in India, Oxford University Press, New Delhi.
9. Uppal, J.S. (Ed.) (1987), India's Economic Problems — An Analytical Approach, Tata McGraw Hill, New Delhi.
10. Basanta K Pradhan, M.R.Saluja, P K Roy and S'L.Shetty (2003), Household Savings and Investment Behaviour in India, EPW Research Foundation, Mumbai

**PEC 4342****CHINA AND GLOBAL ECONOMY****4 Hrs/3Cr**

**Learner Outcome:** The students to get familiarized with the basic characteristics of Chinese Economy, its development process and its challenges and prospects. It helps to understand how each country is peculiar and enable them to learn from other economies.

**Unit I: Introduction to Chinese Economy**

Profile of China – History – Culture – Resources – Infrastructure – Special Features of Chinese Economy – Relevance of Chinese Studies

**Unit II: China's Political System**

Political Ideology - Party State - Structure and levels of Governance - Central and Local Relations

**Unit III: Economic Growth and Development of China**

Dimensions of Growth and Development of China – Composition and Trends in National Income - Growth Models and New Economic Strategy - Achievements of China –Challenges and Prospects

**Unit IV: China's Foreign Relations and Policy**

Priorities of Chinese Diplomacy – Relations with Nations of Groups (developed, developing and neighboring countries) - Dimensions of International Relations – China's Relations with India – China and International Organizations.

**Unit V: Emerging Market and China**

Emerging Market- China's Contribution to World Economy - China and Globalization - Rise of China as a Global Power – World's View of China - Learning from China's Development Experience

**Text Books:**

1. Robert L. Worden, Andrea Matles Savada, and Ronald E. Dolan (1987): China, A Country Study. Area Handbook Series, Federal Research Division, Library of Congress Washington, D.C.
2. Shuxun Chen and Charles Wolf, Jr (2001): China, the United States and the Global Economy, RAND, Santa Monica, CA.

**References:**

1. Dwight H. Perkins (2006): The Challenges of China's Growth, AEI Press, Washington, D.C.
2. Edward Friedman and Bruce Gilley (2005): Asia's Giants: Comparing China and India, Palgrave Macmillan Ltd, New York.
3. Jan Joost Teunissen (2003) China's Role in Asia and the World Economy: Fostering Stability and Growth, FONDAD, The Hague.
4. Martin Jacques (2009) When China Rules the World, Allen Lane, Penguin Books Ltd, London. England.
5. Shaun Breslin (2007): China and the Global Political Economy, International Political Economy Series, Palgrave Macmillan Ltd, New York.
6. Vittorio Valli, Donatella Saccone (2009) Structural Change and Economic Development in China and India, Working paper No. 7/2009, University of Torino, Italy.

PEC

SMALL BUSINESS MANAGEMNET

4Hrs/3Cr

**Learner Outcome:** Students will get better understanding of small business entrepreneurship that includes the concept of Enterprise; Project planning, Financial and Marketing feasibility and they will also learn the challenges of small business such as Innovation, and Crisis Management and inculcates in students the spirit of enterprise.

### **UNIT I: Small Enterprise – An Introduction**

Definition – Classification – Environment of Small Business – Role – Risk and Survival Strategy – Entrepreneurship and Small Enterprises – Nurturing Entrepreneurship

### **UNIT II: Project Planning**

Search for a business idea – Environment scanning – concepts of Projects and classification – Project Identification – Formulation – Design and Network Analysis – Project Report – Project Appraisal: Factory Design and Layout – Shop Floor Environment – Forms of Organization – Incentives and Subsidies – Finance and Consultancy supports

### **UNIT III: Marketing Assessment**

Definition and Functions of Marketing – Marketing Mix – Marketing Channels – Packaging, Branding, Buying Motive - Marketing Institutions and Assistance – Marketing Research and Marketing Information System – Pricing – Market Segmentation and Marketing Strategies – Export Potential

### **UNIT IV: Challenges of Small Business**

Problems of Small Business – Sickness – Reasons and Remedies – Creativity and Innovation – Opportunities – SWOT analysis – Product and Process Protection – Measures

### **Unit V: Branding and Crisis Management**

Patents – Trade Marks – Copy Rights – Managing Growth and Transition - Crisis Management – Time Management and Quality Management

### **Text Books**

1. Vasanth Desai (2006) Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, New Delhi.
2. Suri, K.B. (2006) Small-Scale Enterprises in industrial Development: The Indian Experience, SAGE publications, New Delhi.

### **References**

1. David, Holt (2008), Entrepreneurship, New Venture Creation, Prentice Hall, New Delhi.
2. David Campbell and Tom Craig, (2011), Organizations and the Business Environment (Second Edition)
3. Peter J. Buckley, Peter Ender wick, Adam R. Cross, (2018), International Business, Prentice Hall, New Delhi
4. Paul, (2006), 'Business Environment', Tata McGraw-Hill, New Delhi

**PROGRAM OF COURSES FOR POSTGRADUATE DEGREE IN COMMERCE  
UNDER CHOICE BASED CREDIT SYSTEM**

**(With effect from 2018 - 2019)**

<b>Course Code</b>	<b>Course Title</b>	<b>Hours</b>	<b>Credit</b>	<b>Max Marks</b>
<b>I Semester</b>				
<b>PCO 4421</b>	Organizational Behaviour	6	4	80
<b>PCO 4323</b>	Managerial Economics	4	3	60
<b>PCO 4425</b>	Marketing Management	4	4	80
<b>PCO 4427</b>	Corporate Accounting	6	4	80
<b>PCO 4329</b>	Quantitative Techniques	6	3	60
<b>*PCO 4331</b>	Digital Marketing	4	3	60
	<b>TOTAL</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>II Semester</b>				
<b>PCO 4422</b>	Human Resource Management	6	4	80
<b>PCO 4324</b>	Customer Relationship Management	4	3	60
<b>PCO 4426</b>	International Marketing	4	4	80
<b>PCO 4428</b>	Advanced Corporate Accounting	6	4	80
<b>PCO 4330</b>	Security Analysis & Portfolio Management	6	3	60
<b>*PCO 4332</b>	Basis of Taxation	4	3	60
	<b>TOTAL</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>III Semester</b>				
<b>PCO 5421</b>	Management Accounting	6	4	80
<b>PCO 5423</b>	Business Taxation I	6	4	80
<b>PCO 5425</b>	Insurance and Risk Management	4	4	80
<b>PCO 5427</b>	Research Methodology	4	4	80
<b>PCO 5429</b>	Advanced Cost Accounting	6	4	80
<b>PCO 5431</b>	Services Marketing	4	4	80
	<b>TOTAL</b>	<b>30</b>	<b>24</b>	<b>480</b>
<b>IV Semester</b>				
<b>PCO 5422</b>	Financial Management	6	4	80
<b>PCO 5424</b>	Business Taxation II	4	4	80
<b>PCO 5426</b>	Business Ethics and Corporate Governance	6	4	80
<b>PCO 5428</b>	Small Business Management	4	4	80
<b>PCO 5430</b>	Project	6	4	80
<b>PCO 5432</b>	ERP Applications	4	4	80
	<b>TOTAL</b>	<b>30</b>	<b>24</b>	<b>480</b>

\* CBCS Courses

The objective of the course is to influence and impact the student on behaviour within organization for the purpose of applying such knowledge toward improving an organization's effectiveness to give perspective knowledge on the essential tool for managing effective teams, and to predict human behaviour in an organization. It also provides an idea on how organizations can be structured more accurately, and how several events in their outside situations have effect on organization.

**UNIT I**

Management Concepts and Organisational Behaviour: Concepts and its significance, Introduction to OB, Relationship between management and organizational behaviour. Individual Behaviour: Theories of values and attitudes, Personality, Perception, Learning, theories of motivation.

**UNIT II**

Group Dynamics and Team Development: Definition, importance, types of groups, Group formation, Group development, Group composition, Group performance factors-principle, centered approach to team development.

**UNIT III**

Leadership: Concept, Styles, Theories: Trait theory, behavioural theory, contingency theory, situation theory, Power and authority.

**UNIT IV**

Organizational Conflict: Dynamics and Management, sources, patterns, levels and types of conflict, traditional and modern approaches to conflict, functional and dysfunctional organizational conflicts, resolution of conflict, transactional analysis.

**UNIT V**

Organisational Change and Development: concept, need for change, resistance to change, theories of planned change, Organisational diagnosis, OD intervention. Organisational climate and change.

**Text Books:**

1. Fred Luthens, Organisational Behaviour Mc. Graw Hill International Edition, 12<sup>th</sup> edition, 2010.
2. Aswathappa. K, Organisational Behaviour, Himalaya Publishing House, 12<sup>th</sup> Revised Edition, 2017

**References:**

1. Keith Davis and John. W. Newstrom (8<sup>th</sup> Edition) Human Behaviour at work, McGraw Hill, International Edition 2000
2. Stephen. P. Robbins, Organisational behaviour, PHI Pvt. Ltd., 9<sup>th</sup> Edition 2011
3. Chandan, Organisational Behaviour, TBH Publishers, 2003
4. Koontz, Harold, Cyril O'Donnell, and Hienz Weirich: Essentials of Management Tata Mc GrawHill, New Delhi.2013



This course develops managerial perspective to economic fundamentals as aids to decision making under given environmental constraints and to illustrate the application of economic theory and methodology as an alternative in managerial decisions.

### UNIT I

Nature and Scope of Managerial Economics: Objective of a firm, Economic theory and managerial theory, Managerial economist's roles and responsibilities, Fundamental economic concepts – Incremental principle, Opportunity Cost principle, Discounting Principle, Equi-marginal principle.

### UNIT II

Demand Analysis: Individual and market demand functions, Law of Demand, Determinants of demand, Elasticity of demand: its meaning and importance, Price elasticity, Income elasticity, Cross elasticity, Using elasticity in managerial decisions.

### UNIT III

Theories of Consumer Choice: Cardinal utility approach, Indifference approach, revealed preference and theory of consumer choice under risk, Demand estimation for major consumer durable and non – durable products, Demand forecasting techniques.

Production theory: Production function, Production with one and two variable inputs, Stages of Production, Economies of scale, Estimation of production function, Cost theory and estimation, Economic value analysis, Short and long run cost functions: nature, shape and inter-relationships, Law of variable proportions, Law of returns to scale.

### UNIT IV

Price Determination and Pricing Practices: Characteristics of different market structures, Price determination and firm's equilibrium in short run and long run under perfect competition, monopolistic competition, oligopoly and monopoly. Methods of price determination in practice, Pricing of multiple products, Price discrimination, International price determination and dumping, Transfer pricing.

### UNIT V

Business cycles: Nature, Phases of business cycle, Theories of business cycle - Psychological, Profit, Monetary, Innovation, cobwebs Samuelson and Hicks theories. Inflation: Definition, characteristics, types, Inflation in terms of demand, Pull and push factors, Effects of inflation and Deflation.

#### Text Book:

1. Dr.R.L Varshney, Managerial Economics, Sultan Chand and Sons, New Delhi, 22<sup>nd</sup> Revised Edition, 2014

#### References:

1. Dwivedi DN: Managerial Economics, Vikas Publishing House, New Delhi, 2015
2. Mithani D M, Managerial Economics: Theory & Applications, Himalaya Publishing House, 2016
3. Kulkarni, Managerial Economics, Tamilnadu Book House, 2012

The objective of this course is to facilitate the understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints. This course is taught with both strategic and managerial focus. Students would be given opportunities to perform the role of a marketing manager.

**UNIT I**

Introduction: Marketing Concept and its evolution, Nature, Scope and Importance, Marketing mix, Strategic marketing planning – an overview.

**UNIT II**

Market Analysis and Selection: Marketing environment – macro & micro components, impact on marketing decisions. Market segmentation and positioning, Buyer behaviour, Consumer Vs Industrial buyers, Consumer decision-making process.

**UNIT III**

Product and Pricing Decisions: Concept of a product, Classification of products, Major product decisions, Product line and product mix, Branding, Packaging and Labeling, Product life cycle, Strategic implications, new product development and consumer adoption process. Pricing decisions: Factors affecting price determination, Pricing policies and strategies.

**UNIT IV**

Distribution and Promotional Decisions: Nature, functions and types of distribution channels, Distribution channel intermediaries, Channel management decisions, Retailing and wholesaling. Promotion decisions: Communication process, Promotion mix – Advertising, Personal selling, Sales promotion, Publicity and Public relations, determining advertising budget, Advertising Copy designing and its testing, Media selection, Advertising effectiveness, Sales promotion – Tools and techniques.

**UNIT V**

Marketing Research and Organisational Research: Meaning, Scope, Marketing research process. Marketing organisation and control: organizing and controlling marketing operations. Issues and Developments in Marketing: Social, ethical and legal aspects of marketing. Marketing of services, International marketing, Green marketing, Cyber marketing, Multi level marketing, Relationship marketing.

**Text Books:**

1. Kotler, Philip and Gary Armstrong, Principles of marketing, Prentice Hall, New Delhi, 14<sup>th</sup> Edition, 2015
2. Sherlekar, Marketing Management, Himalaya Publishing House, New Delhi, 2016

**References:**

1. Ramaswamy, V.S and Nama Kumari, S: Marketing Management, Macmillan India, New Delhi, 2009.

2. Srinivasan, R: Case studies in marketing: the Indian Context, Prentice Hall, New Delhi.6<sup>th</sup> Revised Edition, 2014.
3. Stanton, William J and Charles Futrell: Fundamentals of Marketing: McGraw Hill Publishing Company, New York, 2002.

**PCO 4427**

**CORPORATE ACCOUNTING**

**6 Hrs / 4 Cr**

The objective of this course is to give a comprehensive understanding of all aspects relating to corporate accounting and to lay a theoretical foundation for the preparation and presentation of financial statements of Company.

### **UNIT I**

Companies: Types, Share Capital: Types, Shares: Kinds of shares, Issue of Shares, Under subscription and Over Subscription, Calls in arrears and advance, Issue of shares at premium and at discount, Effect of pro- rata allotment, Forfeiture and re-issue of shares, Surrender of shares, Lien on shares, Right issue, Underwriting of shares: Individual and Firm underwriting. Redemption of preference shares.

### **UNIT II**

Debentures: Classification, Issue of Debentures, Treatment of different items relating to Debentures in final accounts. Redemption debentures: Methods - Redemption without provision and Redemption out of Provision. Profits prior to Incorporation: Methods of ascertaining profit / loss. Acquisition of business: Accounting treatment

### **UNIT III**

Final Statements of Companies: Statement of Profit and loss, Form of Balance sheet, Managerial remuneration. Valuation of goodwill: Shares, Alteration of Share Capital: Internal Reconstruction Procedure.

### **UNIT IV**

Amalgamation: Merger and Acquisition, Calculation of purchase consideration, Accounting treatment, Inter Company owing, Intercompany unrealized profit, Inter Company holdings, External reconstruction and Accounting treatment.

### **UNIT V**

Liquidation of Companies: Modes of Winding up, Contributory, Preferential Payments, Preferential Dividend, Liquidators financial statement of Accounts, Liquidators remuneration, Statement of Affairs – Deficiency or surplus account.

### **Text Books:**

1. Kr. Paul, Corporate Accounting, New Central Publication, Kolkata, 2014
2. S.P. Jain and K.L. Narang, Advanced Accounting, Kalyani publications, 2017

**References:**

1. Allen. C. Shapiro, Multinational Financial Management, PH I Pvt. New Delhi, 2013
2. S.P. Iyengar, Advanced Accountancy, Sultan Chand & Sons, 2013
3. R. L. Gupta, Advanced Accountancy, Sultan Chand & Sons, 2016

**PCO 4329**

**QUANTITATIVE TECHNIQUES**

**6 Hrs / 3 Cr**

The purpose of this course is to provide an introduction to both basic and advanced analytical tools for business disciplines. Beginning with simple statistical methods, the course builds to more robust analytical techniques such as multivariate linear regression. Emphasis is placed on theoretical understanding of concepts as well as the application of key methodologies used by industry. This course also aims to promote a critical perspective on the use of statistical and econometric information.

**UNIT I**

Quantitative Techniques: Introduction, Importance, Scope, Uses, Limitations, Applications and relevance in commerce, management, social science etc. Simple techniques, Solving Equations, exponential & logarithmic expressions, Set theory, Determination of X and Y Variables

**UNIT II**

Correlation Analysis: Simple, Partial and Multiple Correlations. Regression analysis, Coefficient of determination, Testing Significance of ‘r’. Regression Equations: Introduction to Multivariate Analysis, Factor Analysis, and Cluster Analysis

**UNIT III**

Probability: Concept, Definitions, Addition, Multiplication Theorem of Probability, and Conditional Probability, Baye’s theorem and its Applications.

**UNIT IV**

Testing of significance: Mean, difference between means, ANOVA (One Way and Two Way) Testing of Proportion, Difference between proportions, Chi-Square Test, Non-Parametric Tests.

**UNIT V**

Operation Research: Introduction, Linear programming: Mathematical formulation, Graphic and Simplex models, Maximization and Minimization, Transportation, Assignment Problem.

**Text Books:**

1. Mithiah, Quantitative Techniques, Tamilnadu Book House, 2012
2. S.P. Gupta, Statistical Methods, Sultan Chand & Co., New Delhi 2011

**References:**

1. Dhareshwar, Business Statistics, Tamilnadu Book House, 2012
2. Reddy, Quantitative Techniques, Tamilnadu Book House, 2012
3. Richard I. Levin, Statistics for management, Prentice Hall, New Delhi, 2008

**PCO 4331****DIGITAL MARKETING****4 Hrs / 3 Cr**

This course enlightens students to gain an understanding how the digital economy works and develop the critical insights necessary to succeed in e-commerce and digital and social media marketing.

**UNIT I**

Digital Marketing: Introduction, Meaning, Definitions, Basics of Marketing, Comparison of Traditional and Digital Marketing, Benefits of Digital marketing, e-commerce Models, Latest Digital marketing trends, Digital marketing platforms, Digital Marketing strategy for websites, Career opportunities in digital marketing

**UNIT II**

Social Media Marketing: Introduction, Face book marketing, Face book advertising, YouTube marketing, Twitter marketing, Google+ marketing, LinkedIn marketing, Pinterest marketing.

**UNIT III**

Email Marketing: Meaning, Benefits, Basic terminology in email marketing, Email Marketing Softwares, Building email marketing strategy, Building subscriber lists, Designing Newsletters, Types of Campaigns, Reports and analysis

**UNIT IV**

Mobile operating systems: Platforms (iOS, Android, Windows, etc), HTML5, Adobe Flash, Multi-tasking, sync and software/app integration, SMS, MMS, App Marketing, App Monetisation

**UNIT V**

Target Group Management: The Internet Audience and Consumer Behaviour, Getting to Know Your Customer, Delighting Your Customer, Engaging with Your Customer, Search Engine Optimisation

**Text Books:**

1. Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, John Wiley & Sons, Inc., New Jersey, 2016
2. Puneet Singh Bhatia, Fundamentals of Digital Marketing, Pearson, 2017

**References:**

1. Philip Kotler, Marketing 4.0: Moving from Traditional to Digital, John Wiley & Sons, Inc., New Jersey, 2017
2. Debra Zahay, Digital Marketing Management: A Handbook for the Current (or Future) CEO, Business Expert Press, New York, 2015

This course equips student to work in the field of human resource management. Key functional areas are considered within a strategic and contextualized framework, with an underlying objective of searching for ways to strengthen organizations for all stakeholders. This course builds the necessary knowledge base for working in employment relations, but the emphasis is knowledge in action.

**UNIT I**

Introduction: Nature and scope of HRM, Organizing of HRM, HRM in India, Personnel policies.

**UNIT II**

Human Resource Planning: Procurement of Human Resources, Job analysis, Job evaluation, Recruitment and Selection, Placement and Induction.

**UNIT III**

Human Resource Development: Training and Development, Training of Operatives, Executive development, Career planning and development

**UNIT IV**

Compensation, Wage and salary Administration: Incentive plans and profit sharing, Appraisal and Job Changes, Performance appraisal: Traditional Vs Modern methods, Job changes, Transfers, Promotions and Separations, Absenteeism and Labour Turnover. Maintenance: Health and Safety, Employee's Welfare, Social Security.

**UNIT V**

Integration: Work environment, Discipline and grievance, Morale, Collective bargaining, Worker's participation in management, Industrial relations and industrial disputes, Trade unions, Job satisfaction, Human relations: Quality of work life – Management of Stress and burnout.

**Text Books:**

1. Edwin Flippo, Personnel Management, Prentice Hall of India, 2012
2. Gupta. C. B, Human Resource Management Text and Cases, Sultan Chand & Sons, 2017
3. Aswathappa. K, Human Resource Management, McGraw Hill Education, 2017

**References:**

1. G.R. Basotia, Human Resource Management, Tamil Nadu Book House, 2013
2. Kausal Kumar, Human Resource Management, Tamil Nadu Book House, 2013
3. Kandula Srinivas R., "Strategic Human Resource Development", Prentice Hall of India, New Delhi 2012
4. Sharma, Human Resource Management, Tamil Nadu Book House, 2013

**PCO 4324                      CUSTOMER RELATIONSHIP MANAGEMENT    4 Hrs / 3 Cr**

This course aims to make the students to understand their role in achieving good customer relationship management with a customer and/or stakeholder. This course also designed to understand the key skills needed to carry out successful customer relationship management, in order to build more productive & mutually rewarding relationships with customers and/or stakeholders.

**UNIT I**

Introduction: Definitions, Concepts and Context of relationship Management, Evolution, Transactional Vs Relationship Approach, CRM as a strategic marketing tool, CRM significance to the stakeholders.

**UNIT II**

Understanding Customers: Customer information Database, Customer Profile Analysis, Customer perception, Expectations analysis, Customer behaviour in relationship perspectives, individual and group customer's, Customer life time value, Selection of Profitable customer segments.

**UNIT III**

CRM Structures: Elements of CRM, CRM Process, Strategies for Customer acquisition, Retention and Prevention of defection, Models of CRM, CRM road map for business applications.

**UNIT IV**

CRM Planning and Implementation: Strategic CRM planning process, Implementation issues, CRM Tools, Analytical CRM, Operational CRM, Call centre management, Role of CRM Managers.

**UNIT V**

Trends in CRM: e-CRM Solutions, Data Warehousing, Data mining for CRM, an introduction to CRM software packages.

**Text Books:**

1. G.Shainesh, Jagdish, N.Sheth, Customer Relationships Management Strategic Perspective, Macmillan, 2011
2. Alok Kumar et al, Customer Relationship Management: Concepts and applications, Biztantra, 2008

**References:**

1. H.Peeru Mohamed and A.Sahadevan, Customer Relation Management, Vikas Publishing, 2014
2. Jim Catheart, The Eight Competencies of Relationship selling, Macmillan India, 2010

To understand the principles and concepts in international Marketing to provide the knowledge of marketing management in the international perspective to develop marketing strategies for the dynamic international markets.

**UNIT I**

International markets: Introduction, Definition, Basic modes of entry, Nature and Benefits of International Marketing, International Marketing Task, World Trade, India's Foreign Trade, Characteristics of MNCs, Global and Domestic marketing, International Product Life cycle, EPRG Framework, Institutional set up, Advisory bodies, Commodity organizations, Service Institutions, Government participation in Foreign Trade

**UNIT II**

International Marketing Environment: Business culture around the world, language, customs, attitudes, marketing strategy adjustments, product adaptations. Geographic Description of Market, Political risk, Political Environment, Import quotas, tariffs, customs restrictions, required licenses, registrations, permits. Development and scope of International law, INCOTERMS, WTO, GATT, Current economic conditions of the countries involved, credit worthiness of the international buyer/seller, Regional economic groupings, its influences in market.

**UNIT III**

Policy Framework and Procedural Aspects: India's Export, Import policy, Exim Policy, promotional measures, Export oriented Units, Deemed Exports, Export- Import Documentation, Kinds of Documents, Principal Export Documents, Auxiliary documents, Documents in Import Trade, Export Documentation and procedures, Demand Estimation, GDP, Producer consumer target, Market segmentation.

**UNIT IV**

International Marketing Planning: International Market Selection, Factors influencing, Process, Strategies and approaches, Competition, International Marketing research, Global scene, International marketing research procedure, Techniques, survey, interview techniques, Analysis of field data, Research report, International Marketing Planning and Control, Framework, marketing control –Control sequence

**UNIT V**

International Marketing Mix: Developing an International Product Line, Foreign Product Diversification, International Branding Decisions, International Packaging, International Warranties and Services. International Pricing Strategy, International Promotion Strategies, Promotion Mix, International Sales Negotiations, Patterns of Global Advertising, Global Advertising Regulations, Advertising Media, International Channels of Distribution, Retailing in International Scenario, International Physical Distribution, Technological Influences in international Marketing – Current trends in international Marketing.

**Text Books:**

1. Warren J. Keegan and Mark C. Green, Global Marketing, Third Edition, Prentice Hall, N.J. 2003. (ISBN 0,13,066998,9)
2. Philip. R. Cateora, John.L.Graham. Prasanth Salwan. International Marketing, Tata Mcgraw Hill,13 th edition, 2008



**References:**

1. Ashok Korwar, Creating Markets across the Globe, Tata McGraw Hill, New Delhi, 1997
2. Thomas L. Friedman, The Lexus and the Olive Tree: Understanding Globalization by Anchor Books, May 2000. ISBN: 0,385,40034

**PCO 4428****ADVANCED CORPORATE ACCOUNTING****6 Hrs / 4 Cr**

The objective of this course is to make the students understand the methods of accounting followed by different organizations like Banking companies, Insurance companies, Railways and Electricity companies.

**UNIT I**

Accounting of Banking companies, Preparation of P& L Account and Balance sheet, Guidelines of RBI, Items requiring special attention in preparation of final accounts.

**UNIT II**

Insurance Company Accounts: Life Insurance and General Insurance, Fire, Marine, Preparation of Final Accounts.

**UNIT III**

Holding Company Accounts: Preparation of consolidated Balance sheet, Minority Interest, Pre-acquisition or Capital Profits, Cost of Control or goodwill, Inter-Company Balances, Unrealized Inter Corporate profits, Revaluation of assets and Liabilities, Bonus share. Treatment of Dividend, Inter Company Holdings, Consolidated P & L Account and balance sheet.

**UNIT IV**

Inflation Accounting: Methods, Inflation accounting at International and National Level. Human Resource Accounting: Valuation of Human resources, Cost based methods & Value based methods, Recording and presenting in Financial Statements.

**UNIT V**

Economic Value-Added Accounting Standards, Accounting for pricing, Segmented reporting, Hotel Accounting, Hospital Accounting, Social responsibility Accounting, Meaning, Approaches and methods, Preparation of social Income Statement, and social balance sheet. Government Accounts: Consolidated funds, Compilation of accounts.

**Text Books:**

1. Kr. Paul, Corporate Accounting, New Central Publication, Kolkata, 2014
2. S.P. Jain and K.L. Narang, Advanced Accounting, Kalyani publications, 2017

**References**

1. Allen. C. Shapiro, Multinational Financial Management, PH I Pvt. New Delhi, 2013.
2. S.P. Iyengar, Advanced Accountancy, Sultan Chand & Sons, 2011
3. R. L. Gupta, Advanced Accountancy, Sultan Chand & Sons, 2011

**PCO 4330 SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT 6 Hrs/3 Cr**

This course explores the theory and practice of investments, covering the topic areas of capital market structure, valuation, and security analysis and portfolio management. This course will emphasize an understanding of the economic forces that influence the pricing of financial assets.

**UNIT I**

Investment: Nature and scope of investment analysis, Elements of investment –return, risk and time elements, objective of investment, security return and risk analysis, measurement of return and risk, Portfolio – Concept, Construction and types – Recent trend in Investment Securities.

**UNIT II**

Types of Investments: Financial investment – securities and derivatives, deposit, tax sheltered investments, Non-financial investment – real estate, gold and other types and their characteristics, sources of financial information.

**UNIT III**

Fundamental Analysis: Economic analysis, Industry analysis, and Company analysis. Technical Analysis: Various prices and volume indicators, indices and moving averages, interpretation of various types of trends and indices. Efficient Market Hypothesis: Weak, Semi, strong and strong market, testing of different forms of market efficiency and their significance.

**UNIT IV**

Valuation of Securities: Valuation of Fixed income securities, Bonds, debentures, Preference shares, and convertible securities. Valuation of variable income securities: Equity shares. Investment by individuals: Investment policy of Individuals, Tax saving schemes in India.

**UNIT V**

Portfolio Evaluation and Revision: Sharpe's measure, Treynor's measure, Jensen's measure, Portfolio revision: Formula plans – portfolio revision – need – importance – management – techniques – advantages – disadvantages.

**Text Books:**

1. Preethi Singh, Investment Management, Himalaya Publishing House, 20<sup>th</sup> Edition, 2018
2. Punithavathy Pandian, Portfolio Management, Vikas Publications, 2017

**Reference:**

1. Fischer and Jordan, Security Analysis and Portfolio Management, Prentice Hall of India, 2012.

PCO 4332

**BASIS OF TAXATION**

4 Hrs / 3 Cr

This course is being offered to non-commerce students to make aware of them the general understanding of both direct and indirect taxation in India. This course inculcates taxation system and structure in India with its implications.

**UNIT I**

**Introduction:** Cannons of Taxation– Assessment year and Previous year, Assessee – Types of Assessee – Person, Income, Features of Income – Gross Total Income – Agricultural income, Exempted Incomes – Direct & Indirect Taxation.

**UNIT II**

**Heads of Income:** Income from Salary, Income from House Property, Income from business or profession (Simple Problems only with Limited Deductions)

**UNIT III**

Income from capital gain, Income from other sources (Simple Problems only with Limited Deductions)

**UNIT IV**

PAN – TDS – Filing of Returns – e-Filing – Assessment and Types of Assessment – Advance Payment of Tax – Tax Holiday

**UNIT V**

**GST Act:** Introduction, Goods and Services Tax Act – Needs – Objectives – History, Enforcement – Registration procedure – Types, Exempted goods – Different slab rates – GSTIN, Benefits of GST.

**Text Books:**

1. Dr. Hariharan N, INCOME TAX LAW & ACCOUNTS, McGraw Hill Education, Revised Edition (as per latest AY)
2. Gaur. V.P and Narang D.B, Income tax law & Practice, Kalyani Publishers, Revised Edition (as per latest AY)

**Reference:**

1. Vinod K Singhania & Monica Singhania, Students Guide to Income Tax, Taxman Publications, Revised Edition (as per latest AY)

PCO 5421

**MANAGEMENT ACCOUNTING**

6 Hrs / 4 Cr

To introduce students to the various tools and techniques of management Accounting. To enlighten students on Financial Statement Analysis with the emphasis on the preparation of fund flow and cash flow statement.

**UNIT I**

Management accounting – Nature and Scope: Development of Accounting – Functions – Classification – Utility– Limitations – Installation – Tools – The Management Accountant: Functions – Duties. Management Accounting Principles – Management Accounting VS

Financial Accounting and Cost Accounting. Financial Accounting Principles, Accounting Standards and International Accounting Standard Committee, Accounting Principles and the Institute of Chartered Accountant of India. Basic Cost Concepts.

**UNIT II**

Financial Statement – Analysis and Interpretation: Meaning of financial statements – Nature – Functions – Analysis and Interpretation: Objectives– Procedure– Types– Tools and Techniques – Limitations. Ratio Analysis: Meaning of Ratios – Classification – Profitability, Activity, Coverage and Financial ratios – Calculation– Reconstruction of Trading and Profit and Loss Account and Balance Sheet.

**UNIT III**

Fund Flow Statement: Meaning – Importance – Limitations – Preparation. Cash Flow Statement: Meaning – Difference between cash flow statement and fund flow statement – Advantages – Limitations – Preparation, Accounting standard 3 (Revised).

**UNIT IV**

Budgetary Control: Meaning – Objectives – Advantages – Limitations – Classification– Preparation of Budgets. Standard Costing, Meaning – Budgetary control and Standard costing – Limitations – Variance analysis – Cost variances – Direct material variances – Direct labour variances – Overhead Variances – Sales variances – Variance with reference to profit – Control of Variances – Accounting procedure.

**UNIT V**

Marginal Costing and Profit Planning: Absorption Costing – Marginal Costing – Advantages and Limitations – Profit Planning – Cost – Volume – Profit Analysis – Break Even Analysis – Key Factor – Break Even Chart – Angle of Incident – Utility of CVP Analysis. Decisions Involving alternative choices: Steps – Determination of Sales mix – Exploring new markets – Discontinuance of a product line – Make or buy decision – Equipment replacement Decision – Change Vs Status QUO – Expand or contract – Shutdown or continue. Pricing Decision: Types – Factors affecting pricing – Pricing methods – Divisional performance – Intra, Company transfer pricing. Management Reporting: Management reporting system –Modes– Requisites – Steps for effective reporting – Kinds– Review of report.

**Text Book:**

1. Dr. S. N. Maheshwari, C. A. Sharad K. Maheshwari, Principles of Management Accounting, Sultan Chand & Sons, 2010

**References:**

1. Gowda, Management Accounting, Tamil Nadu Book House, 2005
2. Agrawal M.R, Management Accounting, Tamil Nadu Book House, 2004
3. Ravi M. Kishor. Management Accounting, Taxmann Publications (P) Ltd., 2003

PCO 5423

BUSINESS TAXATION I

6 Hrs / 4 Cr

Objective of this course is to provide adequate knowledge of various concepts and their applications relating to direct tax laws with a view to integrating the relevance of these laws with financial planning and management decisions.

### UNIT I

Income Tax Act 1961 - Historical background - Definition – Concepts, Special Problems covering on the assessment of individuals, Firms, AOP, Companies. – Tax planning with special reference to employee's remuneration, Scope of Tax Planning / Tax avoidance / Tax evasion. Tax planning in respect of Amalgamation or de-merger of Companies or business restructure.

### UNIT II

Tax planning - Setting up of a new business, locational aspects, nature of business, Planning of tax holiday benefits, limitations on the tax planning exercises, flexible planning premises, planning in the context of court ruling and legislatives amendments.

### UNIT III

Tax planning - Specific managerial decisions such as to make or buy, own lease or hire etc. Tax planning with Books for Reference to financial management decisions such as capital structure of a company and tax incidence, tax as a variable in computing cost of capital, tax considerations in dividend policy and bonus share issue

### UNIT IV

Tax planning – Non-resident company assessee. Double taxation avoidance agreements, General principles, Provisions and tax implications.

### UNIT V

Tax planning and important provisions of wealth tax and court rulings and legislatives, Amendments pertaining to wealth tax. Return of Income and assessment, Advance payment of tax, Tax deduction at Source.

#### Text Books:

1. Vinodh. K. Singhanian, Direct taxes Law and Practice, Taxman's Publication, Revised Edition (as per latest AY)
2. S Datey, Indirect Taxes, Law &Practice, Taxman's Publication, Revised Edition (as per latest AY)

#### References:

1. Ravi Gupta and Ahuja, Systematic Approach to Income Tax, Barath Law House(p)Ltd, Revised Edition (as per latest AY)
2. Dinkar Pagare, Law and Practice of Income Tax, Sultan Chand and Sons, New Delhi, Revised Edition (as per latest AY)
3. H.C. Mehrotra & S.P. Goyal, Corporate Tax Planning, Journal: Chartered Secretary, Chartered Accountant.

This course introduces the concept of risk and techniques of identifying, measuring and managing it. In this context, insurance as a risk management tool is discussed with references to its role, functions and basic principles as applicable to different classes of insurance. The course aims to provide the students with a broad understanding of risk and insurance as a means to manage it. This forms the foundation to facilitate the students in their further studies on insurance.

### UNIT I

Risk & Risk Management process – Risk Identification, Evaluation, Risk Management Techniques, Selecting and Implementing Risk Management Techniques – Risks in our Society – Insurance and Risk.

### UNIT II

Commercial Liability Insurance – Commercial Risk Management Applications – Property – Liability – Commercial Property Insurance, Different policies and contracts – Business Liability and Risk Management – Workers compensation and Risk Financing.

### UNIT III

Property and Liability Insurance Coverage – Personal Risk Management Applications – Property – Liability – Risk Managements for Auto Owners – Risk Management for Home Owners.

### UNIT IV

Risk Management Applications – Loss of Life – Loss of Health – Retirement Planning and annuities – Employee Benefits – Financial and Estate Planning.

### UNIT V

Risk Management Environment – Industry – Functions and organisation of Insurers – Government Regulation of Insurance Sector – IRA – Privatization of Insurance – Changes in Insurance Acts – Insurance Intermediaries – Insurance Product pricing and Claim valuation – Financial Analysis – Bank Assurance – Foreign Insurers in India.

#### Text Books:

1. Rejda, George E., “Principles of risk management and insurance”, Addison Wesley Longman, 12<sup>th</sup> Edition, 2013.
2. M.N. Mishra, Insurance: Principles and Practice, S. Chand Publishing, 2008

#### References:

1. Dorfman, “Introduction to risk management and insurance”, Prentice Hall, 1998
2. K. R. Reddy, Risk management, Tamil Nadu Book House, 2003
3. McNamara principles of Risk Management and Insurance, Addison, Wesley,
4. Anand Ganguly Insurance Management PHI, New Delhi, 2005

This paper will help the students to understand the relevance and role of research methodology and the significance of the research tools in all functional areas of commerce. It will also help to distinguish between the different kinds of research available, based on the purpose and nature of problem. The course will emphasize on the types of research, data collection methods, analysis and inferences and conclusions.

### UNIT I

Introduction to Research: Meaning – Objectives – Characteristics – Qualities of a good research, Types of research, Survey Method: Social survey, Definition – Stages – Types of survey – Uses – Limitations, Case study: Meaning – Characteristics – Sources of Case Study – Uses – Limitations – Review of Literature.

### UNIT II

Planning of Research: Planning process, Selection of a problem for a research – Sources of problems – Process of Identification – Criteria of Selection, Formulation of research problem: Formulation process – Importance of Formulation. Hypothesis – Meaning – Types, Sources – Role of Hypothesis – Characteristics, Process of setting of hypothesis.

### UNIT III

Research design: Meaning – Essentials of a good research design – Nature – Types – Importance – Preparation, Contents of research design. Methods of Collection of Data: Data – Meaning, Types, Importance, Sources of data – Primary – Secondary – Uses of Secondary Data, Methods of collecting primary data: Survey method – Personal interviewing – Telephone interviewing – Mail survey – Observation methods – Experimental method – Construction of Questionnaire - Scaling Technique

### UNIT IV

Sampling Design: Sample – Universe/Population – Sampling Frame, Sampling Size, Steps in Sampling Design – Sampling and Non – Sampling Errors, Types of Sampling Design: Probability and Non-probability Sampling Techniques.

### UNIT V

Data Processing and Report Writing: Editing – Coding – Tabulation: Construction of Frequency Table – Graphs/Charts/Diagrams – Uses of Statistical Tools, Use of Excel and SPSS package. Report writing: Research report – Significance of writing report – Steps in drafting reports – Layout – Types, Contents of research report – Footnotes and Bibliography.

#### Text Books:

1. C.R. Kothari and Gaurav Garg, Research Methodology – Methods and Techniques, New Age International Publishers, 2018.
2. O.R. Krishnaswami and M. Ranganatham, Methodology of Research in Social Sciences, Himalaya Publishing House, 2018.

#### References:

1. R.Cauvery, U.K.Sudha Nayak M.Girija, R.Meenakshi, Research Methodology, S.Chand & Company Ltd. 2003.
2. N. Thanulingam, Research Methodology, Himalaya Publishing House, 2012.

This course explains the concept and role of cost accounting in the business management of manufacturing and non-manufacturing companies and it provides advanced knowledge on costs and their impact on value creation in the manufacturing and non-manufacturing companies.

**UNIT I**

Introduction: Development of Cost Accounting – Cost, Costing, Cost Accounting, Cost Accountancy – Meaning – Classification of Cost, Methods of Costing – Techniques of Costing. Job Costing – Batch Costing – Contract Costing, Operating Costing: Transport, Canteen, Boiler House, Power House, Hospital and Hotel Costing.

**UNIT II**

Process Costing – Normal and Abnormal loss, Abnormal Gain, Equivalent production – Inter process profit – Joint Products and By-products – Accounting treatment. Activity based costing: Meaning – Objectives – Implementation of Activity Based Costing, Advantages and Limitations.

**UNIT III**

Uniform costing: Meaning – Features – Scope – Need – Objectives – Fields covered – Advantages – Limitations. Cost Control Accounting: Integrated and Non-Integrated Accounting. Reconciliation of Cost and Financial Accounts – Responsibility accounting: Fundamental technique – Responsibility Centers – Principles – Advantages

**UNIT IV**

Cost Control and Cost Reduction: Cost Control – Meaning – Elements – Techniques – Essentials for success. Cost Reduction – Meaning – Cost Reduction Programme – Essentials for Success – Distinction between Cost Control and Cost Reductions – Fields covered – Tools and Techniques – Advantages – Dangers.

**UNIT V**

Cost Audit and Reporting: Cost Audit, Meaning – Types – Objectives – Advantages – Auditing Techniques – Cost Audit Programme – Difference between Cost Audit and Functional Audit – Forms of Cost Audit Report – Cost Auditor: Appointment – Rights, Duties and Responsibilities – Functions. Cost Audit in India – The Cost Audit (Report) Rules, 1996. Reporting: Importance – Management Information System – Steps in MIS Development – Objectives, Level of Management and Reporting, Principles of Report Presentation – Classification of Reports – Forms of Reporting – Special Reports.

**Text Book:**

1. Jain and Narang, Cost accounting, Kalyani Publishers, 23<sup>rd</sup> Edition 2012.

**References:**

1. S.P. Iyengar, Cost accounting, Sultan Chand & Sons, 2005.
2. Dr. S.N Maheshwari, Cost and Management Accounting, Sultan Chand & Sons, 2014.
3. M.N Arora, Cost accounting– Theory and Practice, Vikas Publishing, 2015.



PCO 5431

**SERVICES MARKETING**

4 Hrs / 4 Cr

This course helps the students to understand the critical role of services marketing, and also enable the students to know the various concepts of services marketing like service quality, service triangle. It highlights the conceptual framework of the principles, practices, techniques and challenges to the services marketing in the global era.

**UNIT I**

Services Marketing – Introduction – meaning – definitions – concept, Components and Classification of Services – Services (or) Goods, Characteristics of Services and their Marketing implications – Product Support services – Pricing of Services – Innovation in Services.

**UNIT II**

Service Quality – Service quality gap – Service quality audit – SERVQUAL – Services triangle Marketing Strategies for service firms – Information technology, Mass Communication.

**UNIT III**

Marketing of Financial Services – Insurance, Mutual funds, Banking – Factoring – Marketing of Educational Services.

**UNIT IV**

Health care Marketing – Hospitality and tourism Services – Entertainment Marketing – Transport Marketing – Day care Marketing.

**UNIT V**

CRM – Transaction Marketing (or) Relationships Marketing – Objectives of CRM – Implementing CRM – Requisites for implementation of CRM – Levels of Relationship Strategies – GST – Introduction – Rates.

**Text Book:**

1. S.M. Jha, Services Marketing, Himalaya Publishing House, New Delhi, 2013

**References:**

1. Jochen wirtg, Christopher Lovelock, services Marketing, World Scientific Publishing (US), 2016
2. S.L. Gupta, Marketing of Services, International Book House, 2012

PCO 5422

**FINANCIAL MANAGEMENT**

6 Hrs / 4 Cr

The objective of this course is to help the students to understand the conceptual framework of financial management, and its applications under various financial constraints.

**UNIT I**

Financial Management: Meaning, nature and scope of finance, financial goal – Profit Vs Wealth maximization, Finance functions – investment, financing and dividend decisions, Current development in financial management: Hybrid financial instruments. Capital

Structure: Traditional and MM Hypotheses – without taxes and with taxes, Determining capital structure in practice.

**UNIT II**

Capital Budgeting: Nature of investment decisions, investment evaluation criteria, Capital rationing, Risk analysis in capital budgeting – Tools of evaluation and conditions of risk adjusted rate of return: Risk and uncertainty – Certainty equivalent approach – Probability approach, Sensitivity analysis, Simulation analysis, CAPM analysis.

**UNIT III**

Leverages: Meaning – Types – Measurement of leverages, Effects of operating and financial leverage on profit, Analyzing alternate financial plans, combined financial and operating leverage. Cost of Capital: Meaning and significance of cost of capital, Calculation of cost of Debt, Preference Capital, Equity capital and retained earnings, Combined cost of capital (Weighted), Cost of equity.

**UNIT IV**

Working Capital Management: Meaning, Significance and types of working capital, Calculating operating cycle period and estimation of working capital requirements, Financing of working capital and norms of bank finance, Sources of working capital, Factoring services, Dimensions of working capital management. Management of Cash, Receivables and Inventory.

**UNIT V**

Dividend Decisions: Issues on dividend decisions, Walter's model, Gordon's model, M M Hypothesis, Dividend and uncertainty, relevance of dividend, Dividend policy in practice, Forms of Dividends, Stability in dividend policy, Corporate dividend behavior.

**Text Book:**

1. S.N. Maheshwari, Financial Management Principles and Practice, Sultan Chand & Sons, 2013

**References:**

1. Bhattacharya, Hrishikas: Working capital Management: Strategies and techniques, Prentice Hall, New Delhi, 3<sup>rd</sup> Edition, 2014
2. Chandra, Prasanna: Financial Management, Tata Mc Graw Hill, Delhi, 2008
3. Pandey, I. M. Financial Management, Vikas publishing House, Delhi, 2015

**PCO 5424**

**BUSINESS TAXATION II**

**4 Hrs / 4 Cr**

This course is aimed at to make the students to understand various indirect tax provisions to build up and maintaining business concern.

**UNIT I**

Introduction to Indirect taxes – Differences between Direct and Indirect Tax, Tax and Duty – Cess: meaning and objects – Contribution of indirect tax to National Income – Need for Revamping tax system in India – Types of indirect taxes.

**UNIT II**

Customs law – Basic concepts, Definition, Tax planning Vs Tax management – Customs Tariff

Act 1975 – General rules for the interpretation of import tariff – Types of duty, Refund on anti-dumping duty.

**UNIT III**

Valuation under customs – Introduction – transaction value, valuation of import and export goods – Import export procedure – Warehousing – Deemed exports, Duty draw back – Negative list of duty draw back – Export incentives.

**UNIT IV**

Introduction to GST: Importance – Goods and Service covered – Exempted, registration – Supply under GST – Charge of GST – Procedure – Rates for category of Goods and Services – Computation of value of goods and services.

**UNIT V**

Levy of GST – Filing of GST Returns – Types of returns – Payment of GST – Share in revenue between central and state governments – GST council – Power and duties – Settlement of grievances.

**Text Books:**

1. Vinodh. K. Singhania, Direct taxes Law and Practice, Taxman's Publication, Revised Edition (as per latest AY)
2. S Datey, Indirect Taxes, Law & Practice, Taxman's Publication, Revised Edition (as per latest AY)

**References:**

1. Ravi Gupta and Ahuja, Systematic Approach to Income Tax, Barath Law House(p)Ltd, Revised Edition (as per latest AY)
2. Dinkar Pagare, Law and Practice of Income Tax, Sultan Chand and Sons, New Delhi, Revised Edition (as per latest AY)
3. H.C. Mehrotra & S.P. Goyal, Corporate Tax Planning, Journal: Chartered Secretary, Chartered Accountant.

**Journal:**

1. Chartered Secretary, Chartered Accountant.

**PCO 5426 BUSINESS ETHICS AND CORPORATE GOVERNANCE 6 Hrs / 4 Cr**

This course enables the learners to understand the concept of ethics and ethical practices, Corporate Social responsibilities and governance.

**UNIT I**

Concept of Ethics – Meaning and Definition – Business Ethics – Scope – Objectives – Importance – Factors influencing business ethics – Sources – Ethics and Morals – Values: Features – Value formulation – Types – Values of business – Role of values in business.

Justice: Principles – Kinds. Fairness – Morality – Moral Norms – Moral Values – Code of Conduct: Ethical code – Company codes – Reasons for adopting code of conduct – Conditions – Benefits – Influencing Factors – Code of Ethics – Ethical Theory and its applications to business.

## **UNIT II**

Ethical Issues – Bribery and Corruption: Factors stimulate the growth of corruption – Causes – Effects – Suggestion to deal with corruption – Fields of corruption, Revealing Trade Secrets of a firm – Coercion – Deception – Unfair Discrimination – Harassment – Victimization. Ethical Management: Ethical management model – Managing ethics in workplace – Key roles and responsibilities in ethical management – Strengthening personal and organizational integrity.

## **UNIT III**

Corporate Social Responsibility – Meaning – Objectives – Social responsibility of business towards different stakeholders – Arguments for and against social responsibility – Managing socially responsible business. Ethics and Environment: Environmental responsibility – Environmental pollution – Ethics and Ecology – Employee Rights.

## **UNIT IV**

Work Ethics – Improving work ethics – Work culture – Corporate culture – Personal values and organizational goals – Ethics in decision, making, and Marketing, Advertising, HRM and Global business. Professional Ethics – Professionalism – Principles for Professional Ethics.

## **UNIT V**

Corporate Governance – Objectives – Features – Essential elements – Emerging Issues – Appointment of Board of Directors – Roles and responsibilities of Board of Directors, Internal Auditors and External Auditors.

### **Text Books:**

1. C.S.V. Murthy, Business Ethics Text and Cases, Himalaya Publishing House, 2014.
2. U.C. Mathur, Corporate Governance and Business Ethics Text and Cases, Macmillan Publishers India Ltd., 2012.

### **References:**

1. Satish Modh, Ethical Management Text and Cases in Business Ethics and Corporate Governance, Macmillan India Ltd., 2010.
2. Dr. A. K. Gavai, Business Ethics, Himalaya Publishing House, 2012.
3. Dr. V. Radha, Business Ethics and Values, Prasanna Publishers and Distributors, 2013

PCO 5428

SMALL BUSINESS MANAGEMENT

4 Hrs / 4 Cr

This course enables the students to have entrepreneurial motivation by providing them basic idea of entrepreneurship, startup business ideas, project writing and new venture creation

### UNIT I

Entrepreneur and Entrepreneurship: Entrepreneur – Entrepreneurship – importance and his role of economic development – Functions – Qualities of an entrepreneur – types – Entrepreneur Vs Manager – Intreprenuer – Entrepreneurship and economic development – growth and development of entrepreneurship in India – Growth and development of women entrepreneurship – problems – Women entrepreneurship in India.

### UNIT II

Small Scale Industry: Introduction – Evolution of the concept of Small Scale Industry – importance of Small Scale Industry – Policy Support for SSI – Problems of SSI – Incentives – Subsidy – Tax concession – Marketing and Export Assistance – Technical Assistance.

### UNIT III

Starting a small-scale industry: Business Idea – Identifying Business Opportunity – Forms of Ownership – Location – Procurement of Land – Registration – Term loan and working capital – Subsidy – Insurance – government clearances – Trail runs – Commence of Commercial production

### UNIT IV

Project Identification, Formulation & Implementation and Report: Meaning – Definition – Project classification – Project life cycle – Project Appraisal – Project Report – components of project report – contents – importance – model project Report

### UNIT V

Institutional Support to entrepreneurs – EDI – District Industries Centre – National Small Industry Corporation limited – Small Industries Development Corporation – SIDO – SIPCOT – National Institute for Entrepreneurship and Small Business Development – National Alliance of Young Entrepreneurs – National Institute of Small Industries Extension Training.

### Text Books:

1. Jose Paul, N. Ajith Kumar, Paul.T. Mampilly, Entrepreneurial Development, Himalaya Publishing House, 2009.
2. E. Gorden. Natarajan, Entrepreneurship Development, Himalaya Publishing House, 2011

### References:

1. T.R. Banga, Project Planning and Entrepreneurial Development, Himalaya Publishing House, 2009.
2. K.K. Menon, Hand book for Small Industries Management, Sultan Chand &Co, 2010
3. C.B. Gupta, NP.Srinivasan, Entrepreneurial Development, Sultan Chand & sons, 2012

**PCO 5430**

**PROJECT**

**6 Hrs / 4 Cr**

The objective of the project work is to motivate the Post Graduate students of commerce to approach any marketing, managerial and financial problem. The project work imparts practical understanding of the research methodology in commerce. The project work will be carried out by each student under the supervision of a commerce faculty. The project work should be related to commerce field. The project work involves collection of data, analysis interpretation and presentation of project report. Viva Voce examination for each student will be conducted on his or her project report. The project provides students with practical knowledge and firsthand experience in the actual field of commerce.

**Evaluation of Project Work:**

The project work carries 100 marks. Of the 100 marks, 75 marks are entitled for the project report and the remaining 25 marks are entitled for project viva voce examination.

The project work evaluation will be done independently by the guide as well as by an external examiner. A viva voce committee consisting of the faculty guide, the Head of the Department of Commerce and an external examiner will conduct the viva voce examination.

**Project Report:**

Evaluation:	75 marks
Viva Voce:	<u>25</u> marks
Total	<u>100</u> marks

**PCO 5432**

**ERP APPLICATIONS**

**4 Hrs / 4 Cr**

This course covers concepts in enterprise resource planning (ERP). The main focus of this course is to show how ERP systems integrate business processes across functional areas and support business management and performance analysis. An ERP system integrates the flow of data and documents from one functional area to the next throughout the process. This course will also examine how ERP systems evolved from early computer systems and manufacturing, the implications of legislation. This course also explains how enterprise systems, such as SAP, integrate business functional areas into one enterprise, wide information system

**UNIT I**

Introduction, Basic ERP Concepts, Enterprise, An overview, Benefits & Risk, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP.

**UNIT II**

ERP & Related Technologies: Business Process Reengineering (BPR), Data Warehousing and Data Mining, OLAP, Product Life Cycle Management, Supply Chain management, CRM.

**UNIT III**

ERP Functional Module: Introduction, Finance, Manufacturing, Human Resource, Plant maintenance, Material Management, Integration of ERP, Supply Chain and Customer Relationship Application.

**UNIT IV**

ERP Implementation: Implementation Challenges, ERP Implementation Strategies, ERP Implementation Life Cycle, Implementation Methodologies, ERP Projects Teams, Vendors and Consultants, Dealing with employee resistance, Training and Education, data migration, Project Management and monitoring, Post Implementation Activities.

**UNIT V**

The ERP Market: ERP Market Place and Market Place Dynamics, Market Overview, The Changing ERP Market, SAP AG, Oracle, People soft, JD Edwards. Future Directives in ERP

**Text Books:**

1. Alexis Leon, "ERP Demystified", Tata McGraw-Hill Education Pvt. Ltd., 2014
2. S. Sadagopan, "ERP, A Managerial Prospective", Tata McGraw-Hill Education Pvt. Ltd., 1999
3. Vinod Kumar Garg and Venkitakrishnan NK, "Enterprise Resource Planning Concepts & Practice", PHI, 2003

**References:**

1. Rahul V. Altekar, "Enterprise wide Resource Planning", TMH, 2011
2. Andreas Vogel & Ian Kimbell, "MySAP ERP" Wiley India Pvt Ltd; Esa edition, 2005
3. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, 2006

**Postgraduate Department of MA Social Work**  
**With effect from June 2018 onwards**

Course No.	COURSE TITLE	Hrs/wk	Credits	Marks
<b>SEMESTER I</b>				
MSW 4401	Introduction to Social Work Profession	6	4	80
MSW 4403	Sociology for Social Work Practice	5	4	80
MSW 4405	Psychology for Social Work Practice	5	4	80
MSW 4407	Social Case Work Practice	5	4	80
MSW 4509	Life Skill Competencies and Field Visit	9	5	100
<b>SEMESTER II</b>				
MSW 4402	Social Group Work Process	5	4	80
MSW 4404	Community Organization and Social Action	5	4	80
MSW 4406	Social Welfare Administration and Policy	5	4	80
MSW 4408	Social Research and Statistics	6	4	80
MSW 4510	Preparatory Field Work (Block)	9	5	100
<b>SEMESTER III</b>				
MSW 5401	Human Rights Perspectives for Development	5	4	80
MSW 5403	Disaster Management	5	4	80
<b>MEDICAL AND PSYCHIATRIC SOCIAL WORK (Specialization - I)</b>				
MSW 5431	Introduction to Health and Health Care Systems	5	4	80
MSW 5433	Fundamentals of Mental Health	5	4	80
MSW 5435	Disability Management	5	4	80
MSW 5437	Block Placement for Medical and Psychiatric Social Work I – Field Work	5	4	80
<b>DEVELOPMENT MANAGEMENT (Specialization - II)</b>				
MSW 5451	Rural Development in India	5	4	80
MSW 5453	Livelihood and Social Enterprises	5	4	80
MSW 5455	Introduction to NGO Management	5	4	80
MSW 5457	Block Placement for Development Management I – Field Work	5	4	80
<b>HUMAN RESOURCE MANAGEMENT (Specialization - III)</b>				
MSW 5471	Human Resource Management - I	5	4	80
MSW 5473	Industrial Relations and Labour Legislations in India	5	4	80
MSW 5475	Organizational Behavior	5	4	80
MSW 5477	Block Placement for Human Resource Management I – Field Work	5	4	80
<b>SEMESTER IV</b>				
MSW 5402	Project	5	4	80



**MSW 2**

MSW 5404	Development Communication for Social Advocacy	5	4	80
<b>MEDICAL AND PSYCHIATRIC SOCIAL WORK (specialization)</b>				
MSW 5432	Medical Social work Interventions	5	4	80
MSW 5434	Psychiatric Social Work Interventions	5	4	80
MSW 5436	Hospital Administration	5	4	80
MSW 5438	Block Placement for Medical and Psychiatric Social Work II – Field Work	5	4	80
<b>DEVELOPMENT MANAGEMENT (specialization)</b>				
MSW 5452	Social Exclusion and Inclusion in India	5	4	80
MSW 5454	Urban Community Development in India	5	4	80
MSW 5456	Ecological Perspectives and Social Work Intervention	5	4	80
MSW 5458	Block Placement for Development Management II – Field Work	5	4	80
<b>HUMAN RESOURCE MANAGEMENT (specialization)</b>				
MSW 5472	Human Resource Management - II	5	4	80
MSW 5474	Organization Change & Development	5	4	80
MSW 5476	Employee Compensation and Administration	5	4	80
MSW 5478	Block Placement for Human Resource Management II – Field Work	5	4	80

**Semester I**

**Credit: 4**

**Paper – 1**

**Hr/Wk: 6**

**MSW 4401 INTRODUCTION TO SOCIAL WORK PROFESSION**

**Course Description:**

This course aims to build a stage for students to take social work as their career and professional practice. The course will offer a holistic idea about social work profession which has emerged especially in India and UK. It aims to outline the strengths, opportunities, challenges that engulfs the profession and presents the social reality of the contemporary world.

**Objectives:**

- To introduce the learner to the openings in various fields of social work that they may enthuse themselves in getting trained as a social worker
- To apprise students of the social work process and impress upon them the need to acquire knowledge on all basic concepts related to the social work profession.
- To make them come to know the professional values and ethics of social work that distinguishes them from other related disciplines and professions
- To empower students and guide them into the vocational dimensions that may be instilled with confidence to look at Social Work as an enriching profession

**Learning Outcome:**

With successful completion the students would have enrich their knowledge about various concepts, methods, and functional avenues of social work, to develop a conviction on social work as a profession that training in the remaining part of the course.

**UNIT I: Introduction to Social Work**

Social Work: Concept, Definition, Philosophy, Scope, Objectives and Principles; Related Concepts- Philanthropy, Social Service, Social Welfare, Social Reform, Social Security, Social Policy, Social Development, Social Empowerment. Social work Vs Social Service.

**UNIT II: Social Work as a Profession**

Historical Development of Social Work in Western (UK & USA) and Indian context- Role of TISS - Professional Associations in Social Work - Professional Code of Ethics - Challenges of Social Work Professional, Skills and Traits of a Social Worker.

**UNIT III: Methods in Social Work**

Direct Methods- Social Casework, Social Group work, Community Organization Indirect Methods - Social Welfare Administration, Social Work Research, Social Action.

## **MSW 4**

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### **UNIT IV: Fields of Social work**

Welfare: Women, Children, Family, Youth, Old Age, LBGTQ and Marginalized; Fields: Medical & Psychiatric Social Work, Industrial Social Work & Labour Welfare, Correctional Social Work, Rehabilitational Social Work, Community Development, Development Management and Disasters.

### **UNIT V: Transforming the Society**

Social Movements and Reform Tradition in India: Brahma samaj, Arya Samaj, RamaKrishna Mission, Theosophical society, Dalit movement, Sarvodaya Movement, Ecological Movement and Gandhian Ideology of Social work. International Social Work: meaning and scope of International Social work – Global perspective; Skills required for International Social Work.

#### **Text Books:**

- Chowdhry, Paul (1992) Introduction to Social work, New Delhi, Atmaram & Sons.
- Herschel Knapp (2009) Introduction to Social Work Practice - A Practical Workbook, Sage Publications

#### **References:**

- Francis & Nicholas, (2015). Handbook of Professional Practice and Career Development In Social Work. Francis publications, Madurai.
- Bailey.R & Brake.M (1975) Radical Social Work, Edward Arnold
- Clock.G & Asquith.S (1985) Social Work & Social Philosophy, London: Routledge & Kegan Paul
- Congress.E.P (1998) Social Work Values and Ethics, Chicago: Nelson- Hull Publishers
- Cox, David & Pawar, M. (2006) International Social Work-Issues, Strategies and Programs, New Delhi, Vistaar Publishers
- David Howe, (2009) A Brief Introduction to Social Work Theory, Palgrave Macmillan Publishers
- Dominelli, L. 2004 Social Work: Theory and Practice for a Changing Profession
- Freidlander, (2005) Concepts and Methods of Social Work, New Delhi, Concept Publishers
- Madan, G.R., (1981) Indian Social Problems, Allied Publishers, Calcutta.

**Semester I****Credit: 4****Paper – 2****Hr /wk: 5****MSW 4403 – SOCIOLOGY FOR SOCIAL WORK PRACTICE****Course Description:**

This course aims at offering a functional composite of society and seeks to equip the students to develop analytical frames of reference to understand and appreciate its structure and stratification. Basic sociological thoughts and concepts used in looking at the society will help students to construct a critique on understanding social and cultural issue.

**Objectives:**

1. To understand the basic concepts and the major concerns of sociology.
2. To understand the relationship between culture, personality and society.
3. To identify the nature and characteristics of social processes

**Learning Outcome:**

The learners will be able to understand the dynamics and problems of with society and shall interpret the subtle differences between social service, social work, and sociology.

**UNIT I:** Sociology: Definition -Nature – Meaning and Scope; Sociology and its Relationship with Social Work; Society- Meaning, characteristics, Nature and Scope; Basic Social Concepts: groups, community, association, institution, organization, social structure and culture.

**UNIT II:** Social Processes - Co-operation, Competition, Conflict, Accommodation, and Assimilation; Social Institutions - Marriage, Family, Education, Religion and Political Institutions – Meaning, Types and Functions; Socialization - Meaning, Agencies and Functions; Social Mobility – Concept and types of social mobility.

**UNIT III:** Concept of Culture - Culture and Society - Cultural Lag, Cultural assimilation and integration - Civilization - Customs, Mores, Folkways; Social Stratification – Meaning and functions, Caste, Class and Race; Social Control - Meaning and agents - its effect on individual and society.

**UNIT IV:** Sociological Theories: August Comte, Durkheim, Karl Marx, Spencer, Weber; Indian Social Thinkers – Jyotirao Phule, MK Gandhi, B.R. Ambedkar, E.V. Ramasamy and M.N. Srinivas.

## **MSW 6**

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**UNIT V:** Social problem: - Concept, Causes, Characteristics - Social Labeling, Social Deviance, Social Disorganization - Major Social Problems in India; Social Change – Meaning, Causes and resistance - agents of social change- Social change in India.

### **Text Books:**

- Shankar Rao, C.N. 1990, Sociology-Principles of Sociology with an Introduction to Social Thoughts. New Delhi: S. Chand Publication.
- Haralambos, M. 1998. Sociology: Themes and Perspectives. New Delhi: Oxford

### **REFERENCES:**

- Bhusan, Vidya&Sachdev, 2006, An introduction to sociology, Allahabad, KitabMahal.
- Harry. M. Johns, 1993, Sociology – A Systematic Introduction, Chennai, Allied
- Horton,P.S& Hunt, C. L. 2005, Sociology, New Delhi, Tata McGraw Hill.
- Jayaram, N. 2005. Introductory Sociology, Macmillan Publications, Madras.
- Ram Ahuja 1997 Social Problems in India. Jaipur, Rawat Publications.
- Srinivas, M.N. 1966 Social change in Modern India. Bombay, Allied Publication, University Press.

Semester I

Credit: 4

Paper - 3

Hr /wk: 5

**MSW 4513 PSYCHOLOGY FOR SOCIAL WORK****Course Description:**

This is an introductory which would deal with the elements of psychology needed for social work. Ideas and insights providing the foundation of this course will lead the student to develop a passion and interest in their career as a Social Worker.

**Objectives:**

- To develop a broad-based understanding on Psychology as an accompanying element of social work
- To recognize scope and relevance of psychology in various sociological settings.
- To make the boys and girls realize the role of hereditary and environmental influences on their physical, emotional and intellectual development
- To enable them to focus on aspects of learning with a balanced frame of mind to correctly perceive and interpret their physical and social environment.
- To introduce the concept of abnormality pitching on the standards of Normality

**Learning Outcome:**

On completing the exercises prescribed, students would have learnt the importance of Psychology as an overlapping discipline of social work and might have equipped themselves in understanding the nature, scope and basic concepts in Psychology to draw a comprehensive picture on distinguishing their role in social work interventions.

**Unit I: Introduction to Psychology**

Psychology: Definition, Meaning, Branches, Scope, Fields. Utility of Psychology, Relevance of Psychology for Social Work.

**Unit II: History of Psychology**

Development of Psychology: Pre Scientific – Superficialism, Monoism, Dualism, Empiricism, Associationism, Naturalism, Herbartianism. Scientific Psychology: Structuralism, Functionalism, Behaviorism, Gestalt Psychology, Psychoanalysis, Individual Psychology, Analytical Psychology. Contemporary Psychology: Humanistic Psychology, Transpersonal Psychology, Cognitive Psychology.

**Unit III: Developmental Psychology**

Developmental aspects – Physical, Psychological, Social: Prenatal, Infancy, Babyhood, Childhood, Adolescent, Adulthood/early/middle/late.

**Unit IV: Thinking and Behaviour**

Physiology of Behaviour: Nervous System - *CNS* – Brain & Spinal cord - *PNS*- Somatic [sensory & motor] & Autonomic [motor- sympathetic/parasympathetic] -Endocrine System; Psychological aspects: Instincts, Emotions, Thinking, Reasoning and Problem Solving.

**Unit V Motivation and Personality**

Motivation: Definition, Types; Learning: Definition, Types, Theory-Trial & Error/ Classical Conditioning / Operant Conditioning / Insight Learning; Personality – Meaning, nature, characteristics, Theories- Type/Trait/Type cum Trait., Enneagram

**Text Books:**

- Morgan, C. T. & King, R.A. (1975) Introduction to psychology, McGraw Hill, New York.
- Kuppasamy, B. (1980) An Introduction to Social Psychology, Media promoters and pub, Bombay.
- Munn Norman, L. (1967) Introduction to psychology, Oxford and IBH, New Delhi

**REFERENCES:**

- Anastasi, A. (1987) Psychological testing, McMillan Revised Edition, New York
- David, H. Barlow V., Mark Durand 2008 Abnormal Psychology, Thomson Wardsworth
- Davidoff, L. L (1976) Introduction to psychology, McGraw Hill Inc; New York
- Eric (1978) Human Development, George Allen and Unwin, London
- Hurlock E.B (1995) Developmental Psychology, Tat McGraw Hill, New Delhi
- Jaypee Brothers 2005 Diagnostic and Statistical manual of mental Disorders DSM-IV- TR Medical Publishers Pvt. Ltd.
- Michael Gelder (2009) Shorter Text book on Psychiatry V Edition Paul Harrison and Philip Cown Oxford University Press
- Newman P.R.& Newman B.M (1981) Living: The Process of Adjustment, Illinois; The Dorsey Process Rayner.
- Sharan A.K. (1997) international Understanding of Human Psychology, Commonwealth, NewDelhi.

**Semester I****Credit: 4****Paper – 4****Hr /wk: 5****MSW 4407 SOCIAL CASE WORK PRACTICE****Course Description:**

This course aims at introducing the primary methods of social work. The concept and strategies of social case work and social group work will entrain them to work with individuals and groups in the Society. Training given in the course will provide the know-how to use of social case work and group work tools and techniques carefully in social work practice.

**Objectives:**

1. To introduce case work and group as the primary methods of social work and to make students understand values, principles and importance of working with individuals and families
2. To develop in them, the ability to critically analyze problems of individuals and families and factors affecting them
3. To help students gain knowledge about group formation and use of a variety of group approaches and to understand concepts, dynamics and models
4. To urge the learner develop knowledge of the principles, skills and techniques that ought to be used by the social worker while pursuing case and group investigations

**Learning Outcome:**

Students who complete this course would have acquired the basic knowledge and skills needed for social case work and group work. The student will be able to identify situations and settings to translate thoughts and ideas with the right methods considering the prevailing context of social reality.

**Unit I Fundamentals of Social Case Work**

Social Case Work: Meaning, definition and objectives, nature and scope, its importance and relationship with other methods of Social Work; Components of Social Case Work: the person, the problem, the place and the process; Client-case worker relationship and the use of professional self; Principles of case work.

**Unit II Process of Social Case Work**

Social Case Work process: Intake, study, assessment, diagnosis, treatment, termination and follow-up; Tools and Techniques of Social Case Work: Interview, observation, home visits and collateral contacts; Social Case Work intervention: Direct, indirect and multidimensional intervention.



### **Unit III Approaches in Social Case Work**

Approaches in Social Case Work: Psychological approach, functional approach, problem solving model, diagnostic approach and crisis intervention, family therapy. Counselling and social case work - similarities and differences; Social Case Work Recording: Need, importance and types of recording.

### **Unit IV Application of Social Case Work**

Social Case Work in different settings: Family and child welfare, School, Community, Industries, Medical and Psychiatric institutions, Correctional settings: prisons; Care of aged and in foster home. Role of social worker: enabler, facilitator, guide and resource, mobilizer.

### **Unit V Recent Developments in Social Case Work**

Recent development in Social Case Work; Impact of social, cultural factors on individual and families; Practice and research in Social Case Work; Use of case study and ethnography as research methods in Social Case Work. Problems and limitations of Social Case Work practice in India.

#### **Text Books:**

- Upadhyay, P.K. (2003) Social Case work New Delhi Rawat Publications
- Perlman, Helen H (1957) Social Case Work - A Problem solving process, University of Chicago Press, Chicago
- Mathew, Grace (1993) An Introduction to Social Case Work Bombay; Tata Institute of Social Sciences, Mumbai.

#### **REFERENCES**

- Aptaker, Herbert, (1982) Dynamics of Case Work and Counselling, Mifflin Pub. Boston
- Hollis, Florence (1964) Case Work - A Psychosocial Therapy, Random House, New York
- Jordan, William (1970) Client Worker Transactions, Rutledge & Kegan Paul, London
- Kadushin, Alfred (1972) The Social Work Interview, Columbia University Press, New York

**Semester I****Credit: 5****Paper – 5****Hr/Wk: 9****MSW 4509 LIFE SKILL COMPETENCIES AND FIELD VISITS**

This is a skill building courseclutches towards the professionalism in social work practices. The students will examine here will practically orient the students towards developing basic competencies required for doing effective field work. Time spent in the two-part approach of this practicum will provide a orientation and will accompany a vast duration of time in the study period devoted for observation and investigative enquiries to be made in various field work situations.

The in-house training on soft skills and life skill competenciesthrough workshops and simulated exercises, the closely supervised field exposures and observation visits worth a concurrent training, and the professional skills inculcated will embellish the course as the most unique and critical input offered in the whole program.

**Part –A Essentials of life skills competences**

- Knowing Self and Context
- Traits to be built: Self Confidence, personal vision, identity and relating with others, communication, capacity for team work, accepting personal responsibility, gender relations, leadership, motivations, Goal setting, Time management
- Skills for Comprehension – Avenues of input: Listening - Reading - writing – Reflections
- Skills for contextualizing Fieldwork and developing spontaneity - Interviewing, observations, use of records, social mapping, recording, report writing and documentation Developing Learning Objectives, Preparing Field work Plans, Field Work Conferencing and transparency

**Part –B: Observational Visits****List of settings:**

- Industrial setting,
- Development setting,
- Hospital setting,
- Health setting,
- Correctional setting,
- Rights Based Organizations,

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The observations made by the students will be recorded and individual experiences will be shared, discussed periodically. Work put in by the students will be monitored by the Faculty. Students are expected to submit reports prepared as per guidelines indicated in the manual at the beginning of each new week after a cycle is completed.

### **Course Requirements and Evaluation:**

75% of marks will be allotted for continuous assessment. Regularity in attendance, keenness to participate, readiness to learn, and development of required skills, ability to conceptualize and acquisition of functional knowledge will be tested on the basis of process reports, observational reports and participatory evaluation by the faculty. A viva voce will be conducted at the end of the semester by a three-member committee of which one is an external member. Performance in the viva will be evaluated for 25%.

#### **A. Continuous Assessment:**

(Based on submission of weekly reports/assignments)

i.	Regularity of attendance	10 marks
ii.	General Participation	15 marks
iii.	Skills and Competencies	15 marks
iv.	Individual Presentations	10 marks
v.	Written Reports	25 marks
		<u>Total 75 marks</u>

#### **B. Viva Voce:**

i.	Conceptualization	5 marks
ii.	Working Knowledge	5 marks
iii.	Problem Solving Ability	5 marks
iv.	Consolidated Report	10 marks
		<u>Total 25 marks</u>

**Semester II****Credit: 4****Paper – 2****Hr/Wk: 5****MSW 4402 SOCIAL GROUP WORK PROCESS****Course Description:**

This course aims at introducing the social Group work methods in social work. The concept and strategies of social group work will entrain them to work with groups in the Society. Training given in the course will provide the know-how to use of social group work tools and techniques carefully in social work practice.

**Objectives:**

1. To introduce and enrich their knowledge in group work as the primary methods of social work
2. To make students understand values, principles and importance of working with groups
3. To help students gain knowledge about group formation and use of a variety of group approaches and to understand concepts, dynamics and models
4. To urge the learner develop knowledge of the principles, skills and techniques that ought to be used by the social worker while pursuing group investigations

**Learning Outcome:**

Students who complete this course would have acquired the basic knowledge and skills needed for social group work. The student will be able to identify situations and settings to translate thoughts and ideas with the right methods considering the prevailing context of social reality.

**Unit I Fundamentals of Social Group Work**

Groups: meaning, definition, types, purpose and stages of groups; Social Group Work: Definition, characteristics and objectives, assumption and philosophy; historical development and current application of group work as a method; Psychological needs that are being met in groups.

**Unit II Theories in Social Group Work**

Knowledge base for group work: Psycho-analytic theory, learning theory, field theory, social exchange theory and systems theory; Group dynamics: Definition, functions and basic assumptions.

**Unit III Process of Social Group Work**

Social Group Work process: Planning stage, beginning stage, middle stage and ending stage; Principles of Social Group Work: Group process, bond, acceptance, isolation, rejection, sub-groups scapegoats, conflict and control; Leadership development and Team building; Factors of Group formation.

**Unit IV Techniques of Social Group Work**

Social Group Work recording: Use of social group work records, principles and problems of group work recording; Group Therapy: Significance of group therapy, programme planning in Social Group Work, Use of psychodrama and socio-drama; Different Therapeutic approaches: Transactional analysis, T-groups, gestalt, role play, buzz group and brain storming.

**Unit V Application of Social Group Work**

Social Group Work in various settings: Correctional, hospital, educational, old age homes and communities; Use of socio-metry for group work; Skills of the Social Group Worker; Scope and limitations of group work in different fields of Social Work; Knowledge and skills of a group worker, group worker as an enabler, guide, facilitator and therapist.

**Text Books:**

- Gisela Konopka, (1963) Social Group Work: A helping Process, Prentice Hall, New Delhi
- Alissi, Albert S (1980), Perspectives on social Group Work Practice, The Free Press, New York

**References:**

- Gerald Corey (2000) Theory and practice of Group Counselling, Wordsworth, London
- Gravin, Charles, D. (1989) Contemporary Group Work, Prentice Hall, New Jersey.
- Conyne K, Robert (1999), Failures of Group Work Practice, Sage, Oaks.
- Douglas, Tom (1972) Group Process in Social Work, Chicester, Willey.

**Semester II****Credit: 4****Paper – 2****Hr/Wk: 5****MSW 4404 COMMUNITY ORGANISATION AND SOCIAL ACTION****Course Description:**

This course is designed to present to student's community organization as another option method of social work. Besides enabling them to understand the basis of the organization of a community, content of the course helps the learner to look at the nuances of applying community organization as a strategy for social work in different conditions.

**Objectives:**

1. To develop an understanding for the students to have a scientific approach to human enquiry in comparison to the native or common-sense approach in various aspects and its process.
2. To help learners understand major rural situation and urban situation, meaning, scope, and importance of social work research
3. To engrain ability in Program based activities and identify role of social worker in rural community.
4. To inculcate attitudes favorable in rural people ideology and practices

**Learning Outcome**

This course helps the student in applying the ideas of community organization to diverse situations as a method of social work and compare results with other established models such that the existing situation is deciphered and the proposals for social action is planned. Utility wise, the learner will be able to master the role as community organizer and shall come out with advocacy or a recommendation to address issues and offer solution to proactively deal with insurgencies.

**Unit – I Community Organization**

Community: Definition, Characteristics and Types. Community Organization (CO) – Definition, Objectives, scope and relevance. Principles of Community Organization. Community Organization as a method of Social Work. History of Community Organization - USA, UK, India. Community Development (CD): Definition - Difference between CD and CO.

**Unit – II Models and Process**

Process of Community Organization: Study, Analysis, Assessment, Discussion, Organization of Action, Evaluation, Modification, and Continuation. Models in Community Organization: Locality Development, Social Planning and Social Action.

**Unit – III Methods of Community Organization**

Methods of Community Organization: Planning, Education, Communication, Community Participation, Collective Decision-making, Leadership Development, Resource Mobilization, Community Action, Promotion, and Co-ordination.

**UNIT IV Skills and Applications**

Skills in Community Organization: Organizing Conferences, Committee Meetings, Training, Communication, Consultation, Negotiation, Conflict Resolution, Networking and use of Relationship. Role of the community organizer. Application of community organization: Public Health, Child and women Rights, marginalized groups and Disasters.

**UNIT – V Social Action - method of Social Work**

Social Action: Definition, Objectives, Scope, Principles and strategies. Social Action and Social Movement. Social Action for Social Development. Advocacy and Lobbying. Enforcement of Social Legislation through Social Action. Contributions to CO: Paulo Frierrie, Saul Alinsky, Gandhi, and EVR Periyar.

**Text Books:**

- Murray.G. Ross, (1955) Community Organization. Theory, Principles and Practice, New delhi.
- Satyasundaram. (1997) Rural Development, New Delhi: Himalaya Publishing House

**REFERENCES:**

- Joseph M.K (2000) Modern Media and Communication, New Delhi: Anmol.
- Kumar, Aravind (2000), Encyclopedia of Decentralized Planning and Local Self Government, New Delhi: Anmol.
- Kumaran, Hyma, Wood (2004), Community Action Planning, Chennai, T. R. Publications
- Laxmidevi (1997) Planning for Employment and Rural Development, New Delhi: Anmol.
- Maheswari.S (1985) Rural Development in India - A Public Policy Approach, New Delhi: Sage
- Mathur.B.L.(1996) Rural Development and Cooperation, Jaipur: RBSA Publishers.
- Rahul Mudgal (1996) Economic Dimensions of Rural Development, New Delhi: Sarup&sons
- Singh, Hoshiar (1995) Administration of Rural Development in India, New Delhi : Sterling Publishers Private Ltd.
- Tiwari S (2000) Encyclopedia of Indian Government: Programmes and Policies, New Delhi.

**Semester II**

**Credit: 4**

**Paper – 4**

**Hr/Wk: 5**

**MSW 4406 SOCIAL WELFARE ADMINISTRATION AND POLICY**

**Course Description:**

This course would help the student to see Social Welfare Administration as a method of social work and provide knowledge and insights on the various social welfare processes, schemes and Social policies launched in India.

**Objectives:**

- To introduce Social Welfare Administration as a method of social Work.
- To apprise students on the different formats and models of Welfare Administration, Organizational & Financial Frameworks
- To update the students on the Social e policies of the government and keep them updated
- To engrave the skills and confidence in students to establish a newer human service organization.

**Learning Outcome:**

The course shall facilitate a critical understanding of the basic processes of administration and offer to the students an understanding on the procedures and policies behind the establishment of Social Welfare Organizations.

**UNIT I:**

Definition, Nature, Scope, Significance, Functions, Principles, Historical Development; Related Concepts: Social Welfare; Social Development; Social Welfare Agency; Qualities of a Social Welfare Executive.

**UNIT II: Administrative Framework**

Basic Administration Process: Planning, Organizing, Staffing, Directing, Controlling, Reporting, Budgeting (POSDCORB), Notes on Book keeping. Financial and Office Administration: Budgeting, Accounting, Auditing, Fund Raising, Reporting, Office procedures and Record maintenance; Monitoring, Evaluation, Decision-Making, Co-ordination, Communication, Public Relations and Networking.

**UNIT III: Structure and Statutes**

Social Welfare Organization- Types of Social Welfare Agencies - Registration of Societies and Trusts- Bye-laws, Governing Board: Function and responsibilities, Organizational structure; Provisions : the Income Tax Act, Foreign Contribution and Regulation Act.



**UNIT IV: Domains**

Functional areas: Central and State Ministries, Central Social Welfare Board and Other National Institutions: ICDS, ICCW, ISSNIP, ICPS, Child and Women Welfare-, Functions and Structure: State and Central Social Welfare Board, Provisions in State Social Welfare Board Programs; Administrative arrangements for Social Welfare in Tamilnadu.

**UNIT V: Social Policy**

Social Policy- Meaning, Definition, Nature, Scope, Objectives and Types; Social Policy as an instrument of social change. Policies related to: Nutrition and Food Security, Education, Health, Women and Children, Senior citizens, Transgender, Backward Classes and Unorganized Sector.

**Text Books:**

- Chowdhry, D. Paul. 1983- Social Welfare Administration, Atma Ram and Sons Publishers, New Delhi
- Sanjay Bhattacharya (2006)- Social Work Administration and Development, Rawat Publishers
- Singh D.K. (2013)- Professional Social Work: Principle & Practice, New Royal Book Publishers

**References:**

- Bhatiya&Dingh(2009), Social Policy In India, New Royal Book Company, Lucknow.
- Bose.A.B, (2001), Social Welfare Planning in India, Bangkok, United Nations.
- Gautam (2011), Social Work, Social Policy, Concept and Methods, Centrum Press, New Delhi
- KumarJha (2009), Encyclopedia of Social Work, Social Welfare and Social Work, Anmol, New Delhi
- Rino. J.Patti 1983 (2008)- Social Welfare Administration: Managing Social Programme sin a Developmental Context, Prentice Hall Publishers
- Sachdeva, D. R. (2013)- Social Welfare Administration in India, KitabMahal Publishers

**Semester II****Credit: 4****Paper – 4****Hr /wk: 6****MSW 4408 SOCIAL RESEARCH AND STATISTICS****Course Description:**

The course aims at introducing the students to the core concepts, principles, methods and procedures pertaining to Social research and its methods.

**Objectives:**

- To enable students to understand the importance and need for Social research and statistics.
- To help students understand the methodology of social research and statistics and its application in the field.
- To enable the students to understand the importance of the application of Statistics in Social Research
- To equip the Students with the necessary skills and provide them with ability to take up Research Projects independently.

**Learning Outcome:**

At the end, the course work would facilitate a thorough understanding on the contemporary Trends and Practices and applications in Social Work Research

**UNIT I:**

Basics of Research: Meaning, Definition, Objectives, Types - Basic, Action and Applied, Social Survey and Social Research, Qualitative and Quantitative Research; Scientific Method-Meaning, Aim, Objectives, Assumptions, Nature and characteristics; knowledge: Induction and Deduction methods and Criticisms; Social research: Meaning and definition, Aims and objectives – Steps in social research.

**UNIT II:**

Research Problem: Identification -Formulation, Review of Literature, Formulation of Aim and Objectives for Research; Research Designs -Definition, Meaning, Types. Exploratory, Descriptive, Diagnostic and Experimental, - Factors influencing the choice of designs. Hypothesis – Definition, relevance, types; Pilot study - uses, Pre-Test and its importance.

**UNIT III:**

Methods and Tools for Data collection: Primary and Secondary data collection. Observations, Questionnaire and Interview. Universe and Sampling: Meaning, types, advantages and limitations, Factors affecting the size of samples - Sample size estimation and sampling errors.

**UNIT IV:**

Data analysis: Editing, Coding, Sorting, Master chart, Data entry. Presentation of Data– Tabulation, Diagrams, Graphs. Statistics: Introduction, functions, uses and misuses of Statistics. Measurement of Central Tendencies – Mean, Median and Mode –Measure of Dispersion: Range –Mean Deviation- Standard Deviation - Quartile Deviation- Correlation; Significance Test: t & F –Test - Chi Square Test - Usage of SPSS.

**UNIT V:**

Qualitative Research: Meaning, context, Epistemological approach: Enlightenment - Modernity - Positivism - Falsification; Methods in Qualitative Research: Participant Observation - FGD - PRA & Social Mapping - Case Study - Action Research - Triangulation - Phenomenology - Ethno methodology - Semiotic Analysis – Visual Methods, Content Analysis; Ethics and Limitations of Qualitative Research.

**Text Books:**

- C.R. Kothari and Gaurav Garg (2018), Research Methodology, New Age International Publishers.
- O. R. Krishnaswami (2005), Methodology of Research in Social Sciences, Himalaya Publishing House, New Delhi.

**REFERENCES:**

- Anderson et al, (1991), Thesis and Assignment Writing, New Delhi, Wiley Easton Ltd.
- Ahuja, Ram, (2003), Research Methods, Jaipur, Rawat Publications
- Champian, DJ. (2001), Basic Statistics, Prentice Hall
- Goode & Hatt, Methods in Social Research, McGraw Hill
- Gupta, S P. (2005). Statistical Methods, New Delhi, Sulthan Chand.
- Denzin, N.K and Lincoln, Y.S. (2000), Hand Book of Qualitative Research, Sage, Thousand Oaks.

Semester II

Credit:5

*Paper – 5**Hr/Wk: 9***MSW 4510 PREPARATORY FIELD WORK – BLOCK PLACEMENT****Course objective:**

This course aims at developing a closer understanding of field work requirements to the students who are to take their specialization. The content of the course would be dealt with a special approach.

**Customization of the training experience**

This course being the first of its kind to be experienced by the student in the social work program towards gaining direct field experiences will rest on teacher's inventiveness to entrain him/ her in the selected field setting for a period of 25 days. In the creative design of the programme the students who will be attached to an organization / agency will focus consistently in such a way a team of two would continuously monitor the professional skills and methodology followed by the supervisor belonging to the agency in social work setting. The check list provided would direct the candidate look for on details that he/she will have to observe keenly in his/her field work engagement.

**Course Requirements and Evaluation:**

- 75% of marks will be allotted for continuous assessment.
- Regularity in attendance, keenness to participate, readiness to learn, development of required skills, ability to conceptualize and acquisition will be tested
- The functional knowledge will be evaluated on the basis of process reports, observational reports and participatory evaluation by the faculty.
- A viva voce will be conducted at the end of the semester by a three-member committee of which one is an external member. Performance in the viva will be evaluated for 25%.

**A. Continuous Assessment:****(Based on submission of weekly reports/assignments)**

Regularity of attendance	15marks
General Participation	15marks
Skills and Competencies	15marks
Individual Presentations	10marks
Written Reports	20marks
Total	75 marks

**B. Viva Voce:**

Conceptualization	5marks
Working Knowledge	5 marks
Problem Solving Ability	5marks
Consolidated Report	10 marks
Total	25marks

**Semester III****Credit: 4****Paper – 1****Hr/Wk: 5****MSW 5401 HUMAN RIGHTS PERSPECTIVES FOR DEVELOPMENT****COURSE DESCRIPTION:**

This course is aimed at providing knowledge on human rights and provide the basis for handling major social legislations in India. Content of the course shall touch upon various social legislations in the context of welfare administration. It will specially throw light on legal aspects and judicial implications of procedures and practices that ought to be followed in social work practice.

**OBJECTIVES:**

1. To enable the students to acquire skills in develop a perspective in Human rights and engage in the critical analysis of Social legislations in India
2. To develop an insight into Social Legislations dealing with marginalized groups and other weaker sections with an intent of empowering them to be accommodated in the main stream
3. To entrain them in the understanding of legal rights to present themselves confidently working for people in the context of development
4. To inform students on their rights and responsibilities when it comes to the question of identifying role and functions in protecting Human dignity and honor

**COURSE OUTCOME:**

On successful completing the course the student will have the knowledge on various aspects of human rights, techniques and approaches in social legislations that he/she will be able to address social problems with a holistic perspective. Discussions will ensure the students to get adequate knowledge & exposure on legal provisions.

**Unit I Human Rights**

Human rights: Definition, Meaning, Need, and Classification - Civil and Political Rights, Socio Economic and Cultural Rights. Universal Declaration of Human Rights. Functions and powers –International, National and State Human Rights Commissions - Human Rights as a tool for social justice and development.

**Unit II Constitutional Framework in India**

Constitutional Framework: Need and Nature, Fundamental rights, Fundamental Duties, Directive Principles of State Policy. Functional Structure: Executive, Legislative & Judiciary.

Judiciary System in India: Classification - Supreme Court, High Court, District and Magistrate Courts, Family Courts, Lok Adalats, Legal Aid System.

### **Unit III Social Legislation**

Social Legislation: Meaning, Definition, Nature and Scope; Constitutional basis for social legislation, instrument for social change, tool for social justice and control.

### **Unit IV Social legislations – Micro Elements**

1) **Laws Related to Children:** Juvenile Justice Act, Adoption and Guardianship, Child Marriage Restraint, Prohibition of Child Labour. 2) **Laws Related to Family:** Laws related to Marriages, Divorce and Maintenance & Succession; Law against Domestic Violence 3) **Laws Related to Women:** Harassment of Women at Workplace, Dowry prohibition, Maternity benefits, Prohibition against Prenatal diagnostic tests (for sex determination).

### **Unit V Social legislations – Macro Elements**

1) **Laws Related to Scheduled Castes and Scheduled Tribes:** Protection of Civil Rights; Law against Atrocities. 2) **Law Related to Persons with Disability** 3) **Laws Related to Workers:** Minimum wages, Equal Remuneration Act 4) **Laws Related to Consumers and Citizens:** Consumer protection, Food adulteration, Right to information (RTI).

### **Text Books:**

- Gangrade, K.D, Social Legislation in India Vol. I & II, Concept Publishing Company, New Delhi, 2011.
- Velayutham, K.Shanmuga 1998. Social Legislation and Social Change. Chennai: VazhgaValamudan Publishers.

### **References:**

- AdamantiaPollis, Peter Schwab, 2000, Human Rights: New Perspectives, New Realities, Lynne Rienner Publishers,
- Constitution of India. 1991. New Delhi: Govt. of India.
- Encyclopedia of Social Work. Vol. I & III
- Jagadeesan P., Marriage and Social Legislations in Tamil Nadu, ElachiapenPub, Chennai,
- Nair, T.Krishanan (ed): Social work Education and Development of Weaker Sections. Madras: Association of Schools of Social Work in India.
- Nation Law School. 1991. Select Materials on public Legal Education. National Law School of India University. Bangalore.
- P Chauhan, 2004, Human Rights: Promotion and Protection, Anmol Publications Pvt. Ltd.

Semester III

Credit:4

Paper - 2

Hr /wk: 5

**MSW 5403 DISASTER MANAGEMENT****Course Description:**

This course is designed to facilitate the understanding and thereby to enhance the professional skill of the social workers to deal the emergency situations very effectively.

**Objectives:**

- To make students realize that Disasters, Catastrophes and Calamities are prone to occur in the fast-paced changing world that cuts into create disturbances in eco balance
- To enable students to gain knowledge on key concepts and approaches of Disaster Management
- To develop the cognitive ability to analyze factors contributing to disaster and develop an understanding on the process of Disaster Management
- To impress upon the learner to understand the role of science and technology in predicting and dealing with the methods in Disaster Management

**Outcome:**

By securing knowledge about the types, nature and the impact of disasters, the student who would rescuer or planner of rehabilitation will be able to offer invaluable service and leadership to deal with contingency and develop a broader understanding on team building for group engagement during differ stages of Disaster Management, Relief and Rehabilitation.

**UNIT I: A Perspective of Catastrophes and Disasters**

Disaster- Meaning and Concept, related concepts: Risk, Hazard, vulnerability. Types of Disasters: Famine, Floods, Tsunami, Cyclone, Hurricanes, Earthquake, Volcanoes, Landslides, Snow Avalanche, Fire, Forest Fire, Epidemics, Warfare, Community/Ethnic clashes; Models of disaster - crunch model and release model; Disaster Management: Meaning - Disaster Management Cycle; Disaster Management models;

**UNIT II: Disaster Prediction and Forecasts**

Disaster prevention: Vulnerability Assessment, disaster Risk Reduction, Hazard Assessment, emergency Operation Plan, Capacity assessment; Disaster preparedness: Public Awareness and education- community based Approach, Stakeholders' Roles and Responsibilities; Disaster management Risk factors: Challenges and constraints;



**UNIT III: Dealing with Emergency**

Response: Introduction- Disaster Response Activities- Traditional and Modern methods, Disaster Recovery: Introduction - The Recovery Plan- Disasters as opportunities for Developmental Initiatives-Rehabilitation and Reconstruction; Risks involved in response and recovery;

**UNIT IV: Impact of Disasters**

Disaster associated Health Issues - Emergency Health services and communicable diseases, Promoting Health and Hygiene through a sanitation programme; Physical Impact types - Infrastructure, Transportation, Communication, Electricity, Water, security; Social Impact- Welfare- Economic Impact, Emotional Impact- Trauma and Counseling; NGO's in Disaster Management and relief - National and International donor agencies; Animals in Disaster;

**UNIT V: Role of Technology in Disaster Management**

Emergency Management Systems (EMS) -Introduction – Uses- Types o Geographic Information System(GIS)-Advantages- Global Positioning System (GPS) and Role of EMS, GIS, GPS in Disaster Management Cycle, Role of social work professionals at different levels.

**Text Books:**

1. Murthy.D.B.N 2007- Disaster Management: Text and Case Studies, Deep and Deep Publishers, New Delhi

**References:**

2. Anderson.M&Woodrow.P 1998- Development Strategies in times of Disaster, ITDG Publishing, London
3. Deshpande.B.G 1996- Earthquakes –animals and Man, JAC Trust, Gurgaon
4. Hejimans. A & Victoria. L 2001- Citizenry- Based and Development- Oriented Disaster Response, centre for Disaster Preparedness, Philipines
5. Tearfund 2004-Development and Risk Reduction in the Indian state of Andhra Pradesh: A Case
6. Abarquez. I &Murshed. Z 2004- Community- Based Disaster Risk Management: Field Practitioners' Handbook, Asian Disaster Preparedness Centre,New Delhi

Semester III

Credit:4

Paper -3

Hr /wk: 5

**MSW 5431HEALTH & WELLBEING****Course Description:**

The aim of this course is to give the students the basic knowledge of health and impress upon them the need to advocate for personal hygiene. Efforts will be taken to orient the learners to the various concepts about health and disease. Topics covered would help the students to rationalize the initiatives at the local, national and international level through organizations, governmental and non-governmental agencies in the delivery of health protection through special projects and schemes. It also ensures the physical and physiological well being of the individual and masses. Technically the course work would also allude to concepts of Clinical & Social Epidemiology, Sociology for diseases and Medical Anthropology.

**Objective:**

7. To give students the awareness on concepts of health and illness that besides developing individualized concern on self, the learner will be able to understand and appreciate that the discourse on hygiene *and wellbeing* merits treatment and attention as a program of national and global concern
8. To sensitize individuals on communicable and non-communicable diseases that the chances of the incidence and spread of diseases can be critically evaluated
9. To provide knowledge on the indicators of sound health and show how the various dimensions of illness can be qualified to be approached under the term *Medical Sociology*.

**Learning Outcome:**

On completion of course work students will have gained overall understanding of the physical well being and ailments that plague the community and will be able to guide the latter on choosing to lead a healthy life with abuse of body and mind under normal circumstances and get involved in advising and rescuing sick by tendering health care advice by comparing the merits and the utility of various discourses of medicine

**Unit I : Health**

Health – Concepts, Definition, Indicators and Determinants of Health, Fertility/ Mortality/ Nuptiality/ Morbidity. Health Education – Principles & Methods

**Unit II : Disease**

Disease – Concepts, definition, Causes-deficiency/ Pathogens(bacteria, viruses, fungi, protest).

Types : Communicable (infectious)/Non-Communicable(non infectious)/Acute & Chronic disease/ Illness, Disease , Sickness – Meaning/ differentiation/ Sick role

**Unit III : Health and Social Factors**

Social factors affecting health, social consciousness – perception and meaning of illness/ physical, psychological and psychosocial environment and health

**Unit IV : Health Care Delivery System**

Health system, Health care services, health care delivery system – primary, secondary, tertiary. Community health care center- structure/ staff pattern/functions. Indigenous health service- ayush

**Unit V : Public Health**

Health – WHO \_ Millennium Development Goal / Sustainable Development Goal. Public Health- Under developed/ developing/ developed countries - Global challenges and responsibility.

**Text Books:**

- Goel SL (1981) Health care Administration – A text Book, New Delhi, Sterling Publishing House.
- Kumar R, (1992) : Social and Preventive health administration, Asia Publishing House, New Delhi.

**REFERENCES:**

- Banerjee G.R. (1950),Social Service Department in Hospitals – its organisations and functions, TISS, Bambay.
- Goel, S.L. (1984) Public Health Administration, Sterling Publishers, New Delhi,.
- Goldsteine Dora (1955) Expanding Horizons in Medical Social work; University of Chicago press.
- Minna Field (1953) : Patients are people, Columbia University Press, new Yori,
- Park, J.E. & Park K (1983) Text Book of Preventive and Social Medicine; Jabalpur, M/s. Banashidas
- WHO (1981) Social Dimensions of Mental Health, Geneva, WHO, Publications.
- Anand K K, (1996) Hospital Management: a new perspective, New Delhi, Vikas Publishing House.
- Desai VA, (1985) Hospital Administration, Miraj, Wanless Hospital.
- Francis CM (1995) Hospital Administration, New Delhi, Jaypee Brothers.
- Goyal, RC (2006) Hospital Administration and Human Resource Management, New Delhi, Prentice Hall India.

Semester III

Paper –4

Credit: 4

Hr/Wk: 5

**MSW 5533 MENTAL HEALTH****Course Description**

The theme of the course will be to search for reasons which determine the stability of mind, thought and action. To help the students gain a broader understanding and working knowledge in the field of Mental Health, aspects of diet, habits, customs and traditions that influence on the cognitive and emotive upkeep will be discussed. Major emphasis will be on factors such as personal, family and other societal determinants which cause distraught situations as matter of conflict of interest. In analyzing the emotional breakdown and mental disorders of individuals, aspects of delinquency, congenital disease, and habitual aberrations leading to extreme behavior will be covered.

**Objectives**

- To give the students an overview of human behaviour and address the issues and challenges faced in dealing with Mental health status and related concepts
- To make learners understand the various factors that contribute to well being and healthy mental status of the individual and the community and spot the instances and conditions that pose threat and lead to mental health issues
- To provide for an understanding on the community setting relating to the concept of mental health help the trainees acquire knowledge in mental disorders, stress and coping for moving towards holistic health.
- To develop skills in identifying mental disorders and conflicts in emotional health and make the students realize their duties, responsibilities and role as social work personnel in the community and Psychiatric settings.

**Learning Outcome:**

Inputs given in the course will widen their understanding of the student about the scope of human behavior in the medical health setting and help them carve out a specialized niche with focused job and career aspirations for a professional engagement. As competent social work specialists trained in psychiatric social setting, learners will be able to identify their responsibilities and duties that they would discharge in restoring the physical and mental health of the affected individuals during the rehabilitation and restoration process.

**Unit I : Mental Health and Models**

Mental Health, Mental Illness, Mental Disorders: Concepts, Definitions, Causes (biological /psychological/ sociological/ psychosocial) Effects ( Predisposing/ precipitating/ perpetuating

## **MSW 30**

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or maintaining factor). Myths and misconceptions of MI. Models of Mental Health – Biomedical / Psychosocial/ Structural determinants / strength recovery determinant. Relevance of Social Work to MH & MI.

### **Unit II : Neuroses and Psychosis**

Neurosis- Anxiety, depression, OCD, convulsive disorder, phobia related. Psychosis : Functional – Affective – Organic Disorder

### **Unit III :Psychosomatic Disorder**

PD , Alcoholism, Substance abuse, Sexual Disorder, Epilepsy, MR, Psychological problem among children, adolescent, elderly

### **Unit IV : Cultural belief and Treatment**

Magnitude and burden of MD , promoting MH, Preventing and managing MI , Gap between MD and resources, MHGAP global health programme- Common cultural belief – Methods of Treatment – Physical/Psycho Social/ Indigenous

### **Unit V : Community Mental Health**

Community Mental Health : Concepts, definition, principles, practices. Development and Models of CMH . MH Act (1987), DMH Programme, School MH Programme

#### **Text Books:**

- Comprehensive Textbook of Psychiatry, (third ed.) Volumes 1 to 3, Williams and Wilkins, Baltimore / London.
- Diagnostic criterion from DSM-IV American psychiatric assn, Kaplan, H.I. Freedom A.M. and Sadock B.J. (1980)

#### **REFERENCE**

- Bellack A.S. (1984) Schizophrenia, treatment Management in Adult Bailliere Tindal, London.
- Berrios, G.E. & Dawson J.H. (1983) Treatment and Management in Adult Bailliere Tindal, London.
- Kappur, M Sheppard. Ralph and Renate (Eds) (1993)
- Mane P &Gandevia K. (Eds.) (1993) Mental Health in India Issues and Concerns; Tata Institute of Social Sciences, Mumbai.
- World Health Organization Geneva (1992) The ICD 10 Classification of Mental and Behavioral disorders. Clinical Description and Diagnostic Guidelines; Oxford University Press.

Semester III

Credit: 4

Paper –5

Hr/Wk: 5

**MSW 5535DISABILITY MANAGEMENT****Course Description**

The vulnerability of human to get carried away with the so-called indicators of growth and prosperity makes them pay more in terms of health and happiness. Though the rapid strides of progress made in science, technology and development have undoubtedly brought sophistication and greater life expectancy, the equilibrium with which we have been living with nature is upset and this had led us to face several unprecedented catastrophes. Disability is one major issue in the health front. There are many causes and painful consequences to this. This course coming under M & P gives an overall glimpse on the assessment, management and the care given to the affected, especially the socially disabled, and briefs on efforts that are to be taken in rescuing, restoring and rehabilitating them.

**Objective**

- To introduce the issue of disability which is on the rise to the students and discuss with them the Causes, Types, Magnitude and Severity of various Disabilities
- To give to the students an understanding the experience of disability, limitations, strengths and potentials of persons suffering disabilities
- To inform them the methods of assessment and management of Disability and apprise them of the effort taken worldwide in tackling this issue
- To brief the learner the efforts taken rescuing, restoring and rehabilitating the socially disabled that they may be sensitized to serve in this setting

**Learning outcome**

The theory studied and the observational visits made in the context will help the students to develop a concern for the needy and at the same time make them realize that well being, body, mind and the various facilities with which they live is not be taken for granted. The services and reflections that would make in this setting will make them more competent. Caring and creative enough that their participation in the restoration and rehabilitation of the disabled shall turn personally and professionally rewarding

**Unit I:**

Disability: Definitions, causes, types and magnitude of various disabilities, Prevention of disabilities at primary, secondary and tertiary levels. Concept: Disability, Impairment and Handicapped. Misconceptions and societal attitudes towards persons with disability.

**Unit II**

Historical and contemporary perspectives on Disability. Models of Disability and discourses - historical, medical, social, spiritual, cultural, political, gender and psychological. Limitations and strengths of persons with disabilities.

**Unit III**

Impact of disability on persons with disability and their families: reactions of parents/family members and ways of coping. Needs and problems of persons with disability and their families across the life span and at critical stages in their lives and social work intervention at each stage.

**Unit IV**

Multidisciplinary rehabilitation team and their roles: Process of rehabilitation, early identification, treatment, aids and appliances, psycho education, vocational rehabilitation and social integration within the family and community. Role of social worker in different settings - hospital and treatment centres, home, educational institutions, vocational rehabilitation centres, community based rehabilitation.

**Unit V**

Social Work Methods and Intervention strategies - individual, family and community levels: problem : self help level – self help, support groups, assertiveness training, life skills enrichment; family level - family crisis intervention, , parent guidance, parent training, community level - community awareness and education, PWD Act

**Text Books:**

- Karanth, Pratibha & Joe Rozario, (2003) Learning disability in India, Sage, London
- Albrecht G.L, Katherine D Seelman. & Michael Bury, (2001) Hand Book of disability Studies, Sage, London

**References**

- Hegarty Seamus & Mithu Alur, (2002) Education and Children with special needs, sage, London,
- Grant, (2005) Learning disability: A lifecycle approach to valuing people, Open University Press, London
- Moore, (2005) Researching disability issues, Open University Press, London
- Sanchiler, Social welfare India.

Semester III

Credit: 5

Paper - 6

Hr /wk: 5

**MSW 5537BLOCK PLACEMENT FOR MEDICAL & PSYCHIATRIC SOCIAL  
WORK-FIELD WORK****Course Description:**

The course aims at enabling the students to understand the various components of Medical and Psychiatric social work practice and develop skills and competencies required for effective Psychiatric Social Work Interventions at clinical and community level. This will be done by deputing students for a period of 30days in field work placement in Medical and psychiatric settings.

**Objectives:**

- To equip the students with the necessary assessment skills to understand the Psychosocial problems of the patient and the family with reference to the consequence of the illness
- To enable the students to practice methods of social work, particularly case work and group work, dealing with emotional issue of normal individual and extreme
- To equip the students with the necessary skills in hospital administration
- To apply the methods of social work and involve the family as an Social Institution
- To accept the patient and facilitate them to function at an optimal level in spite of the mental disability

**Outcome:**

With the practical exposure provided to students on Medical & Psychiatric Social Work in Clinical and Community settings, the students will be professionally equipped to engage in the various job roles in the domains of Medical & Psychiatry

**UNIT I: Medical & Psychiatric Social Work in Clinical setting**

Case history taking and mental status examination- Disability assessment and Management- Rehabilitation Processes- therapeutic Interventions- Home visits and Referral services- Counseling in different settings

**UNIT II: Medical & Psychiatric Social Work in Community setting**

Community basement rehabilitation- campaigning and educational programmes- state and Mental Health- Field Research



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N.B The learning situation will be both structured and unstructured. The trainee will be given various practical assignments during the placement that would enable him/her to use not only process learning methods but also various non-participant study techniques.

### **Course Requirements and valuation:**

75% of the marks will be allotted for Continuous Assessment. Regularity in field visits, seriousness of purpose, ability for conceptualizing issues, functional knowledge in Medical and Psychiatric social work practices, application of concepts and skills in problem solving will be assessed on the basis of weekly reports. A Viva- Voce will be conducted at the end of the semester with the faculty and External Examiner. Performance in Viva will be evaluated for 25%.

#### **A. Continuous Assessment**

Nature of Project/ Assignment undertaken	- 15 Marks
Field Work Consultation and Conferences	- 15 Marks
Weekly Reporting	-20 Marks
Assessment by Training Organization	- 25 Marks
<b>Total</b>	<b>- 75 Marks</b>

(Regularity of attendance, willingness to take Instructions and responsibilities, learning and Problem solving ability etc.)

#### **B. Viva- Voce**

Working Knowledge in the field	- 10 Marks
Conceptualization of issues	- 5 Marks
Problem solving ability	- 5 Marks
Consolidated Report	- 5 Marks
<b>Total</b>	<b>- 25 Marks</b>

Semester III

Credit:4

Paper - 3

Hr /wk: 5

**MSW 5451 RURAL DEVELOPMENT IN INDIA****COURSE DESCRIPTION**

This paper is planned to provide information on the life in the rural backdrop, governance and bureaucracy framework of rural development and seeks to examine at least few major rural schemes and projects that are conceived to alleviate and mitigate the existential problems of rural poor in India.

**OBJECTIVES:**

- To provide students an understanding on social structures, social relations and institutions in rural communities.
- To develop in them the sensitivity, commitment and skills to influence critical issues in rural communities.
- To make the learner appreciate the policies, programmes and approaches made in the context of rural community development.

**LEARNING OUTCOME:**

As an expected outcome student who would have developed a critical understanding of various policy initiatives, methods, strategies, and implications of various rural development plans, programs and projects in the past and present will be able to take up social work liaison as a freelance worker or by joining governmental or nongovernmental organization or an agency.

**UNIT I: NATURE OF RURAL COMMUNITY**

Rural Community: Definition, meaning, Characteristics of rural Community, Issues of accessibility, availability and affordability of basic services; Rural economy – Agriculture, non-agriculture sub sector, rural craft and occupation and rural industries; Problems in Rural India: Structural inequality, rural poverty and Rural employment. Livelihood: problems and prospects.

**UNIT II: RURAL DEVELOPMENT**

Rural Development: Concept, nature, philosophy and historical context; Meaning & Determinants; Early experiments of rural development-Sriniketan, Sevagram, Marthandam,

Gurogaon, Firka development, Nilokheri and Etawah pilot project; Approaches to rural community development.

### **UNIT III: RURAL DEVELOPMENT PROGRAMMES IN INDIA**

Rural development policies and goals in India and Supportive Policies - Different Models of Rural Development – 1) Community Development Programme- History, objectives, activities and evaluation of CDP -2) Approaches and Strategies: Intensive Agricultural District Programme (IADP), Integrated Rural Development Programme (IRDP), Draught Prone Area Programme (DPAP), Employment and Infrastructure Development Programme (EIDP), High Yielding Variety Programme (HYVP), NREGP.

### **UNIT IV: RURAL GOVERNANCE AND RURAL DEVELOPMENT**

Panchayati Raj Institutions: concept & Significance; Gram Sabha: Concept, Significance, Structure & Powers - People's participation in development – local self governance – understanding the evolution of the panchayatiraj system - Detailed study of 73<sup>rd</sup> Constitutional Amendment - Successful models in Panchayatiraj system – Kerala, Karnataka and West Bengal models.

### **UNIT V: RURAL DEVELOPMENT ADMINISTRATION**

Structure & Function of Rural Development Administration - structure of rural development department – DRDA-BDO-VAO; Financial Institutions: RBI, NABARD, CAPART, World Bank and IMF, Corporates etc. - Role in Rural Development: NGOs, Cooperatives, Public enterprises, SHGs and Community enterprises.

#### **Text Books:**

- Singh, Katar. 1999. Rural Development Principles, Policies and Management. New Delhi. Sage Publications.

#### **References:**

- McAreavey, Ruth. 2009, Rural development theory and practice, Routledge studies in development and society, UK
- Kumar, S. 2002 Methods for Community Participation: A Complete Guide for Practitioners. New Delhi: Vistaar Publications.
- Reddy, G.R., & Subrahmanyam, P. 2003 Dynamics of Sustainable Rural Development. New Delhi: Serials Publication
- Shah. G (1990), Social Movements in India, Sage Publications, New Delhi.
- Sharma, K. L (1998) Social Stratification in India, Rawat Publications, Jaipur.
- Beteille, A (1992) The Backward Classes in Contemporary India, Oxford University Press, New Delhi.

Semester III

Credit:4

*Paper - 4**Hr /wk: 5***MSW 5453 LIVELIHOOD AND SOCIAL ENTERPRISES****Course Description**

This course aims to introduce and facilitate about the concept Livelihood and Social Enterprises among the students and expose them to the social enterprise models to enhance and strengthen their competence in social entrepreneurship.

**OBJECTIVES**

- To help the students know concepts of Livelihood and Social Enterprises.
- To facilitate their understanding about the social entrepreneurship frameworks.
- To give adequate exposure and develop skills in learners to make them commit and participate developing social entrepreneurship, especially in supporting and sustaining development in the rural backdrop.

**Learning outcome**

This course aims at providing a basic foundation to livelihood and social enterprises would turn the student to have a comprehensive understanding on the themes of entrepreneurship tilted in favor of examining opportunities in rural India for pursuing his/her career.

**UNIT I Livelihood**

Livelihood: Concept, Meaning, Definition, Principles, History and Importance of Livelihood Promotion. Livelihood approaches: Rural poor, Agriculture, Migration, and Diversification, Sectoral differences - Livelihood promotion by different agencies - Government, Non Profits & Corporate - Major livelihood programs in India and Challenges in livelihood promotion.

**UNIT II Livelihood framework**

Understanding Livelihood Frame Work – Assets/Capitals – Natural, Physical, Financial, Human and Social. Vulnerability context, Policies and Process, Livelihood Strategies, Livelihood Outcomes. Livelihood Frame Work Analysis: Different models - Enhancing Income, Increasing Food Security and Reduction – Risk and Migration.

**Unit III Social Enterprise**

Social Enterprise: concept, definition, importance, similarities and differences and types. Growth and performance of social enterprises in Indian and global context; Relationship: with State, Civil society and Corporate; Corporate Social Responsibility: meaning, definition,

concepts, principles, Business ethics and corporate social responsibility, models of CSR: Concept of Triple Bottom Line, Bottom of the Pyramid, Sustainopreneurship; Role and skills of social workers in CSR.

#### **Unit IV Social Entrepreneurship**

Social Entrepreneurship: concept, definition, importance; social entrepreneurship and business entrepreneurship – social entrepreneurs and social change. Skills, Qualities and traits of social entrepreneurs. Problems of entrepreneurship, Role of social workers in entrepreneur development.

#### **Unit V Case studies**

Case studies in Livelihood Promotion –Watershed, Animal Husbandry, Micro enterprises, Micro Finance; Case studies of Indian social enterprises and entrepreneurs such as Ela Bhatt, M.S.Swaminathan, Vargeese Kurien, Aruna Roy, Rajinder Singh. Case studies related to CSR: Suzlon, Hindustan-Unilever,Infosys, Wipro, Ranbaxy and TATA.

#### **Text Books:**

- Vijay Mahajan, SankarDatta and Gitali Thakur, (2001) A Resource Book for Livelihood Promotion,
- Phansalkar,(2003) Livelihoods: Promoting Livelihood Enhancement, Mumbai, Sir Dorabji, Tata Trust.

#### **References:**

- Livelihood - Key Concepts,(1999) ICRA Learning Resources
- DFID (2001) Livelihood Framework - Sustainable Livelihood Guidance Sheets
- Perpetua Katepa, (2005) Sustainable Livelihood Approaches in Operation: A Gender Perspective, International Associates for Development
- David Bornstein, (2007) how to change the world, social entrepreneurs and the power of New Ideas , Oxford university Press
- Alex nicholls (2006) social Entrepreneurship : New models of Sustainable Social change, Oxford university Press.

**Semester III****Credit:4****Paper - 5****Hr /wk: 5****MSW 5455 – NON-GOVERNMENTAL ORGANIZATIONS****COURSE DESCRIPTION:**

This course aims at introducing the students of development management specialization, the concepts and principles involved in managing non-profit organizations, particularly Nongovernmental Organizations (NGOs). The need for establishing NGOs and the context with the ways and means of managing a nonprofit agency will be narrated. The organizational structure, the frame and terms of references made within and between agencies of similar kind functioning within India and abroad will be adequately covered.

**OBJECTIVES:**

- To make the student understand the need to float the development organizations like NGO's as part of a civil society initiative
- To develop skills in learners and train them in planning and management of NGO's & NPO's
- To enable the boys and girls touch base with contemporary development through discourses and equip them to develop suitable strategies for community intervention and development via NGO movement.

**OUTCOME:**

On successful completion the enrichment of knowledge on the structure, development and establishment of NGOs and acquiring skills for effective managing and administering NGO's & NPO's, will be inculcated.

**Unit 1 Non-Governmental Organizations (NGO)**

NGO: Concept, Meaning, Need, Classification and types, Functions, Principles, Role of NGOs in Development. Historical Development of NGOs in India. Locating NGOs – Voluntarism and Civil Society – the Third Sector - Development aid chain; NGO Interface – State relationship, community based organizations, Other NGOs and CSOs – Networking, Partnering, Collaborating, - Common denominators and overlaps in Business, Public and Non-profit managements. NGO as Organizational Entities.

**Unit 2 Legal framework**

Need for Legalframework: Registration and Establishment of NGOs –Societies Registration Act, Trust Act and Company's Act (Sec. 25) - Bylaws Preparation – MOU, MOA. Specific

Tax Exemptions (Section 12 A, Section 35 AC, Section 80 G & 80 GG of Income Tax Act.  
Foreign Contribution Regulations Act.

**Unit 3 Organizational structure & management**

Vision, Mission and Goals; Management: Strategic Planning - Division of responsibility, authority and power relations - Decision making – Participation; Organizational commitment Stakeholder Accountability and Transparency; HR competencies: need and importance, acquirement of competencies and skill sets, Training and Development and Appraisal of NGO staffs.

**Unit 4 Resource mobilization**

Resource mobilization: Non-Financial Resource – Natural Resources, Physical Resources – Human Capital Resources and Social Capital - Financial Resource. Funding source: Institutional and Non-Institutional, National and International; Financial Management: concepts and Basic Accounting principles, Office management: record keeping and documentation, File upkeep and maintenances, Publicity and public relations.

**Unit 5 Managing Projects in NGOs**

Project management: Project - concept, meaning, need, importance; requirement of Project proposal writing; Project management cycle – project identification, formulation, planning, implementing, budgeting, monitoring and evaluation; Tools: Stakeholder analysis, Gender Analysis, Situation Analysis, Problem Analysis, Logical Frame Analysis (LFA).

**Text Books:**

- Kandasamy, M., 1998 *Governance and Financial Management in Non-Profit Organizations*. New Delhi: Caritas India.
- Fowler, Alan. 1997. *Striking a Balance - A Guide to Enhancing the Effectiveness of Non Governmental Organizations in International Development*. London. Earthscan Publications Ltd.

**REFERENCES:**

- Brody, R. 2004 *Effectively Managing Human Service Organizations*. Sage Publications
- Drucker, P.F., 1992, *Managing the Non-Profit Organization: Principles and Practices*. Harper Business
- Julie Fisher, 2003 *Governments, NGOs and the Political Development of the Third World*, Jaipur: Rawat Publications.
- Kilby, Patrick, 2011, *NGOs in India : the challenges of women's empowerment and accountability*, Routledge contemporary south Asia series, London and New York

Semester III

Credit: 4

Paper - 6

Hr /wk: 5

**MSW 5457 - BLOCK PLACEMENT FOR DEVELOPMENT MANAGEMENT I-  
FIELD WORK****Course Description:**

The course aims at training the students build their own skills and competencies required for Development Sector. This will be done by organizing field work placements in NGOs and other Development agencies for a period of 30days.

**Objectives:**

- To study the rural and semi-rural life pattern in all its ramifications
- To train students in dealing with the Group Dynamics and Power Structure in a Rural Community.
- To develop an understanding of the process of program formulation and program management for the benefit of rural folk
- To formulate program management of the rural local bodies, government and n-n-government agencies
- To develop a positive attitude to work in rural community setting and enable students develop as competent individuals in public relations, fact findings, leadership, networking, fund raising, budgeting, report writing, lobbying an advocacy required for a development worker

**Outcome:**

Enlightened students would have acquired knowledge about NGOS, their style of functioning, their way of addressing social issues. The learner on completion of this course will be equipped for advocacy and lobbying and would have developed the skill of report writing

**UNIT I: NGO and the Community Interface**

Peoples' Constituency- Community structure- Current problems and issues- Relationship with CBOs- Entry strategies- Sustaining relationships- Community perceptions- Exit strategies

**UNIT II: NGO and the State**

Collaboration with the state- State sponsored projects-State- NGO relationships - problems in autonomy and Critical collaboration- Evaluating NGO Experiences



**UNIT III: Networking**

Understanding networks- Partnering and collaborations- NGO collectives- Nodal agency roles

**UNIT IV: Advocacy**

Role in advocacy- Methods and strategies adopted

**UNIT V: Knowledge Management**

Documentation- Research and knowledge generation- knowledge dissemination methods

N.B The learning situation will be both structured and unstructured. The trainee will be given various practical assignments during the placement that would enable him/her to use not only process learning methods but also various non-participant study techniques.

**Course Requirements and valuation:**

75% of the marks will be allotted for Continuous Assessment. Regularity in field visits, seriousness of purpose, ability for conceptualizing issues, functional knowledge in NGO Management, application of concepts and skills in problem solving will be assessed on the basis of weekly reports. A Viva- Voce will be conducted at the end of the semester with the faculty and External Examiner. Performance in Viva will be evaluated for 25%.

**A. Continuous Assessment**

Nature of Project/ Assignment undertaken	- 15 Marks
Field Work Consultation and Conferences	- 15 Marks
Weekly Reporting	-20 Marks
Assessment by Training Organization	- 25 Marks
<b>Total</b>	<b>75 Marks</b>

(Regularity of attendance, willingness totake Instructions and responsibilities, learning and Problem solving ability etc.)

**B. Viva- Voce**

Working Knowledge in the field	- 10 Marks
Conceptualization of issues	- 5 Marks
Problem solving ability	- 5 Marks
Consolidated Report	- 5 Marks
<b>Total</b>	<b>- 25 Marks</b>

**Semester III****Credit:4****Paper – 3****Hr/ Wk: 5****MSW 5471 HUMAN RESOURCE MANAGEMENT - I****Course Description:**

The main objective of this course is to prepare the students for management and administrative positions in various industrial, businesses, governmental/ non- governmental organizations and service sector organizations

**Objectives:**

- To help students acquire knowledge in Human Resource Management.
- To understand the various functions of Human Resource Management.
- Develop managerial skills in different functional areas of management
- applying conceptual and behavioral skills
- Understand the relationship of HR strategy with overall corporate strategy

**Outcome:**

This course will provide a proper understanding of the basic concepts and sub- systems of HRM. It will also render in-depth knowledge about Strategic HRM, IHRM and the skill and ability to manage the personnel in any dynamic organization in national and global context.

**UNIT I**

Management -Definition, Concept, Principles. Schools of thoughts on Management - Scientific Management Movement - Henry Fayol's principles of management – Human Relations Movement - Systems Approach - Contribution of Frederick W. Taylor, Elton Mayo, Peter Drucker.

**UNIT II**

HRM: Meaning, Definition, Concept, objectives and importance- Role of HR Manager; Competencies of HR Manager: Employer branding and Competency mapping -Changing role of HRM.Human Resources Planning - Nature and need for Human Resource Planning in Organizations- Importance of HRP- Various factors affecting HRP- HRP Process.

**UNIT III**

Job analysis- purpose and methods- Job description- Job specification- Job evaluation - techniques in job evaluation - Job enrichment - Job enlargement, Attrition analysis, Retention

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Management: Need & objectives, method; Human Resource Acquisition: Recruitment - Meaning and Definition- Factors affecting Recruitment, Sources of Recruitment; Selection: Meaning - Process of Selection- Placement- Orientation and Socialization.

### **UNIT IV**

Performance Management System: Concept, Philosophy, Performance Management Process – Skill Matrix, 360 Degree Appraisal, Balanced Score Card, People Capability Maturity Model, Performance Counselling, Mentoring; Employee Engagement Activities: HR Audit, Knowledge Management, Business Process Outsourcing.

### **UNIT V**

SHRM: Introduction- Definition- Rationale for SHRM- Aligning HR with Business strategy; IHRM: Concept, Definition, importance, and models of International HRM - Challenges of International HR Managers; Global HR practices; Measuring intellectual capital; Path to Global Status : Control Mechanism - Cross-border Alliances – Cross-border mergers and acquisitions – International Equity Joint Ventures.

#### **Text Books:**

- Aswathappa, K (2008), International Human Resource Management, New Delhi, Tata-
- Bhatia, B S (2003), Human Resource Management, New Delhi, Deep & Deep

#### **REFERENCE**

- Arya & Tandon, (2004), Human Resource Management, New Delhi, Deep & Deep
- Cary. L. Cooper 2005- Reinventing HRM Challenges and New Directions, Atlantic Publishers
- Chatterjee, Baskar (2007), Human Resource Management, New Delhi, Sterling Pub.
- Chatterjee. B 1999 - Human Resource Management: A Contemporary Text, Sterling Publishers, New Delhi
- Fisher & Cynthia 1997- Schoenfeldt Human Resource Management Development, Houghton Mifflin Publishers, Boston
- Kushway, Barry (2004), Human Resource Management, New Delhi, Crest Publishing, McGraw Hill.
- Mrudula.E&Ramani.V.V 2007- Emerging Trends in HRM: Sectoral Experiences, DGM Icfai Books

**Semester III****Credit:4****Paper - 4****Hr/ Wk: 5****MSW 5473 INDUSTRIAL RELATIONS AND LABOUR LEGISLATIONS IN INDIA****Course Description:**

The purpose of this course is to provide in-depth knowledge about the relationship between Employer, Employee and the State, to bring out the importance of cordial employee relations for organizational productivity.

**Objectives:**

- Develop the skills of interpersonal relationship as per organizational requirement
- Understand the trends and dynamics between the partners in the organization
- Develop the knowledge on various statutory/ legal aspects influencing the organization
- To make a detailed study of the basic provisions of labour enactments
- To stimulate thinking on rationale behind the Laws and their enforcement

**Outcome:**

This course will aid to acquire a holistic knowledge on basic concepts, functions and the recent trends in Industrial relations. It will also create an in-depth understanding of relevant labour legislations.

**UNIT I: Industrial Relations**

Industrial Relations (IR) - Introduction -Meaning and Definition, Forms of IR –Significance of good IR Practices; Labour Legislation: Concept, Meaning, Objectives and Importance; Labour Welfare: concept, scope and classification- Role and functions of Labour Welfare Officer. International Labour Organization (ILO): Objectives, functions and role of ILO in labour welfare- implementation of ILO recommendations in India.

**UNIT II: Working and Safety**

The Factories Act 1948, The Mines Act 1952, The Plantation Labour Act 1951, The Shops and Establishments Act 1947. Tamil Nadu Shops and Establishment Act 1947, Tamil Nadu Industrial Establishment (National and Festival Holidays) Act 1951.

**UNIT III: Social Security and Wages**

Social Security: The Workmen's Compensation Act, 1932; The Employee State Insurance Act, 1948 ; The Employees Provident Fund and Miscellaneous Act, 1952; The Payment of Gratuity Act, 1972; The Maternity Benefit Act, 1961; Legislations relating to Wages: The Payment of

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Wages Act,1936- The Minimum Wages Act , 1948- The Equal Remuneration Act, 1976- The Payment of Bonus Act, 1965.

### **UNIT IV: Legislations related to Industrial Relations**

The Industrial Disputes Act, 1947; The Industrial Employment (Standing Order) Act, 1948; The Trade Union Act, 1926; The Contract Labour (Regulation and Abolition) Act, 1970.

### **UNIT V: Conflicts and Disputes**

Conflicts& Grievances: Meaning, Causes, forms of conflicts: strikes and Lockouts, RedressalProcedure;Collectivebargaining:Meaning, Scope, difficulties encountered in India; Negotiation: Meaning, procedure;Workers Participation in management: Meaning and importance; Industrial Social Work: meaning, scope,Role of Social Workers in Industry;

### **Text Books:**

- Tripathi.P.C 1994- Personnel Management &Industrial Relations, Sultan Chand Publishers , New Delhi
- Padhi.P.K 2012- Labour and Industrial Laws, PHI Publishers

### **References:**

- Madhusudhana Rao. M 1986- Labour Management Relations And Trade Union Leadership, Deep and Deep Publishers, New Delhi
- Lal Das. D. K 1991- Personnel Management, Industrial Relations and Labour Welfare, Y.K. Publishers, Agra
- Arora. M 2005- Industrial Relations, Excel Book Publishers, New Delhi
- SharitBhowmik 2012- Industry, Labour and Society, Orient Blackswan Publishers
- Kumar. H. L 2013- Labour Laws Everybody Should Know, Universal Law Publishers

Semester III

Credit:4

Paper - 5

Hr/ Wk: 5

**MSW 5475 – ORGANIZATIONAL BEHAVIOUR****Course Description:**

The purpose of this course is to provide in-depth knowledge about organizational behavior relationship between to perceive develop the skills appropriate to the field practices to bring out the importance of cordial behavior for organizational productivity.

**Objectives**

1. To help students build a knowledge base appropriate to and Organizational Behavior.
2. To enable the students to perceive and develop the attitudes required for the successful application of organizational Behavior
3. To assist them to perceive develop the skills appropriate to the field practices

**Outcome:**

This course secures knowledge about the types, nature and the impact of Organizational behavior. The student will also gain insights about the processes OB in Indian industries.

**Unit IOrganizational Behavior (OB):**

OB: Nature, Meaning and Definition, History, Models- Contributions of Hawthorne studies. System views of Organization level of analysis (Individual, group and organization). Organizational Effectiveness, Organizational Climate.

**Unit IHuman Behaviour at Work:**

Job satisfaction, morale, motivation &Theories - Maslow, Herzberg, Vroom, McClelland;Conflict and Negotiation, Stress management and Effective Communication, Johari Window.

**UnitIIIOrganizational Dynamics:**

Groups in Organization: Nature, Cohesiveness, group dynamics; dynamics of group formation; Teams: Meaning, Characteristics, Types and significances. Leadership: process, style, types and theories - Contingency Model, Managerial Grid, Situational, Transactional and Transformational.

**Unit IVHuman Engineering**

TQM, TPM, Japanese Style of Management-5S, Kaizen and Six Sigma and its applicability; Occupational hazards at workplace environment.Employee counseling

**Unit V Organizational Culture**

Meaning and characteristics, Challenges, Organizational socialization process, Function and effects, role of leaders, Assessing organizational culture, changing organizational culture, developing a global organizational culture.

**Text Books:**

- Stephen Robins (1993), Organizational Behaviour PHI, New Delhi,
- Vroom V.H & Grant L. Organizational Behaviour and Human Performance Wiley, New York 1969

**REFERENCES:**

- Arnold, Hugh J. & Daniel E.Feldman (1986), Organizational Behaviour, McGraw Hill,
- Fred Luthans (1993), Organizational Behaviour, McGraw Hill New York,
- Hellriegel Slocum Woodman: Organizational Behaviour- Thomoson Asia Pvt Ltd. Singapore
- Keith Davis: Human Behaviour at Work McGraw Hill New York 1993
- Lawler, Porter L.M: Behaviour in Organizational McGraw Hill, NewYork ,1975
- Lewll L.N. and Reitz H. J Group Effectiveness in Organization in Organization, Glenview I.L: Scott foreman
- Ouchi W.G: Theory .How American business can meet the Japanese Challenges, Addison West. 1981
- Prasad L.M: Organizational Behaviours.Chand&Co. 1996
- Schein Edgar: Organizational Psychology, Englewood Cliffs NJ, Prentice Hall, 1970

Semester III

Credit:4

Paper - 6

Hr/ Wk: 5

**MSW 5477 BLOCK PLACEMENT FOR HUMAN RESOURCE MANAGEMENT I-  
FIELD WORK****Course Description:**

The course aims at enabling the students to understand the emerging trends and concepts in HR practices and hone skills and competencies required for effective HR interventions. This will be done by organizing field work placements in Industrial settings for a period of 30days.

**Objectives:**

- To familiarize the organizational process in view of understanding its implications on personnel policies and programmes either in the manufacturing or service sector
- To assess the relevance of structure and functions of HR department from the employee and labor perspective
- To develop necessary HR competencies to collaborate with other departments specific to the industry/ organization
- To develop insight into the value addition by the HR department to further the business goals of the company

**Outcome:**

On successful completion of the course the students will confidently deal with the business processes underlying manufacturing and service industries and gain knowledge in utilizing and managing human resources for the betterment of the organization

**UNIT I: Issues and Practices in Industrial Relations**

Legal basis of IR- applications of trade Union Act- ID Act etc.- Trade unionism- Issues of changing roles- Industrial dispute and dispute settlement procedures- grievance handling procedures- Collective bargaining- Nature and changing patterns- Negotiation- Conciliation- Arbitration in industries

**UNIT II: OD Interventions**

Steps and processes in organizational change- Employee participation and empowerment- organizational restructuring- job redesigning- OD interventions such as TQM, ISO, QC, QWL etc.



**UNIT III: Social Work Interventions in Industry**

Industrial counseling- Employee family welfare programmes- Community development projects- Collaborating with government and non- government organizations-Social responsibility of industries

N.B The learning situation will be both structured and unstructured. The trainee will be given various practical assignments during the placement that would enable him/her to use not only process learning methods but also various non-participant study techniques.

**Course Requirements and valuation:**

75% of the marks will be allotted for Continuous Assessment. Regularity in field visits, seriousness of purpose, ability for conceptualizing issues, functional knowledge in HR Practices, application of concepts and skills in problem solving will be assessed on the basis of weekly reports. A Viva- Voce will be conducted at the end of the semester with the faculty and External Examiner. Performance in Viva will be evaluated for 25%.

**A. Continuous Assessment**

Nature of Project/ Assignment undertaken	- 15 Marks
Field Work Consultation and Conferences	- 15 Marks
Weekly Reporting	-20 Marks
Assessment by Training Organization	- 25 Marks
<b>Total</b>	<b>- 75 Marks</b>

(Regularity of attendance, willingness to take Instructions and responsibilities, learning and Problem solving ability etc. )

**B. Viva- Voce**

Working Knowledge in the field	- 10 Marks
Conceptualization of issues	- 5 Marks
Problem solving ability	- 5 Marks
Consolidated Report	- 5 Marks
<b>Total</b>	<b>- 25 Marks</b>

Semester IV

Credit: 4

*Paper –1**Hr /wk: 5***MSW 5402 PROJECT****Course Objective:**

This course practically aims at acquiring the application of research methods, tools and techniques and to develop skills of analysis and reporting among the students. This is done by encouraging students to identify researchable problems in their areas of specialization and do independent field study projects.

**Course Requirements and Evaluation**

1. The duration for the study project is for one semester.
2. The students shall submit the report in a prescribed mentioned format on or before a specified date, failing which will warrant disqualification.
3. The student shall work under the close supervision and consultation with the faculty guide appointed for the purpose at every stage of the research work regularly and get approved failing in which leads to disqualification for appearing in Viva Voce examination.
4. The faculty advisor shall be responsible for the continuous assessment of the course and his/her recommendation for final evaluation of the project shall be mandatory.
5. 75% of the marks shall be allotted for continuous assessment. Continuous assessment shall be made on the following basis by the faculty advisor:

**A. Continuous assessment**

Participation in Research workshops	15 marks
Consistency of involvement and meeting deadlines	15 marks
Individual presentations	20 marks
Ability for independent work	25 marks
<b>Total</b>	<b><u>75 marks</u></b>

6. Remaining 25% of the marks shall be allotted for Terminal Evaluation on successful completion and submission of the Project Report ( 2 bounded copy) in the **Prescribed format - 40 pages in A4 size executive bond paper excluding tabular columns, graphs etc.,**

7. **The Project Work has to be duly recommended by the faculty advisor and the Head of the Department for appearing in the final Viva Voce.**
8. **The Viva Voce shall be conducted by a three-member committee of examiners of which one is an external member.**
9. 25% of the marks allotted for the Viva Voce will be assessed on the following basis:

Problem identification and conceptualization of the Research Question	5 marks
Review of Literature	5 marks
Effort taken in collecting data	5 marks
Innovative methods and techniques used	5 marks
Analysis, Conclusion & Reporting	5 marks
Total	<u>25 marks</u>

**Any proven case of plagiarism will warrant disqualification.**

**Semester IV**

**Credit:4**

**Paper – 2**

**Hr /wk: 5**

**MSW 5404 DEVELOPMENT COMMUNICATION FOR SOCIAL ADVOCACY**

**Course Description:**

This course is important to all students getting trained in social work because effective communication is a basic necessity for any individual to make sense in this society. With the internet technology, the conventional means of communication which gives a world of opportunity for imaginations and freedom to interpret contexts takes a beating. It becomes all the more important to train students in various methods in the mainstream and alternate forms of communications. With this in mind the course on Development Communication for Social Advocacy aims at training the students with the following objectives

**Objectives:**

1. The course will take upon itself the task of opening up the realm of changes that had taken place recently in the concept of handling communication
2. Student shall acquire skills and enhance their capacities for effective communication, both in traditional style and in the newer unconventional ways of exchanging information

3. Part of training will make the student effective and articulate enough that he/she shall be made to convey or express ideas with ease, style, exuberance and comfort
4. The central theme however will be that the course shall make collective and concerted efforts to devise strategies for developing communication and application tools in both traditional and electronic formats that the learner will muster the craft for social work advocacy with fair competence.

### **Learning Outcome**

The practical training and effort dwells on traditional, conventional and modern ways of dissemination of ideas, students with their enhanced capabilities of reading, writing, listening, comprehension and communication skills will be able to use folk art, mainstream print and visual media and street theatre for effectively advocating their views in community settings.

### **Unit I: Media and Mass Communication**

Communication: Meaning, concept, significance and Types, Sociological aspects of Communication; Communication and Culture; Communications Models - Print, Visual and Electronic; Mass Communication: Meaning, Development and Scope; Mass Media - Meaning, Elements & Functions of Mass Media, Impact; Role of Mass Media in National Development, Limitations in the use of Mass Media in India.

### **Unit II Nuances of Mass Media on culture**

Role & Performance: Mass Media & Cyber Media - Cultural approaches: Mass communication and multicultural nuances and its impact; Mainstream modes: Print and visual media – A critique on populist Genre in Print media, Television and Movie - Media Education, Media Research.

### **Unit III Need for Development Communication**

Development – key concepts in development: Self reliance, dependence, cultural identity, decentralization, Modernization, first world and third world needs - Development Communication: Definitions- Roles of Development Communication – Philosophy - General differences from communication – goals of communication – difference between communication for development and development communication

### **Unit IV Alternative Media**

Alternative media: Definition and usage, types, relevance; Group Media: Concept, manufacture and use of different media for a campaign - photos, posters, puppets, flash cards, street play, Electronic Media: strengths and limitations; internet as a tool for development;

## **MSW 54**

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Social networking: Face book, twitter, Blog, Websites and emails - Folk Media: Definition, types, problems faced in using folk media

### **UNIT IV Advocacy for Social Work Practice**

Advocacy –Meaning, Definition, types; Social Advocacy: Meaning, Need, Process, Social advocacy and social change; Role of Social Worker in social advocacy; social activism: Communicating social emotions, needs and canalizing information;

#### **Text Books:**

- Kumar, Keval 2004,Mass Communication in India. Mumbai: Jaico Publishing House.
- Mody, Bella 1991,Designing Messages for Development Communication: An Audience Participation Based Approach. New Delhi: Sage Publications.

#### **References:**

- Doctor, Aspie et al 1984,Basic study in Mass Communication. Mumbai: Seth Publishers.
- Poster, Mark. 1991. Post Structuralism and communication. London. Polity press

**Semester IV**

**Credit:4**

*Paper – 3*

*Hr/Wk:5*

### **MSW 5542 MEDICAL SOCIAL WORK**

#### **Course Description**

This course coming as a paper of specialization to the student who intends training in the field of Medical and Psychiatry aims at providing a concise but comprehensive opening to the medical settings. It will highlight and show the student the realm of medical social work with a special task of identifying the opportunities and spaces exclusively available for a trained social worker to be involved in augmenting the health care delivery in India and elsewhere. It would define the job role which is different from the physicians and medical doctors, and all those involved in routine Hospital and Public Administration.

#### **Objectives:**

- To sensitize students about the significance of the novel and noble field of medical social work
- To make the learner understand the psycho- social and economic implications of illness and the prospects and problems connected with health care delivery and services.

- To provide an understanding on the medical setting in general and learn the functioning of the health care dispensations from the state and peoples perspective.
- To train students understand the plight of the sick individual and pitch in to alleviate the anxiety and nervousness of the caring kin.
- To appraise on the role and need of social worker that as trained hand he/she may act as perfect interface between the various constituent namely the patient, the supporting family, physician ad supportive staff including the officials handing insurance that no one feels betrayed or panic in the insurgent situation

**Learning Outcome:**

A learner who completes the course is expected to be equipped to take his /her own cut and capitalize on by further training for engagement in any specialized avenue of the medical science.

**Unit I:**

Medical Social Work : Definition, Concept, Objectives, Nature, Need and Scope; Ethical Practices, Roles and Functions of a Medical Social Worker; Medical Sociology and its Relevance to Medical Social Work Practice. Practice of Social Work Methods in Hospital Settings: the Need and Importance in Working with Patients and Families, Scope and Limitations of Practice.

**Unit II**

Historical Development of Medical Social Work in India and Abroad; Difference between Disease, Illness and Sickness; Psychological, Social and Economic Implications of Illness and Concepts of Patient as a Person, Principles of Medical Social Work; Role of Social Worker as a Member of the Multi Disciplinary Team.

**Unit III.**

Role of the Medical Social Worker: Out-Patient Unit, In-Patient Unit, Intensive Care Unit, Neonatal Intensive Care Unit, Pediatric Ward, Maternity Ward, Family Planning Centre, ICTC, Orthopaedic Department, Cardiology Department, Blood Bank, Oncology Unit .

**Unit IV**

Rehabilitation: Definition, Concept, Principles, And Process; Role of the Medical Social Worker In Rehabilitation Planning, Resource Mobilisation, and Follow-Up. Rehabilitation Units - Hansenorium, TB Sanatorium, Hospice, Palliative Care for Terminally Ill.

**Unit V:**

Ethical Challenges – Aids, Abortions, Euthanasia, Sterilization, Adoption of children, Ethical issues & poor patients, Ethical Issue of Examination of females, Use of new drugs on trial on

patients. Medico Legal Issues : Negligence, Professional In-competency, Organ Transplants, Personal Injury, Ethical issues in human experimentation, Sex Determination & genetic counselling, Medical Termination of Pregnancy Act, 1972

**Text Books:**

- Bajpai P.K. (ed.) (1997), Social Work Perspectives in Health, Rawat Publications, Delhi.
- Barlett H.M. (1961), Social Work Practice in the health field; National association of social workers, New York.

**REFERENCE**

- Anderson R. & Bury M. (eds) (1988), Living with chronic illness – the experience of patients and their families, Unwin Hyman, London.
- Crowley M.F., (1967), A New look at nutrition; Pitman Medical Publishing Co., Ltd., London.
- Field M., (1963), Patients are people – A Medical – Social Approach to Prolonged illness; Columbia University Press, New York.
- Gambrill. E. (1997), Delhi Social work in the 21st century, Pine forge press, New Delhi.
- Pokarno K.L., (1996), Social Beliefs, Cultural Practices in Health and diseases; Rawat Publications, Delhi.

**Semester IV**

**Credit:4**

**Paper – 4**

**Hr/ wk: 5**

**MSW 5434 PSYCHIATRIC SOCIAL WORK**

**Course Description**

The theme of the course is to stress upon the need and the dictum that stability of mind, thought and action is imperative to the well being of community and effective functioning of a healthy society. To help the students to gain a broader understanding and the working knowledge to specialize in the field of Mental health, various aspects of diet, habits, culture and practice that would determine the cognitive and emotional upkeep will be informed in the first part of the course while the major emphasis will go on the causes, effects, personal family and societal consequences of the consequences for emotional breakdown and mental disorders.

**Objectives**

- To give the students an overview of the issues and challenges faced in dealing with Mental health status and related concepts and the community

- To make learners understand the various factors that contribute to well being and healthy mental status of the individual and the community and spot the instances and conditions that pose threat and lead to mental health issues
- To provide for an understanding on the community setting relating to the concept of mental health help the trainees acquire knowledge in mental disorders, stress and coping for moving towards holistic health.
- To develop skills in identifying mental disorders and conflicts in emotional health and make the students realize their duties, responsibilities and role as social work personnel in the community and Psychiatric settings.

**Learning Outcome:**

Inputs given in the course will widen their understanding about the scope medical health setting and help them carve out specialized niche with focused job and career aspirations for a professional engagement. As competent social work specialists trained in psychiatric social setting, learners will be able to identify their responsibilities and duties that they would discharge in resorting the physical and mental health of the affected individuals during the rehabilitation and restoration process.

**Unit I**

Psychiatric Social Work: Definition, Scope and Concept, Historical Development in India, UK And USA, Methods of Social Work in the field of Psychiatry - Case Work, Group Work, And Community Organisation, Limitations And Difficulties Faced In Psychiatric Social Work Practice;

**Unit II**

Myths and misconception pertaining to mental illness in ancient, medieval and modern times; concepts of normality, abnormality and mental health; classification of mental illness: Diagnostic Statistical Manual (DSM) IV- TR ; International Classification Of Diseases (ICD 11);

**Unit III**

Psychiatric Assessment: Interviewing, Case History Taking with , Mental Status Examination; Diagnosis. Therapeutic Intervention in Psychiatric Illness: Psycho Social Education, Cognitive Therapy, Group Psychotherapy, Family Therapy, Marital Therapy: Scope And Types, Principles and Techniques, Clinical Hypnotherapy, ECT, Chemotherapy, Mega Vitamin Therapy; Occupational Therapy

**Unit IV**



Roles and functions of a psychiatric social worker with regards to the problems of patients and their families in: 1) psychiatric OPD'S 2) psychiatric specialty clinics 3) de-addiction centres, 4) child guidance clinics; day care centers, half way homes, sheltered workshop and transitory homes

**Unit V**

Rehabilitation of psychiatric patients: role of the social worker in rehabilitation – principles, Process and models of psychiatric rehabilitation; role of the psychiatric social worker in team work. National Mental Health Programme; District Mental Health Programme.

**Text Books:**

- Kaplan, H.I. Freedom A.M. and Sadock B.J. (1980) Diagnostic criterion from DSM-IV American psychiatric assn,
- World Health Organization Geneva (1992) The ICD 10 Classification of Mental and Behavioural disorders. Clinical Description and Diagnostic Guidelines;Oxford University Press.

**References:**

- Barker P. Child Psychiatry; Granada Publishing Ltd.
- Bellack A.S. (1984) Schizophrenia, treatment Management in Adult BailliereTindall, London.
- Berrios, G.E. & Dawson J.H. (1983) Treatment and Management in Adult BailliereTindall, London.
- Child Mental Health – Proceedings of the Indo – US Symposium, NIMHANS and ADAMHA
- Comprehensive Textbook of Psychiatry, (third ed.) vols. 1,2&3; Williams and Wilkins, Baltimore / London.
- Anand K K, (1996) Hospital Management: a new perspective, New Delhi, Vikas Publishing House.
- Desai VA, (1985) Hospital Administration, Miraj, Wanless Hospital.
- Francis CM (1995) Hospital Administration, New Delhi, Jaypee Brothers.
- Goel SL (1981) Health care Administration – A text Book, New Delhi, Sterling Publishing House.

Semester IV

Credit:4

Paper – 5

Hr/Wk: 5

**MSW 5436 HOSPITAL ADMINISTRATION****Course Description**

With medical tourism and Hospital Management emerging as contemporary avenues of interest in the market world that has only virtual boundaries, social workers and social work professionals cannot simply brush aside the stark truth and be complacent without addressing its impact on the multifarious dimensions of life. Though courses covered in the MA social work curriculum alludes to certain community and social issues that comes as package with liberalization, privatization and globalization, a curriculum that had leaning with medical and psychiatry specialization cannot remain mute by not making discourse on Hospital Administration, and hence this course.

**Objectives:**

- To educate students on the need of dealing with diseases and health disorder in Hospital settings and teach them fundamental concepts of setting up and managing a hospital
- To provide a wider panoramic view on hospital organization and the health services rendered through well managed hospital administration.
- To help the students in learning about various Hospital departments and the direct and axillary services offered through them.
- To inform students about the administrative procedures, record keeping and service references made by and through hospital.
- To entrain students in gaining foothold in ensuring that Quality Assurance in Hospitals is not sacrificed or dealt with a skewed and lopsided approaches.

**Learning Outcome**

The student on completion of the course will becoming an able hospital administrator as he/she would have been adequately informed about the Intricacies involved in establishing, heading and governing the hospital and departments transcending the space and time barriers. With the rounded inference drawn on hospital administration the gradating student can be instantly hired and absorbed discharge duties in other specialized medical social work settings too.

**Unit I**

Hospitals: Concept, Services and Functions, History and Evolution of Hospitals, Hospital Administration: Meaning, Nature, Scope and Principles

**Unit II**

Types of Hospitals: Government., Private, Single/ Super Specialty, Trust, Nursing Homes, Profit & Non Profit Hospitals, Public Private Partnership in Health Care . Role of Hospital Administrator towards: Patient, Hospital Organization, Community

**Unit III**

Support and Auxillary Services: Pharmaceutical Services, Laundry, Laboratory and X- Ray , Nursing Services, Diet Management Service, Stores, Registration and Indoor Case Records, Transport, Martuary

**Unit IV**

Human Resources Planning and management,: Planning, Organizing, Staffing, Directing, Controlling , Co ordinating, Patient Management, Patient Satisfaction and Accountability, Human Resource Information System, Hospital Information System

**Unit V**

Policies and Programmes : National Health Policy : GoI, 1983 & 2002, NRHM & Major Health Programmes in India, Legislations in India governing Health Care

**Text Books:**

- Desai VA, (1985) Hospital Administration, Miraj, Wanless Hospital.
- Goyal,RC (2006) Hospital Administration and Human Resource Management, New Delhi, Prentice Hall India

**References:**

- Anand K K, (1996) Hospital Management: a new perspective, New Delhi, Vikas Publishing House.
- Benjamin Rober-t, etal 1983, Hospital Administration Desk Book Newjerky Prentice hall
- Davies r lawelyn eta -1966, Hospital planning & administration Geneva WHO
- Francis CM (1995) Hospital Administration, New Delhi, Jaypee Brothers.
- Goel SL (1981) Health Care Administration – A Text book, New Delhi, Sterling Publishing House.
- Rabick& Jonathan etal 1983, Hospital Organization and Management London Spectrum Publishers.
- WHO Expert Committee 1975, Role of Hospital in programme of Community health protection WHO technical Report service.

Semester IV

Credit: 4

Paper - 6

Hr /wk: 5

**MSW 5438 BLOCK PLACEMENT FOR MEDICAL AND PSYCHIATRIC SOCIAL  
WORK II – FIELD WORK****Course Description:**

As the integral part of social work training that slates the students in actual field setting alongside of the cognitive training that he/ she receives as part of course work, this course aims at enabling the students to understand the various components of the specialization settings and develops skills and competencies required for effective Social Work interventions at different.

**Course Objective:**

- To augment the classroom learning with the life experiences gained through the assistance of the agency to which the student is allotted.
- To make the student familiarize with Vision, Mission, System, Processes and Objectives of the professional field work Organizations to which he/she is attached.
- To develop *Analytical and Assessment Skills* of Social Problems at the level of Individual, Group and Community in Industry/ NGO/ Hospital settings.
- To infuse rigor in the habit of self learning, reflections and learning through experiences
- To entrain in *Documentation Skills* to ensure continuity of Service and Growth of Professional Competence in the practice of Social Work methods.
- To prepare the student to actively and independently engage in action research in accompaniment of his project work.

**Methodology**

This will be done by identifying the appropriate agency that would provide space for the student to transact work with the professional understanding and competency. The course coordinator and the faculty team will decide upon the selection of agencies that would offer training. Actual training comprises of work put in by the student for a 30 days in accordance with the prescription of the attached agency.

The assigned student is expected to gather a comprehensive idea on: Expanse of Illness and Disabilities; Care for challenged; Palliative care; Psychiatric Social Work; Intervention & Treatment on psychiatry; Therapeutic Intervention; Mental Health Care Services; Psychiatric Rehabilitation in context of Family & Community settings.

**Specialization:**

Medical and Psychiatry

**Course Requirement and Evaluation:**

- 50% of the marks will be allotted for continuous assessment.
- Regularity in attendance, keenness to participate, readiness to learn, development of required skill, ability to conceptualize and acquisition will be tested
- The functional knowledge will be evaluated on the basis of process reports, observational reports and participatory evaluation by the faculty.
- A viva voce will be conducted at the end of the semester by a committee of which one is an external member. Performance in the viva will be evaluated for 25%.

**Continuous Assessment:**

Regularity of Attendance	15 marks
General Participation	10 marks
Skills and Competencies	15 marks
Written Reports	25 marks
Individual Presentation	10 marks
<b>Total</b>	<b>75 marks</b>

**VIVA VOCE**

Conceptualization	5 marks
Working Knowledge	10 marks
Problem Solving Ability	5 marks
Consolidated Report	5 marks
<b>Total</b>	<b>25 marks</b>

**Semester IV****Credit:4****Paper - 3****Hr /wk: 5****MSW 5452 SOCIAL EXCLUSION AND INCLUSION IN INDIA****COURSE DESCRIPTION:**

This course aims at helping the students to contextualize the major human mess in postmodern society, in terms of marginalization and exclusion in forms of prejudice, discrimination and oppression in the society in India and in many parts of the world in different ways.

**COURSE OBJECTIVES:**

- To make students understand that the concept of ‘Social Exclusion, Inclusion and Marginalization’ is matter of concern inflicted upon the society.
- To acquaint the students with the idea that different excluded groups of India are affected on developmental activities.
- To inculcate critical understanding of inclusive policies in India.

**COURSE OUTCOME:**

After completion of this course the student will get proper understanding of marginalization and exclusion of individuals and groups that they shall willfully modestly support and participate in the intervention program to address these problems.

**Unit-I Meaning and Reality of Social Exclusion**

Social Exclusion: Meaning, Definition, Need, Forms of social exclusion (Caste, class, religion, race and gender, ethnic groups, disability, Migrants and Refugees);

History of social exclusion - Consequences of social exclusion - Social exclusion in context of Globalization, Liberalization, and Privatization. Social Inclusion: Meaning, Definition, Need and Scope.

**UNIT II: Caste Class Structure in India**

Defining Caste and class in India – Caste power matrix – Impact of caste discourses - Intolerance, prejudice, discrimination, neglect, alienation, exclusion, domination and oppression. politics of caste and class in Tamil Nadu and India. Religion and religious sects as instruments of discrimination and oppression - Complexity of Post-Modern casteist discourse in India.

### **Unit III Discourse on Marginalization**

Understanding Marginalization – Factors contributing Marginalization – Vulnerable sections: Gender constructs - Political economy and status of women - Gender bias - Feminist discourse; Children: Physical, Mental and Health– Child Abuse; Elders: alienation and neglect of Elders – Elder abuse; Sexual Minorities: LGBTQ - Identity needs and their Rights; Religious Minorities: Meanings and dimensions of Minorities. Constitutional safeguards for religious minorities.

### **UNIT IV Constitutional Obligations**

**Scheduled Tribe:** Major problems of Scheduled tribe in India. Constitutional safeguards to scheduled tribes, Development and welfare programme for Scheduled tribe. Contemporary approaches to Tribal Development - Role of NGOs. **Schedule Caste:** Social Reforms relating to Scheduled caste, constitutional safeguards to scheduled castes, Contemporary Dalit movements, Role of NGOs - Development and welfare programme for Scheduled caste.

### **UNIT V Social Movements of the Marginalized - Case Studies**

Dalits of India: Jyotirao Phule, Ambedkar and Gandhi. The South American Campaign for Civil Rights - Campaign against the Apartheid - Women's liberation movements in India – pre and post independent initiatives. Selected Case studies: Afghanistan, India, Sri Lanka, Middle East, Eastern Europe and Northern Ireland (Not for examinations).

#### **Text Books:**

- Sharma, K. L (1998) Social Stratification in India, Rawat Publications, Jaipur.
- Thorat S.K.: Caste exclusion/ Discrimination and deprivation: The situation of Dalit in India Concept paper for DFID Delhi.
- Barai Beteille A (1997), Caste: Old and New, Rawat Publication, Jaipur.

#### **References**

- Ghurye, G.S. 2000. Caste and Race in India. Bombay. Popular Prakashan
- Sem A: 'Social exclusion: Concept application and scrutiny, Asian Development Bank, 2003
- Omvedt, G (1994), Dalits and the Democratic Revolution, Sage Publication, New Delhi.
- Shah. G (1990), Social Movements in India, Sage Publications, New Delhi.
- Beteille, A (1992) The Backward Classes in Contemporary India, Oxford University Press, New Delhi.
- Shah, G (2000) Dalit and the State, Sage Publications, New Delhi

Semester IV

Credit:4

*Paper - 4**Hr /wk: 5***MSW 5454 URBAN COMMUNITY DEVELOPMENT IN INDIA****COURSE DESCRIPTION**

This course on the urban community development is planned impute the concept of urbanization, Urbanism, and Urban Community Development. It helps the student to understand the unban context and theories of urbanization equal thrust. Students will be made to understand the responsibility and participation of the state in civil society engagement.

**OBJECTIVES:**

- To provide understanding urban communities, consciousness of city dwellers on urban planning and development.
- To make student develop sensitivity and commitment to the rights of vulnerable groups in urban communities.
- To promote skills necessary for community development for every student of development management to work in urban settings.

**LEARNING OUTCOME**

On acquiring the functional knowledge on various aspects, the learner of this course and the program will know the lagging urban community development and urban development that he/she shall pitch into be social work advisor who can run the show on his/her own

**UNIT-I Urbanization**

**Urbanization:** Concept – Characteristics - Urbanization and Economic Development- Urbanization and Industrialization- Trends in urbanization process -**Urbanism:** Meaning and Characteristics - Theories of Urbanization – Concentric zone theory – Sector Theory – Multi-Nucleus theory.

**UNIT II Urban Determinants**

Urbanization and social problems – Urban Social problems: Environment protection – Air, Water, Soil, Noise Pollution –Crime – Accidents – Prostitution; Slums: Definition – Causes – Characteristics – Socio-Psychological Issues of Slum Dwellers; Unorganized/Informal sectors: concept,- characteristics; Migration – Concepts, causes, types and theories.

**UNIT-III Urban Community Development**

**Urban Community Development:** Definition, Objectives and Historical context, Principles, Process and methods of Urban Community Development; Urban Development Administration:



National, state and local levels; Structure and functions of Urban Development Agencies; Role of Community Development Worker: Application of Social Work method in Urban Development

**UNIT IV Urban Community Development Programmes**

**Urban Community Development Programmes:** Five year Plans and Urban Development, Urban Development Policy, Slum Clearance Board: Structure, Functions, Programmes of Slum Clearance Board, Slum Clearance Act, Housing Board-Housing and Urban Development Corporation (HUDCO), Problems in Implementation of Urban Community Development Programmes.

**UNIT V People's participation**

**People's participation:** Concept, importance, scope and problems - Social action and advocacy in urban development, Civil society organizations and initiatives for urban community development - Case studies of best practices - Delhi project – Baroda project – Jamsedpur project – Neiveli Township model.

**Text Books:**

- Sandhu, R.S (ed.) 2003 Urbanization in India: Sociological Contribution. New Delhi: Sage Publications

**References:**

- Asthana M. and Ali, Sabir, 2003, Urban Poverty in India, Mittal Publication, New Delhi.
- Muttagi P.K. 1989 , Urban Development. Bombay: Tata institute of Social sciences.
- Nagpal, H. 1994 Modernization and Urbanization in India. Jaipur: Rawat Publications
- Singh, A. M. & A. De Souza, 1990. Then Urban Poor Slum and Pavement Dwellers in the Major Cities of India, Manohar Publication, New Delhi,
- Thakur, B. (ed.) 2005 Urban and Regional Development in India: Vol I New Delhi: Concept Publishing Company.

**Semester IV****Credit:4****Paper - 5****Hr /wk: 5****MSW 5456 - ECOLOGICAL PERSPECTIVES AND SOCIAL WORK  
INTERVENTION****COURSE DESCRIPTION:**

This course aims at facilitating the students to understand the qualitative and quantitative constructs of development, more precisely the sustainable development initiative, and work out models that would minimally impact ecology and environment to fetch admirable progress and advancement in meeting the developmental needs of the community and India.

**COURSE OBJECTIVES:**

- To make students gain insight about environmental problems and challenges in the global and national context
- To fetch them ideas to develop a critical understanding and evaluation of environmental policies, legislations and programmes
- To facilitate an understanding on strategies and approaches of green development and environment management
- To enable the students to conceive ecologically sound, organic models of development with a balanced perspective

**COURSE OUTCOME:**

On learning and assimilating ideas from this course, students would have developed balanced perspectives that they would strive to adapt green technology for development and eco friendly approaches to pursue life and development of skills in social work intervention in the protection and promotion of people, especially the weaker ones, and the environment alike.

**UNIT I Composites of Environment**

Ecology and Environment: Meaning, Definitions and approaches; Society and Environment, Development and environment, Environmental degradation: Causes and consequences. Sustainability issues: Implications for livelihood security and community well-being: impact on women, poor, marginalized groups and indigenous people.

**UNIT II Contemporary Indian Environmental Concerns (Case Studies)**

Environmental problems in India - Status of India's land, water, air, forests-Development related issues: Dams and Displacement of people - Forest lands, and indigenous people -

changing land using pattern- unplanned urban growth, - Fuel and Energy needs – Nuclear technology. Global environmental issues: Climate Change, Greenhouse Effects and Carbon Footprint.

### **UNIT III Environmental Movement**

Movements in India: Bishnoi movement, CHIPKO, APIKO, NBA, Silent Valley, Jungle Bachao Andholan, Tehri Dam Project, International Scenario - environmental agreements and WTO concerns.

### **UNIT IV Environment Action and Management**

Environment preservation – Ministry of Environmental conservation and Forestry, Environmental Legislation- needs and importance; Environmental Justice, EcoTourism and Eco Feminism. Environment Management: Waste Management and recycling – Sustainable development: need and importance.

**UNIT V Social Work Intervention:** Role of Social Workers in Environmental Protection and Development. Application of Social Work methods in creating awareness on various Environmental Issues – Civic and NGO Responsibilities.

#### **Text Books:**

- Coates, J. 2004, *Ecology & Social Work: Towards a New Paradigm*. New York: Paul & Company Public Consortium.
- Shiva, Vandana. 1993. *Ecofeminism*. New Delhi.

#### **Reference:**

- Alvares, Claude. 1992. *Science Development and Violence*, New Delhi. Oxford University Press.
- Gadgil, M. & Guha, R., 1992, *This Fissured Land: An Ecological History of India*. Delhi: Oxford University Press.
- Gadgil, M. & Guha, R. 1995, *Ecology & Equity: The Use and Abuse of Nature in Contemporary India*. London: Routledge
- Nandy, Ashish. 1988. *Science, Hegemony, and Violence*, Oxford University Press.

Semester IV

Credit: 4

Paper - 6

Hr /wk: 5

**MSW 5458 BLOCK PLACEMENT FOR DEVELOPMENT MANAGEMENT II –  
FIELD WORK****Course Description:**

As the integral part of social work training that slates the students in actual field setting alongside of the cognitive training that he/ she receives as part of course work, this course aims at enabling the students to understand the various components of the specialization settings and develops skills and competencies required for effective Social Work interventions at different.

**Course Objective:**

- To augment the classroom learning with the life experiences gained through the assistance of agency to which the student is allotted.
- To make the student familiarize with Vision, Mission, System, Processes and Objectives of the professional field work Organizations to which he/she is attached.
- To Develop Analytical and Assessment Skills of Social Problems at the level of Individual, Group and Community in Industry/ NGO/ Hospital settings.
- To infuse rigor in the habit of self learning, reflections and learning through experiences
- To develop Documentation Skills to ensure continuity of Service and Growth of Professional Competence in the practice of Social Work methods.
- To prepare the student to actively and independently engage in action research in accompaniment of his project work.

**Methodology**

This will be done by identifying the appropriate agency that would provide space for the student to transact work with the professional understanding and competency. The course coordinator and the faculty team will decide upon the selection of agencies that would offer training. Actual training comprises of work put in by the student for a 30 day continuous placement in accordance with the prescription of the attached agency.

The assigned student is expected to gather a comprehensive idea on:

Forms of social exclusion and Discrimination Consequences of social exclusion on Indian society - Dimensions of Social exclusion in context of Globalization, Liberalization, and Privatization context. Factors contributing Marginalization Role of NGOs - Development and

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welfare programme for Scheduled caste / Tribe State & status of India's land, water, air, forests  
Environmental degradation: Causes and Consequences State and the Environment  
preservation (strategies

### Specialization:

Development Management

### Course Requirement and Evaluation:

- 50% of the marks will be allotted for continuous assessment.
- Regularity in attendance, keenness to participate, readiness to learn, development of required skill, ability to conceptualize and acquisition will be tested
- The functional knowledge will be evaluated on the basis of process reports, observational reports and participatory evaluation by the faculty.
- A viva voce will be conducted at the end of the semester by a committee of which one is an external member. Performance in the viva will be evaluated for 25%.

### Continuous Assessment:

Regularity of Attendance	15 marks
General Participation	10 marks
Skills and Competencies	15 marks
Written Reports	25 marks
Individual Presentation	10 marks
<b>Total</b>	<b>75 marks</b>

### VIVA VOCE

Conceptualization	5 marks
Working Knowledge	10 marks
Problem Solving Ability	5 marks
Consolidated Report	5 marks
<b>Total</b>	<b>25 marks</b>

**Semester IV****Credit: 4****Paper - 3****Hr /wk: 5****MSW 5472 HUMAN RESOURCE MANAGEMENT - II****Course Description:**

The purpose of this course is to look at the theme of Human Resource Development (HRD) from a system point of view, working out strategies to improve human resources with a sociological perspective that ensures organizational effectiveness and deal with issues of stress, conflicts and performance through appropriate models.

**Objectives**

- To assist the students to acquire Knowledge as well as local and global perspective on Human Relations, Training and Development
- To sensitize the learner to look at the ways and means to adopt suitable attitudes that push for practice of HRD
- To help the students see the need for acquiring appropriate skills in this regard.

**Learning Outcome:**

Acquiring adequate knowledge over the basic concepts of HRD, students complete this course would have been acquainted with the recent trends in Human Resource Development, that as trained hands they would be readily employable in the various work /job settings.

**Unit – I Philosophy of HRD**

Introduction to the concept and philosophy of HRD- Meaning, Definition, Scope. Importance and comparison of traditional personnel management and HRD; Elements of HRD –Training, Development and Education; Human Resource System Designing, Principles in designing HRD system - HRD at different levels- HRD in Indian Industries

**Unit – II Training Methods**

Various approaches in training;Analyzing Training Needs – Identifying performance gaps and building performance measures; Choosing training methods and estimating training costs; Implementation of Training programmes; Training Evaluation – Internal and External evaluation, Kirkpatrick's 4 levels of evaluation model.

**Unit – III EmployeeDevelopment**

Concept of Employee empowerment, Employee Development and Managerial Development;Employee participation, capacity building and competency building- Quality management as Development tool.Building Conducive Organizational Climate for Development.

**Unit IV-HRD Activities**

Employee development activities- Approaches: employee development, Mentoring, leadership development, action learning, assessment and development centres; Intellectual capital and HRD; HRD practices in government organisations, manufacturing and service industries.

**Unit – V Organization Effectiveness & HRD**

HRD climate – organizational culture facilitating Learning and development- HRD implementation: strategies and issues. Pre-requisites for successful HRD programmes. Responsive Learning Organizations - HRD experiences in India Emerging trends and perspectives: case studies.

**Text Books:**

- Craich Robert, L. (1987), Training and Development - Hand book, McGraw Hill. Pub., New Delhi.
- Rao T.V. (1990), HRD Missionary, Oxford & IBH, New Delhi. Agarwal Yash, 1988, Education and HRD (Emerging challenges in the regional context), Common Welth Pub., New Delhi.

**REFERENCES**

- Jeya, Gopal, R. (1993), Human Resource Development - connectional analysis and strategies, sterling pub., New Delhi.
- Puranik M.V. (1988), Human Resource Development in research and development organisation, Rawat Pub., Jaipur
- Richard A. Swanson and Elwood F. Holton, 2008, Foundations of Human Resource Development, Berrett-Koehler Publishers
- Sing P.N. (1993), Developing and managing Human Resources, Scuhandra pub. , Bombay

**Semester IV****Credit:4****Paper - 4****Hr/ Wk: 5****MSW 5474 ORGANIZATION CHANGE & DEVELOPMENT****Course Description**

This paper defines Organization Change and Organization Development, discusses its importance and takes into consideration the Techniques and Applications of OD. It also includes discussions on Organization change related to OD Interventions that would provide for guiding a Planned Change.

**Objectives**

- To familiarizing students with theory and practice of OD and helping them to learn OD as a viable strategy for changing improving organizational effectiveness
- To inform learners the learning to use OD for enhancing the quality of life for organizational members
- To making them aware of various interventions and applied behavioral science tools and Techniques
- To project to students the understanding of organization change that will help them get trained with global perspective for work around the world

**Learning Outcome**

On successful completion of this course will enable the student the knowledge and strategies of application of OD techniques in various sectors in context of contemporary changing factors in organization.

**UNIT I: Organizational Change**

Organizational Change: Concept and Meaning, Significance; Environmental Analysis, Implications of Change; Types of change; resistance to change.

**UNIT II: Models and Process**

Models and process of Organizational Change: Force-Field Analysis, Process Consultation, Normative Re-Educative Strategy, Parallel Learning Structures, Implementing change and evaluating change process; Managing Change;

**UNIT III: Organizational Development (OD)**

OD: concept, definition, scope, Evolution of OD; OD as an applied behavioural science; OD Interventions; Role of top management and organization development practitioners. Change agents- Role, skills and styles of change agents; Relation with the client system; Designing interventions; Evaluating and institutionalizing interventions; practice of Organizational Development in India and other developed and developing countries.



**UNIT IV: Organizational Development Techniques**

Group Focused techniques: Survey Feedback, Management by Objective (MBO), Product and Service Quality Programs, team building Individual Focused techniques: Skills training, Leadership training & development, Executive coaching, Role negotiation, Job redesign, Career planning;

**UNIT V: Applications of OD**

OD in Health Care Organizations, Family Owned Organizations, Educational Institutions, Public Sector Organizations and future directions in OD; Management Development: Definition, elements of formal and informal management development, models, types.

**Text Books:**

- Ramnarayan S., T. V. Rao and K. Singh (1998): Organization Development, Response Books;
- French, W.L. and Bell, Jr. C.H.: Organizational Development, 6th ed, PHI, N. Delhi.

**References:**

- Brown D.R. and D. Harvey: An Experiential Approach to Organization Development, 7<sup>th</sup>ed, Pearson-Education, N. Delhi.
- Cummings T.G. and C.G. Worley; Organization Development and Change, 5th ed,
- Fred, Luthans (1998), Organizational Behavior, Singapore, McGraw Hill Book Com.
- John W. Newstrom & Davis, Keith (2002), Organizational Behavior, New Delhi, Tata McGraw Hill –Hill
- Mumford, Alan 1993 - Management Development: Strategies for Action, the Eastern Press, Brittain.
- Paton, Robert A. & McCalman, James 2000 - Change Management, Response Books, Chennai.
- Rothwell, W. & Sullivan, R. 2005. Practicing Organizational Development

**Semester IV****Credit: 4****Paper – 5****Hr/ Wk: 5****MSW 5476 EMPLOYEE COMPENSATION AND ADMINISTRATION****Course Description:**

The purpose of this course is to provide in-depth knowledge about Employee's Compensation and Administration and to perceive and develop the skills appropriate to the field practices to bring out the importance and execution of Compensation management for organizational productivity.

**Objectives**

- To help students build a base knowledge appropriate to Employee Compensation and Administration
- To enable the students to perceive and develop the skills and techniques required for the successful execution of Employee's Compensation and Administration
- To assist them to perceive develop the skills appropriate to the field practices

**Outcome:**

The completion of this course secures knowledge about the types, nature and the impact of Employee's Compensation and Administration. The student will have gained insights about the processes and methods of Employee's Compensation and Administration

**UNIT I**

Employee Compensation: Concept and Significance; Wage Concepts: Wage , Salary , Minimum Wage, Living Wage, Need-Based Minimum Wage, Nominal Wage and Real wage; Wage policy in India ; Theories of wages.

**UNIT II**

Wage Administration: Principles, Factors influencing Wage Fixation and Methods; Role of Wage Differentials: Occupational, Skill, Gender, Inter-Industry, Regional and Sectional.

**UNIT III**

Wage Fixation Mechanisms: Statutory Wage fixation, Wage Boards, Collective Bargaining, Adjudication, Pay Commission; Wage Fixation in Public Sector.

**UNIT IV**

Incentives : Principles and procedures for installing sound incentive system; Types of Wage Incentive System; Wage Incentive Schemes in India; working of incentive schemes; Linking wage with productivity; Fringe Benefits: Concepts and Types.

**UNIT V**

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Wage and Salary policies in Organization; Role of HR Department in Wage and Salary Administration; Managerial compensation: Perquisites and special Features; Recent trends in managerial compensation in Indian Organizations and MNCs.

### **Text Books:**

- Kanchan Bhatia (2008), Compensation Management, Himalaya Publishing House K.N.
- Subramarniam (1971) , Wages in India, McGraw - Hill Publishing Company Limited

### **References:**

- Milkovich, George T., Jerry M. Newman, and Carolyn Milkovich (2008), *Compensation*, McGraw-Hill/Irwin,.Boston
- P.R.N. Sinha (1972), Wage Determination in India, Asia Publishing House
- Pramod Verma (1987), Labour Economics and Industrial Relations, Tata McGraw-Hill6.

**Semester IV**

**Credit: 4**

**Paper - 6**

**Hr/ Wk: 5**

## **MSW 5478 BLOCK PLACEMENT FOR HUMAN RESOURCE MANAGEMENT II – FIELD WORK**

### **Course Description:**

As the integral part of social work training that slates the student in actual field setting alongside of the cognitive training that he/ she receives as part of course work, this course aims at enabling the students to understand the various components of the specialization settings and develops skills and competencies required for effective Social Work interventions at different.

### **Course Objective:**

- To augment the classroom learning with the life experiences gained through the assistance of agency to which the student is allotted.
- To make the student familiarize with Vision, Mission, System, Processes and Objectives of the professional field work Organizations to which he/she is attached.
- To Develop Analytical and Assessment Skills of Social Problems at the level of Individual, Group and Community in Industry/ NGO/ Hospital settings.
- To infuse rigor in the habit of self learning, reflections and learning through experiences
- To develop Documentation Skills to ensure continuity of Service and Growth of Professional Competence in the practice of Social Work methods.
- To prepare the student to actively and independently engage in action research in accompaniment of his project work.

## Methodology

This will be done by identifying the appropriate agency that would provide space for the student to transact work with the professional understanding and competency. The course coordinator and the faculty team will decide upon the selection of agencies that would offer training. Actual training comprises of work put in by the student for 30 day continuous placement in accordance with the prescription of the attached agency.

The assigned student is expected to gather a comprehensive idea on:

HRD programmes HRD at different levels; areas of HRD; HR Information System - Essential qualities of human relations in work place training effectiveness, evaluation of training methodology dealing with stress and performance- implementation of Japanese Style of Management-5S, Kaizen and Six Sigma - Occupational hazards social work at workplace environment.

### Specialization:

Human Resource Management

### Course Requirement and Evaluation:

- 50% of the marks will be allotted for continuous assessment.
- Regularity in attendance, keenness to participate, readiness to learn, development of required skill, ability to conceptualize and acquisition will be tested
- The functional knowledge will be evaluated on the basis of process reports, observational reports and participatory evaluation by the faculty.
- A viva voce will be conducted at the end of the semester by a committee of which one is an external member. Performance in the viva will be evaluated for 25%.

### Continuous Assessment:

Regularity of Attendance	15 marks
General Participation	10 marks
Skills and Competencies	15 marks
Written Reports	25 marks
Individual Presentation	10 marks
<b>Total</b>	<b>75 marks</b>

### VIVA VOCE

Conceptualization	5 marks
Working Knowledge	10 marks
Problem Solving Ability	5 marks
Consolidated Report	5 marks
<b>Total</b>	<b>25 marks</b>

**Department of Immunology and Microbiology**  
**The American College, Madurai**  
**Proposed Curriculum for M.Sc Immunology & Microbiology – for 2017-19 batch**  
**only**

Course Code	Course Title	Hours	Credits	Marks
<b>Semester I</b>				
MIM 4621	Principles of Microbiology	6	6	120
MIM 4523	Biological Chemistry	5	5	100
MIM 4325	Lab in Biological Chemistry	3	3	60
MIM 4527	Mol. Bio. and Microbial Genetics	5	5	100
MIM 4329	Lab in Mol. Bio. & Microbial Gen.	3	3	60
MIM 4531	Immunology	5	5	100
MIM 4333	Lab in Immunology	3	3	60
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>600</b>
<b>Semester II</b>				
MIM 4622	Medical Microbiology	6	6	120
MIM 4324	Lab in Medical Microbiology	3	3	60
MIM 4526	Imm. of Infectious Diseases	5	5	100
MIM 4328	Lab in Imm. of Infectious Diseases	3	3	60
MIM 4530	Food and Indus. Microbiology	5	5	100
MIM 4332	Lab in Food and Indus. Microbio.	3	3	60
MIM 4534	Mol. Imm. & Immunogenetics	5	5	100
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>600</b>
<b>Semester III</b>				
MIM 5631	Environ. and Agri. Microbiology	6	6	120
MIM 5333	Lab in Environ. and Agri. Microbiology	3	3	60
MIM 5535	Vet. Microbiology and Immunology	5	5	100
MIM 5337	Lab in Vet. Microbiology and Vaccinology	3	3	60
MIM 5539	Vaccinology	5	5	100
MIM 5441	Biostatistics and Bioinformatics	4	4	80
MIM5443	Research Project	4	4	80
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>600</b>
<b>Semester IV</b>				
MIM 5532	Microbial Gene Technology	5	5	100
MIM 5334	Lab in Microbial Gene Tech.	3	3	60
MIM 5536	Immunotechniques and Immunotech.	5	5	100
MIM 5338	Lab in Immunotechniques and Immunotech.	3	3	60
MIM 5540	Animal Cell culture	5	5	100
MIM 5342	Lab in Animal Cell culture	3	3	60
MIM 5644	Research Project	6	6	200
	<b>Total</b>	<b>30</b>	<b>30</b>	<b>600</b>
	<b>Grand Total</b>	<b>120</b>	<b>120</b>	<b>2400</b>

The objective of this course is to educate the students on environmental and agricultural microbiology. Environmental microbiology includes ecology of microbes, biogeochemical cycles, biodegradation, bioaccumulation and bioremediation. In agricultural microbiology, comprehensive role of microbes as biofertilizers, biopesticides, plant growth promoting agents, plant pathogens will be dealt in detail.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- understand the role of microorganisms in the organization and processes of the biosphere
- learn the principles behind elemental cycles and ecological interactions
- distinguish different microbiological habitats and niches
- identify the microbial ecology of different biomes and biotopes
- learn the applications of microorganisms in agricultural microbiology
- acquire knowledge of techniques and equipments in environmental sample collection, processing and storage

**I. Basics of Microbial Ecology:** biosphere organization; nature, energy and nutritional flow in ecosystems; ecological interactions; biogeochemistry – atmospheric cycles – carbon, nitrogen; sedimentary cycles - water, phosphorus, sulfur; techniques - environmental sample collection and processing techniques; measurements of microbial biomass - primary production, respiration, predation and enzymatic activities.

**II. Soil and Aeromicrobiology:** Earth environment – soil functions, physicochemical properties, types, rock and subsurface, rock varnish, cave, deep subsurface habitats; and air – aerosol, nature and control of bioaerosols, aeromicrobiological pathway, microbial survival in the air, extramural and intramural aeromicrobiology.

**III. Aquatic Microbiology:** aquatic environments - microbial habitats - physical and chemical characteristics; planktonic and benthic microbes, biofilms and microbial mats; aquatic microbial lifestyles – primary and secondary production; marine environments; freshwater environments - springs, streams and rivers, lakes; others - brackish, hypersaline, subterranean waters, wetlands; extreme environments - low and high temperature, geothermal hot springs, desiccation, UV stress, aphotic environments, deep-sea hydrothermal vents, acid mine drainage system, desert carbonate cave

**IV. Applied Environmental Microbiology:** water quality and fecal contamination - microbial source tracking; Wastewater treatment; microbial fuel cells and Biogas,

bioremediation and biodegradation – technology, biofarming; bioremediation of organic compounds and inorganic pollutants, degradation of hydrocarbons, xenobiotics, microbial weathering and biomineralization

- V. **Agricultural Microbiology:** plant – microbe interaction - rhizosphere – mycorrhizae, nitrogen-fixing bacteria, plant growth promoting bacteria; phyllosphere associated microorganisms; interactions with pathogens; biocontrol of pests and pathogens; Biofertilizers – Vermicomposting, Agroforestry

**Textbooks:**

1. Pepper IL., Gerba CP., Gentry TJ., & Maier RM. (Eds.). (2011). *Environmental microbiology*. Academic Press.
2. Barton LL., & Northup DE. (2011). *Microbial ecology*. Wiley-Blackwell.
3. Bagyaraj DJ., & Rangaswami G. (2007). *Agricultural microbiology*. PHI Learning Pvt. Ltd.

**References:**

1. Black JG. (2014). *Microbiology: principles and explorations*. John Wiley & Sons.
2. Tortora GJ., Funke BR. & Case CL. (2018). *Microbiology: An Introduction*. Pearson.
3. Subba Rao NS. (2000). *Soil Microbiology*. 4th Ed. Oxford & IBH, New Delhi.

**MIM 5333 Lab. in Environmental and Agricultural Microbiology 3Hrs/3Cr**

The objective of this course is to give practical experience in understanding the principles of environmental and agricultural and veterinary microbiology. Experiments in environmental microbiology deals with the survey and monitoring of pathogens, analysis of effluents for their biochemical characters that helps in their treatments. Agricultural microbiology experiments are designed to enrich the students a practical knowledge in the isolation, identification and mass production of biofertilizers and biopesticides.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- study microbial interactions
- investigate physicochemical properties of soil and water samples
- isolate and enumerate microbial populations from soil, water and air
- identify biodegradation of pollutants
- isolate and enumerate microorganisms involved in plant rhizosphere

**List of Laboratory experiments:**

- I. Microbial Ecology
  - a. Demonstration of associative activities of bacteria: Competition and antagonism
  - b. Soil biofilm
- II. Soil Microbiology
  - a. Winogradsky Column
  - b. Determination of the soil pH and soil water content by dry-weight analysis
  - c. Enumeration and examination of soil microorganisms via dilution plating and contact slide assay
  - d. Isolation of saccharolytic, proteolytic and lipolytic bacteria from soil
  - e. Enrichment and isolation of bacteria that decolorize dyes
  - f. Adaptation of soil bacteria to metals and pesticides
- III. Water Microbiology
  - a. Determination of dissolved oxygen (DO), Chemical oxygen demand (COD) and Biochemical oxygen demand (BOD) of water
  - b. Quantitative Analysis of Water: Coliform MPN Test and Membrane Filter Method
  - c. Isolation of *Escherichia coli* bacteriophages from sewage and determining bacteriophage titers
- IV. Aeromicrobiology
  - a. Determination of air microflora and Index of Microbial contamination of air (IMA)
- V. Agricultural Microbiology
  - a. Isolation and identification of *Rhizobium*, *Azospirillum*, phosphobacteria and *Azotobacter* from soil
  - b. Observation of mycorrhizal fungi
  - c. Screening for plant growth promoting traits

**References:**

1. Gerba CP., Josephson K., & Pepper IL. (2011). *Environmental microbiology: A laboratory manual*. Elsevier.
2. Pollack RA. (2011). *Laboratory exercises in microbiology*. Wiley Global Education.
3. Aneja KR. (2003). *Experiments in microbiology, plant pathology and biotechnology*. New Age International.
4. Tiwari RP., Hoondal GS. & Tewari R. (2008). *Laboratory techniques in microbiology and biotechnology*. Global Media.



This course is intended for students with a basic knowledge of microbiology. It describes the various animal diseases (listed by OIE), their treatment strategies and the various methods used for prevention of these diseases and to treat them. It gives an insight into the disease burden among economically important animals and birds and how it affects human health and economy.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- know the types of interactions of microorganisms with animal hosts
- comprehend the pathogenesis and distribution of veterinary diseases
- understand the role of microbes in animals
- learn the important infectious diseases in animals and birds
- learn about the immune system of animals and fishes
- identify the evasive strategies of the veterinary pathogens

#### I. Normal microflora of animals, role of microbes in animals and bacterial diseases:

Microbial contribution to animal nutrition, symbiosis, digestion within the rumen, commensalism, amensalism, naturalism and probiotics-cultivation of animals for food and food processing. Heartwater, Bovine tuberculosis, Anthrax, Infection with *Chlamydia abortus* (Enzootic abortion of ewes, ovine chlamydiosis), Salmonellosis (*S. abortus ovis*), Avian chlamydiosis, Brucellosis.

#### II. Fungal, Viral and Parasitic diseases: Dermatophytes, Sub-cutaneous mycoses, Systemic mycoses (Candida), Mycotoxicoses, Rinderpest, Rabies, Foot and Mouth Disease, Blue tongue, Hog cholera, Ranikhet Disease, Scrapie, Peste des petits ruminants virus, Sheep pox and goat pox, Infectious bursal disease (Gumboro disease), Bovine spongiform encephalopathy, Lumpy skin disease, Echinococcosis, Q fever, Trypanosomiasis, Bovine anaplasmosis, Bovine babesiosis, Trichomonosis, Porcine cysticercosis, Leishmaniasis

#### III. Overview of the immune system of animals: Organs of the immune system, Immunoglobulins and Ig genes, Cell mediated Immunity, DTH, Allograft rejection, transplantation antigens, foetal immunology, transplacental and intestinal absorption of antibodies, maternal antibodies to MHC antigens, and response to antigens in mammary glands, GI tract, lung and reproductive tract, local vaccination.

#### IV. Immunity to infections: Humoral and cell mediated immune response to bacteria and viruses. Immune response to internal and external parasites.

- V. **Immune system of fishes:** Non-specific and specific mechanisms: humoral and cell mediated immunity- factors affecting immunity in fishes-immunostimulants- therapy and prophylaxis-vaccines and vaccination methods

### **Textbooks:**

1. Hirsch DC. and Zee YC. (1999). *Veterinary Microbiology*. Blackwell Science Inc. Massachusetts, USA.
2. Quinn PJ, Markey BK, Leonard FC, Hartigan P, Fanning S. & FitzPatrick ES. (2011). *Veterinary microbiology and microbial disease*. John Wiley & Sons.
3. Tizard IR. (2013). *Veterinary Immunology-E-Book*. Elsevier Health Sciences.

### **MIM 5337 Lab. in Vaccinology, Veterinary Microbiology & Immunology 3Hrs/3Cr**

This course intends to provide the students with 'hands on' experience in veterinary immunology, microbiology and vaccinology. Importance will be given to blood grouping, cytopathic effect and artificial immunity. In vaccinology, preparation, testing and evaluation of the vaccines will be done. Students will visit vaccine institutes and veterinary hospitals.

### **Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- learn the care and handling of animals
- prepare bacterial vaccines and test their efficacy
- analyse the normal microflora of cows

### **List of Experiments:**

1. Care and handling of laboratory animal
2. Study of gut microflora of laboratory animal
3. Selective isolation of methanogens from cow dung
4. Electrophoretic separation of serum proteins
5. Detection of mastitis
6. Microflora of the skin, saliva and various parts of the cow
7. Microflora of animal feed
8. Demonstration of artificial & acquired active immunity
9. Demonstration of anaphylactic shock
10. Preparation of bacterial vaccines
11. Efficacy test for vaccines
12. Toxoid preparation
13. Microlethality test
14. Visit to regional veterinary hospital
15. Visit to vaccine institutes

**Textbook:**

Malik BS. (1992). *A laboratory manual of veterinary bacteriology, mycology and immunology*. CBS, New Delhi.

**MIM 5539****Vaccinology****5Hrs/5Cr**

The concept of vaccines and their application have saved, and continue to save millions of people across the world from many dreaded diseases like small pox and polio. This course gives a comprehensive account of basis and purpose of vaccination tracing the origin and development of various kinds of vaccines from whole cell vaccines through DNA, edible and designer vaccines. The challenges faced by vaccinologists in developing vaccines against AIDS and tropical diseases like malaria & leprosy are given due emphasis. Fertility control and Veterinary vaccines are also included. Passive immunization with preformed antibodies, their prophylactic and therapeutic effects are also to be discussed.

**Specific Learning Outcome:**

Upon successful completion of the course, students will be able to

- understand the basic concept and types of immunization
- know the characteristics of an ideal vaccine and the process of vaccine development
- comprehend the evolution of diverse types of vaccines available in the market
- learn the methods of killed and attenuation vaccine
- study the modern vaccines against aids, malaria & leprosy
- gain information about antifertility vaccine development and passive immunization

- I. Introduction to vaccines:** Principles and purpose of vaccination, historical milestones, types of immunization, characteristics of an ideal vaccine, vaccine development. Factors affecting efficacy of vaccines, vaccine delivery systems – microbial- and material- based.
- II. Whole and Non whole cell vaccines:** Killed vaccines - heat, formaldehyde, radiation; live attenuated vaccines - methods of attenuation; relative merits of killed and attenuated vaccines. Macromolecules as vaccines - polysaccharides, toxoids, recombinant proteins; recombinant vector vaccines - viral and synthetic peptide vaccines and anti-idiotypic vaccines - methods of development, multivalent subunit vaccines - micelle, liposome and ISCOM.

- III. Modern vaccines:** Recombinant vector vaccines - viral, bacterial vectors; DNA vaccines - advantages, issues; edible vaccine - advantages - selection of plant (criteria). AIDS vaccines - problems, challenges in development of vaccines, vaccines against leprosy, tuberculosis and malaria. Veterinary vaccines- Vaccines against viral, bacterial and parasitic infections in cattle, dogs and poultry; fish vaccines - vaccination methods and their relative merits.
- IV. Vaccines for control of fertility:** Anti HCG vaccines - natural and synthetic; antisperm antigen vaccines. Challenges and issues.
- V. Passive immunization:** Natural passive immunization - transplacental, colostrum; artificial passive immunization - passive antibody therapy, serum therapy, monoclonal and polyclonal preparations. Human immune serum globulin, indication and precautions on use of immunoglobulin therapy.

**Textbooks:**

1. Talwar GP, Rao KVS and Chauhan VS. (1994). *Recombinant and synthetic vaccines*, Narosa, New Delhi
2. Plotkin, Stanley A., et al. *Plotkin's Vaccines*. Elsevier, 2018.
3. Milligan, GN. & Barrett, AD. (2014). *Vaccinology: An essential guide*. John Wiley & Sons.

**Reference:**

1. Benjamini E, Coico R and Sunshine G (2000). *Immunology a short course*. 4<sup>th</sup> Ed. Wiley-Liss Publication, NY.
2. Owen JA, Punt J and Stranford SA. (2013). *Kuby Immunology*. 7<sup>th</sup> Ed. WH Freeman and Company, New York.
3. Outteridge PM. (1985). *Veterinary Immunology*. Academic Press, London.
4. Morrow, WJW., Sheikh, NA., Schmidt, CS., & Davies, DH. (Eds.). (2012). *Vaccinology: principles and practice*. John Wiley & Sons.

This course provides a theoretical as well as practical approach towards learning bioinformatics and Biostatistics. It comprises the basics of molecular biology, evolution and genomic tools required to understand bioinformatics concepts better. It deals with the emergence of bioinformatics as a field, its datatypes, data retrieval, databases, sequence alignment, gene and protein structure prediction and molecular phylogeny tools. Biostatistics component is designed to impart a fundamental knowledge on data, scales of measurement, sources and acquisition; organization and presentation of data; descriptive statistics and inferential statistical procedures.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- recollect the history and the evolution of bioinformatics as a field
- know basic concepts in storage, submission, retrieval of data and data formats
- apply the fundamental tools in the field of sequence analysis, and phylogeny
- understand the mechanisms of protein sequence, and structure analysis
- convey the fundamental concepts of molecular docking and drug design
- categorize the types of data, present them graphically
- apply biostatistics techniques like ANOVA to their data

**I. Introduction to bioinformatics:** - History: Margaret Dayhoff, Richard Eck, Robert Ledley; bioinformatics - definition, goals - technical toolbox; collecting and storing sequences - DNA sequencing, submission of sequences to the databases, computer storage of sequences, sequence formats; archives and information retrieval –databases indexing – format – search - retrieval systems, and genome browsers.

**II. Nucleotide analysis and Phylogeny:** Sequence Retrieval, Primer Designing, Editing Sequence Data, Sequence Assembly—CAP3 Program, Restriction Mapping Using NEBcutter, Gene Prediction Using ORF Finder, Gene Prediction Using FGENESB, Dot-Plot, Global and Local Sequence Alignment, BLAST - Interpreting Result; Multiple Sequence Alignment: T-Coffee, MUSCLE, MAFFT, Multiple Sequence Alignment and Phylogenetic Analysis Using MEGA; RNA Analysis - Predicting RNA Secondary Structure, Finding Repeats.

**III. Protein Sequence and structure analysis:** Protein Sequence Retrieval; Predicting Signal Peptides, Transmembrane Segments, Subcellular Location; Protein BLAST (blastp), (PSI)-BLAST, (PHI)-BLAST, (DELTA-BLAST); CASP; Protein Primary, Secondary, and Tertiary Structure Analysis—ProtParam, SOPMA, PSIPRED, Homology Modelling - SwissModel , Threading (Fold Recognition); ROSETTA, LINUS; Protein Tertiary Structure Analysis – RAMPAGE, SAVeS; Protein Structure Visualization – RasMol, PyMol, Protein Structure Alignment/Superimpose Using

SuperPose, Protein Cleft Analysis; Protein–Ligand Interactions - AutoDock4.1 and MGLTools, ClusPro2.0; Drug discovery and development.

**IV. Introduction to biostatistics:** understanding data, data types, sources, population, sample, sampling methods, scales of measurement – nominal, ordinal, interval and ratio scales - Organizing and presenting data – raw data, organizing – arranging, grouping; tabulation and graphical representation – pie charts, bar charts, column graphs, histograms, Ogive curves, stem-leaf diagram, box plot – properties.

**V. Descriptive statistics:** measures of dispersion/central tendency – mean, median and mode; measures of spread/dispersion – range, mean deviation, inter quartile range, variance, standard deviation and standard error, distribution. **Inferential statistics:** – chi-square test/goodness of fit; Spearman’s rank correlation, Karl Pearson’s correlation and regression, student’s t-test paired & pooled; introduction to ANOVA (one way).

**Textbooks:**

1. Lesk, A. (2014). *Introduction to bioinformatics*. Oxford university press.
2. Paulson, D. S. (2008). *Biostatistics and microbiology: a survival manual*. Springer Science & Business Media.

**References:**

1. Choudhuri S. (2014). *Bioinformatics for beginners: genes, genomes, molecular evolution, databases and analytical tools*. Elsevier.
2. Ibrahim KS., Gurusubramanian G., Zothansanga YR., Yadav RP., Kumar NS., Pandian SK., & Mohan S. (2017). *Bioinformatics-a Student's Companion*. Springer.
3. Mount, D. W. Bioinformatics: sequence and genome analysis. (2004). *Bioinformatics: Sequence and Genome Analysis*. Cold Spring Harbor Laboratory Press
4. Singh, G. B. (2015). *Fundamentals of Bioinformatics and Computational Biology*. Springer International Publishing.
5. Rosner B. (2015). *Fundamentals of biostatistics*. Nelson Education.

This course provides adequate knowledge in the field of microbial gene technology. The study comprises understanding of gene, various techniques for studying the gene, DNA splitting enzymes, gene mapping. Emphasis will be on different cloning vectors, advanced cloning strategies; introduction of DNA into the living cells, identification of recombinants, recombinant DNA technology application in agriculture and medicine, human genome sequencing project and gene therapy will also be dealt.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- understand the tools and techniques used to extract, quantify, and synthesis nucleic acids
- learn the various enzymes, vectors and cloning techniques to manipulate nucleic acids
- comprehend types of systems used to study the expression of recombinant gene
- know the diagnostic methods that uses molecular manipulation of nucleic acids
- be aware of the ethical, legal and social implications of modern biotechnology
- explore advanced fields like transgenics, genomics, proteomics and metagenomics

- I. Techniques for Studying the Gene and tools for manipulation:** Isolation genomic DNA - plasmid DNA and phage chromosome – DNA quantification methods - Radio labeling of nucleic acids (end labeling, nick translation and labeling by primer extension) nucleic acid hybridization – types of PCR AND ITS applications - DNA sequencing. Restriction endonucleases - DNA modifying enzymes - ligation strategies – linkers – adapter and homopolymeric tailing technologies.
- II. Gene Cloning Strategies:** construction of genomic library and cDNA library - Cloning Vectors - Biology, properties-genetic map and applications of *E. coli* vectors. plasmids – ds phage vectors – ss phage vectors – phagemids – plasmids – cosmids – fosmids- BAC and PAC vectors. yeast cloning vectors – YEP, Yrps, Yips, Yips – YAC vectors.
- III. Introduction of rDNA into Living Cells:** Transformation – identification of recombinants, introduction of phage DNA into bacterial cells, Recombinant phages, transformation of non-bacterial cells, transformation and transfection – alternate DNA delivery systems.
- IV. Gene Technology Applications:** General problems with production of recombinant proteins from *E. coli* and eukaryotic cells, transgenic animals, transgenic plants - Production of recombinant pharmaceuticals, Identification of gene responsible for human disease – human genome sequencing projects.

- V. **Gene therapy and Bioethics:** Scope and Importance, principles of gene therapy for inborn errors of metabolisms – cancer treatment, HIV infection – retroviral, adenoviral, alpha viral vectors for gene therapy. ELSI (ethical, legal, social issues of GMOs) – release of GMO into society and food safety – patenting and debate.

**Textbooks:**

1. Brown TA. (2001). *Gene cloning and DNA analysis – An Introduction*. 4th Ed. Blackwell, Oxford.
2. Watson JD et al. (1992). *Recombinant DNA*. 2<sup>nd</sup> Ed. Scientific American Books, WH Freeman and Co, New York.
3. Templeton NS and Danilo DL. (2000). *Gene therapy– therapeutic mechanism and strategies*. Marcel Decker Inc, New York.

**References:**

1. Desmond ST. and Nicholl. (1994). *An Introduction to Genetic Engineering*. Cambridge Univ press. Oxford.
2. Glick BR and Pasternak JJ. (1996). *Molecular Biotechnology – principles and applications of Recombinant DNA technology*. Panima Publishing Co, New Delhi.

**MIM5334      Lab. in Microbial Gene Technology      3Hrs/3Cr**

In the laboratory component students are introduced to the methods for the isolation of microbial DNA, analysis of the DNA by agarose. This course focuses on the restriction digestion, ligation, introduction of rDNA in bacteria and screening of rDNA clones.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- isolate DNA from various microbes
- analyse isolated DNA by electrophoresis
- perform cloning of DNA into vectors
- screen recombinant DNA clones

**List of Experiments:**

1. Isolation of genomic DNA from various organisms
2. Isolation of vector DNA - plasmid and phage DNA
3. Analysis of DNA on agarose gel
4. Restriction digestion of both vector and genomic DNA
5. Ligation
6. Introduction of rDNA in bacteria (*E. coli*) transformation



7. Screening and selection of rDNA clones
8. Transformation by CaCl<sub>2</sub> method
9. Screening of recombinants - (a) by antibiotic resistance (b) by blue-white screening
10. Southern blotting
11. PCR – demo
12. Visit to centre for cell and molecular biology, Hyderabad (CCMB)

**Textbook:**

Das S. and Dash HR.(2014). *Microbial Biotechnology-A Laboratory Manual for Bacterial Systems*. Springer.

**Reference:**

Clark MS.(2013). *Plant molecular biology—a laboratory manual*. Springer Science & Business Media.

**MIM 5536****Immunotechniques & Immunotechnology****5 Hrs/5Cr**

The course deals with the principles, procedures and applications of advanced immunological tools and techniques. The immunological techniques include detection and testing of antigens and antibodies, complement and cellular assays. A section on experimental animal models is included. Immunotechnology includes methods in the production of monoclonal, recombinant antibodies, their applications in clinical diagnosis and treatment. Conventional and modern strategies in vaccine development and their applications are also dealt with.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- perform and understand the mechanism behind serological assays
- learn the types and principles of effector cell assays and immunofluorescence techniques
- comprehend experimental animal models, systems and vaccine technology
- gain knowledge in techniques involved in synthesis of monoclonal antibodies
- understand the genetic engineering and biotechnological strategies behind recombinant antibodies
- appreciate the applications in clinical diagnosis and treatment

**I. Serological assays:** Precipitation-double immunodiffusion, Radial immunodiffusion – Immunoelectrophoresis and other types. Agglutination – direct, viral, haemagglutination, passive; reverse passive agglutination – column agglutination technology, agglutination inhibition. Immunochromatography, evaluation of

complement, complement components in disease, complement fixation test. ELISA, RIA and Immunoblotting.

**II. Effector cell assays and conjugation techniques:** Assays for human lymphocytes and monocytes – T & B lymphocyte assays- flow cytometry-lymphocyte activation, mixed lymphocyte culture & cell mediated lympholysis – Enumeration of NK cells, monocyte, macrophage assays – neutrophil functional assays. Antibody labelling- radioisotopes-enzymes and fluorochromes, avidin- biotin conjugation and protein A & G.

**III. Experimental animal models, systems and immunofluorescence techniques:** Inbred strains – strategies in developing inbred strains – types – adoptive transfer systems – SCID mice and SCID human mice – Gene targeted knock out mice – Inducible gene targeting – the cre/lox system. Immunofluorescence – Direct, indirect, transmitted and epi-illumination fluorescence microscopy.

**IV. Monoclonal antibodies:** MAb through hybridoma technology production strategies – enrichment techniques – applications – nomenclature of MAbs: Rabbit monoclonal antibodies – advantages: humanizing monoclonal antibodies – HamA, HAca and RHAs

**V. Recombinant antibody fragments:** Production strategies – display systems – expression system: types – catalytic antibodies (abzymes) – immunotoxins – chimeric antibodies – bispecific antibodies – single chain FV – diabodies – tetrabodies – intrabodies, plantibodies – plastibodies – applications.

**Textbook:**

Sheehan C. (1997). *Clinical Immunology*. 2<sup>nd</sup> Ed. Lippincott Williams and Wilkins NY.

**References:**

1. Goldsby RA., Kindt TJ and BA Osborne. (2013). *Kuby Immunology*. 4<sup>th</sup> Ed. WH Freeman New York.
2. Kontermann R and S Dubel. (2001). *Antibody Engineering*. Springer, Germany

**MIM 5338      Lab. in Immunotechniques and Immunotechnology      3Hrs/3 Cr**

In the laboratory component students are introduced to the various tools and techniques that form the basis for the antigen-antibody assays and cellular assays. A special emphasis is given to the strategies for producing immunodiagnostic kits.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- perform immunodiffusion and immunoelectrophoresis experiments
- do complement fixation test and cellular assays
- demonstrate elisa, western blot and immunodiagnostic tests

**List of Experiments:**

1. Ouchterlony Double Immuno Diffusion (ODI)
2. Single Radial Immunodiffusion (SRID)
3. Immunoelectrophoresis – isolation and characterization of serum albumin
4. Rocket immunoelectrophoresis – semi quantitative analysis of antigen
5. Counter-current immunoelectrophoresis
6. Separation of T & B lymphocytes and identification of T cells
7. Microlymphocytotoxicity assay
8. DOT ELISA
9. Western Blot
10. Immunodiagnostic tests - RPR, WIDAL, VDRL

**Textbooks:**

1. Garvey JS, Cremer NE and DH Sussdorf. (1977). *Methods in Immunology*. 3<sup>rd</sup> Ed. Benjamin Cummings Pub Co, Massachusetts, USA.
2. Hudson L and FC Hay. (1989). *Practical Immunology*. 3<sup>rd</sup> Ed. Blackwell Science Pub, Oxford.
3. Myers RL.(1989). *Immunology – A laboratory Manual*. Wm C Brown Pub, Dubuque, Iowa. USA.

This course intends to provide students with basic cell culture methods and bioprocessing technology. The students will be taught with various aseptic techniques and environment, media and supplements for cell culture. The disaggregation of tissue, primary cell culture techniques, maintenance of the culture will be given due importance. The cloning and selection of specific cell types with special reference to cells of the immune system and their culturing method, substrate for the cell culture will be dealt. Cloned specific cells line induction and the bioreactors types and their uses in the industry will also be dealt. Apart from the culturing techniques and method, commercial useful products through microbes will also be mentioned.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- explore the biology of cultured cells in terms of adhesion, proliferation, differentiation
- identify different culture vessels, substrates, media and serum free media used in cell culture
- demonstrate the techniques of primary explants, monolayer culture, and cell line characterization
- acquire knowledge on the wide applications of animal cell culture
- understand the characterization of cell line on basis of differentiation and immortalization
- comprehend the microscopic, cell separation and viability techniques of cell culture

**I. Introduction to Animal Cell Culture:** History, Advantages and disadvantages, types of tissue culture; Biology of cultured cells - cell types, adhesion, proliferation, differentiation, signaling, evolution, senescence, transformation; laboratory design; equipment and materials; aseptic technique; safety and bioethics

**II. Culture Media and Vessels:** Culture vessels and substrates, specialized systems; Media, supplements, physico-chemical properties— serum and serum free media; preparation and sterilization; Common microbial contaminants in cell culture – sources, types, monitoring, disposal of contaminated cultures, eradication, Cross-contamination

**III. Primary culture and routine maintenance:** Primary culture – types, initiation and isolation of the tissue; subculture- propagation, choice of cell line, routine maintenance, methods - Cloning – types - dilution cloning, suspension cloning, isolation of clones - methods; isolation of genetic variants, interaction with substrate.

**IV. Induction of differentiation and the transformed phenotype:** Differentiation – in vivo expression, proliferation, commitment and lineage, stem cell plasticity, markers and induction of differentiation, transformation and immortalization – role in cell line characterization –genetic instability– aberrant growth control – tumorigenicity.

**V. Techniques used in cell culture:** Cryopreservation, Quantitation –confocal microscopy, cell counting- cell proliferation – plating efficiency. Cytotoxicity – viability, toxicity and survival – application of cytotoxicity assay – cell separation – antibody based techniques, Specialized techniques - lymphocytes preparation – autoradiography.

**Textbook:**

1. Freshney RI. (2016). *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications*. Wiley-Blackwell.

**References:**

1. Mather JP. & Barnes D. (1998). *Methods in cell biology. Volume 57: Animal cell culture methods*. Academic press.
2. Sinha BK. & Kumar R. (2008). *Principles of Animal Cell Culture: Students Compendium*. IBDC.
3. Butler M. (2003). *Animal cell culture and technology*. Taylor & Francis.
4. Davis JM. (Ed.). (2011). *Animal Cell Culture: Essential Methods*. John Wiley & Sons.

**MIM 5342**

**Lab. in Animal Cell culture**

**3Hrs/3Cr**

This is a supportive course on cell culture and bioprocess technology. In cell culture part, preparation of media for animal cell culture with special emphasis on the cells of the immune system.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- acquire knowledge in preparing animal cell culture media
- establish, maintain and sub culturing of animal cells
- gain hands on practice in primary explants and cell culture preparation
- identify the monolayer & suspension culture and their viability

**List of Experiments:**

1. Aseptic and Sterilization techniques
2. Preparation of media for animal cell culture
3. Primary explants culture from chick embryo
4. Primary culture of lymphoid cells
5. Primary culture of chick organ
6. Disaggregation of tissue – Physical method
7. Disaggregation of tissue – Enzymatic method

8. Primary cell culture – Monolayer Cells
9. Primary cell culture – Suspension Cells
10. Sub culturing technique/Secondary cell culture method.
11. Lymphocytes response to mitogen
12. Cell counting and viability – Trypan blue dye exclusion test, MTT, DAPI staining
13. Visit to cell culture institutes

**References:**

1. Freshney RI. (2016). *Culture of Animal Cells. A Manual of Basic Techniques*. 2<sup>nd</sup> Ed. Alan R. Liss Inc, New York.
2. Harrison MA. & Rae IF. (1997). *General Techniques of Cell Culture*. Cambridge University Press.

**IM 5443/5644**

**Research Project**

**6Hrs/4Cr**

This course aimed at orienting students towards research methodology and to do independent research work. The students will do experiments individually after designing them by standard statistical procedures followed by critical interpretation and drawing valid conclusions. The research project is carried out throughout third and fourth semester and evaluated at the end of the fourth semester.

**Department of Microbiology**  
**The American College, Madurai**

**Proposed Curriculum for M.Sc Microbiology Program – Revised 2018 onwards**

Course Code	Course Title	Hours	Credits	Marks
<b>Semester I</b>				
MIM 4421	Principles of Microbiology	6	4	80
MIM 4223	Lab. in Principles of Microbiology	3	2	40
MIM 4525	Biological Chemistry	7	5	100
MIM 4527	Cell Biology	7	5	100
MIM 4229	Lab. in Bio. Chem., Cell and Mol. Bio.	3	2	40
MIM 4331	Human Health and Hygiene (CBCS)	4	3	60
	<b>Total</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>Semester II</b>				
MIM 4522	Medical Microbiology	7	5	100
MIM 4224	Lab. in Medical Microbiology		2	40
MIM 4526	Immunology	7	5	100
MIM 4228	Lab. in Immunology		2	40
MIM 4430	Mol. Bio. and Microbial Gen.	6	4	80
MIM 4332	Dairy Science (CBCS)	4	3	60
	<b>Total</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>Semester III</b>				
MIM 5521	Molecular Biotechnology	6	5	100
MIM 5523	Immunotechniques and Immunotech.	6	5	100
MIM 5225	Lab. in Mol.Biotech. &Immunotech.	3	2	40
MIM 5527	Animal Cell Culture	6	5	100
MIM 5229	Lab. in Animal Cell Culture	3	2	40
MIM 5531	Biostatistics and Bioinformatics	6	5	100
	<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>
<b>Semester IV</b>				
MIM 5422	Environmental and AgriMicrobio..	5	4	80
MIM 5224	Lab. in Environ. and Agri. Microbio.		2	40
MIM 5426	Food and Industrial Microbio.	5	4	80
MIM 5228	Lab. in Food and Indus. Microbio.		2	40
MIM 5530	Vaccinology		5	100
MIM 5732	Research Project		7	140
	<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>
	<b>Grand Total</b>	<b>120</b>	<b>90</b>	<b>1800</b>

This course provides students a better understanding about the fundamentals of microbiology. The course includes contributions of eminent scientists in the various fields of microbiology, classifications, microscopic techniques, growth, metabolism, culturing and control of microorganisms.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- understand the basis of Microbiology, classification, structure, functions of organelles, and metabolism
- learn the history of microbiology, the contribution of microbiologists, microscopy and staining of microbes
- know the methods of isolating, growing, maintaining microbes in vitro and the fine structure of microbes
- learn phases of bacterial growth and various control measures
- comprehend the diverse and versatile metabolism of microbes, the ways in which nutrients are carried in to the microbial cells and microbial response to stress
- understand the different methods of classification of microbes and their evolution

**I. Basics of Microbiology:** Historical roots– discovery of microorganisms, Spontaneous generation- Germ theory of diseases- contributions of Pasteur, Koch, Jenner and others- scope of microbiology. Microscopy- Principles- types- Simple, compound, light, fluorescence, phase contrast microscope, TEM and SEM- preparation of specimen and staining techniques.

**II. Culture, Characteristics and structure of microorganisms:** Culture of microorganisms- culture media- types- establishment of pure culture- maintenance and preservation- characterization and identification- Enumeration techniques- Prokaryotic cells – characteristics and cell structure of Bacteria and Archaea, Endospores. Eukaryotic cells- features and structure- Protista and fungi.

**III. Microbial nutrition, growth and control:** Nutritional requirements- chemical and physical requirements- Nutritional types of microorganisms- bacterial cell cycle – phases of growth, factors affecting growth– Sterilization – physical and chemical methods of control of microorganisms. Antibacterial Antibiotics – classification, mode of action, determination of their efficacy; antifungal and antiviral drugs.

**IV. Microbial physiology and metabolism:** Bioenergetics- Thermodynamics- Redox reactions- Transport across membrane- Metabolism of chemoorganotrophs- glycolysis- Entner-Duodoroff pathway- Krebs' cycle- fermentation- types. Aerobic and anaerobic electron transport chain- Electron transport chain of *E. coli*- Metabolism of photoautotrophs- bacterial photosynthesis. Overview of other metabolic processes. Overview of protein and fat metabolism- beta-oxidation- transamination- amino acid biosynthesis- peptidoglycan biosynthesis. Bacterial stress response- nutrient stress and starvation, thermal stress and the heat shock response, pH stress, and oxidative stress.



**V. Microbial Evolution and Taxonomy:** Classification – Binomial and numerical, phylogenetic tree, Haeckel's three kingdom, Whittaker's five kingdom; classification of bacteria, Bergey's classification; molecular taxonomy- polyphasic taxonomy and species concept. Classification of viruses – Baltimore system; classification of fungi – Recent system.

**Textbooks:**

1. Black, JG. (2013). *Microbiology*. 8<sup>th</sup> Ed. John Wiley and Sons, Singapore Inc.
2. Sherwood, L., Willey, JM. and Woolverton, C. (2011). *Prescott's Microbiology*. McGraw-Hill.

**References:**

1. Tortora, GJ., Funke, BR., & Case, CL. (2018). *Microbiology: An Introduction*. Pearson.
2. Talaro, KP.& Chess, B. (2018). *Foundations in Microbiology*. Tata McGraw-Hill Education Private Limited. New Delhi.
3. Moat, AG., Foster, JW and Spector, MP. (2002). *Microbial Physiology*. Wiley-Liss, Inc
4. Pelczar MJ, Chan EC, Krieg NR. (2010). *Microbiology: an application based approach*. McGraw Hill Education Private Limited. New Delhi.
5. Madigan, MT., Martinko, JM., Stahl, D. and Clark, DP. (2013). *Brock Biology of Microorganisms*. 13<sup>th</sup> Edition. Benjamin Cummings.

**MIM 4223**

**Lab. in Principles of Microbiology**

**3Hrs/2Cr**

The laboratory course starts with basic techniques such as aseptic handling, sterilization techniques, media preparation and isolation of bacteria and fungi from various sources. It also deals with the various staining procedures for bacteria and fungi. Various biochemical methods needed for the identification of unknown bacteria will also be dealt with.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- learn aseptic handling techniques and sterilization methods
- isolate pure cultures and learn staining methods
- identify unknown bacteria through biochemical tests
- determine bacterial growth curve and antimicrobial susceptibility by various methods

**List of Experiments**

1. Aseptic Handling techniques
2. Methods of sterilization and Preparation of culture media
3. Pure culture isolation and maintenance
  - a. Isolation and identification of bacteria and fungi from various samples and study of culture characteristics
  - b. Maintenance of pure cultures of bacteria and fungi
4. Staining methods:
  - a. Simple staining
  - b. Differential staining
  - c. Lacto phenol cotton blue staining for fungi

## MIM 4

5. Motility of bacteria by Hanging drop method
6. Measurement of bacterial cells with micrometer
7. Identification of unknown bacteria by biochemical characterization
  - a. IMViC test
  - b. Oxidase and catalase tests
  - c. Oxidation/fermentation of glucose
8. Determination of bacterial growth curve
9. Effect of physical factors such as temperature and pH on bacterial growth
10. Screening bacteria for the production of extracellular enzymes such as amylase, caseinase, gelatinase, urease, and lipase
11. Determination of antimicrobial susceptibility tests
  - a. Minimum inhibitory concentration (MIC) /Minimum Bactericidal Concentration (MBC) Assay
  - b. Kirby Bauer method
  - c. Agar well diffusion method
  - d. Minimum bactericidal concentration

### References:

1. Cappuccino JG, Welsh CT. (2017). *Microbiology: a laboratory manual*. Pearson education.
2. Benson HJ. (2001). *Microbiological Applications: A Laboratory Manual in General Microbiology*. The McGraw– Hill Companies.
3. Gunasekaran P. (1995). *Lab Manual in Microbiology*. New Age International Pvt. Ltd., Madras.

## MIM 4525

## Biological Chemistry

7Hrs/5Cr

This course on biological chemistry includes physical and chemical concepts in biology, composition, structure and functions of carbohydrates, proteins, lipids and vitamins. Enzymes and enzyme kinetics, carbohydrate, proteins, lipids, and vitamin metabolism are taught. It also includes biosynthesis and degradation of purines and pyrimidines.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- learn the physical and chemical concepts in biology
- understand the chemistry and structure of biomolecules
- gain knowledge on enzyme kinetics and bioenergetics
- understand carbohydrate and vitamin metabolism
- comprehend the amino acid, nucleic acid and lipid metabolism
- appreciate relationships between metabolism of different bio-macromolecules

**I. Physical and chemical concepts in biology:** Structure of atoms, molecules and chemical bonds; Biomolecule interaction – van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction and covalent bond; Principles of biophysical chemistry- pH, buffer, reaction kinetics, colligative properties.

**II. Biomolecules:** Composition, structure, classification and function – Carbohydrates, lipids, proteins, nucleic acids and vitamins; Conformation of proteins - Ramachandran plot, primary, secondary, tertiary & quaternary structures, domains, motif and folds.

**III. Enzymes and bioenergetics:** Enzymes and enzyme kinetics - regulation of enzymatic activity - mechanism of enzyme catalysis - Michaelis-Menten equation – isozymes; Bioenergetics – thermodynamics, free energy, coupled reactions, group transfer and biological energy transducers.

**IV. Carbohydrate and vitamin metabolism:** Types of metabolism; Carbohydrate metabolism - glycolysis, TCA cycle, oxidative phosphorylation, gluconeogenesis; glycogen metabolism, - Glycogenesis and Glycogenolysis, HMP shunt, uronic acid pathway; Vitamin metabolism – vitamins A and C.

**V. Amino acid, nucleic acid and lipid metabolism:** Amino acid metabolism – Inborn errors - Urea cycle; Nucleotides - Biosynthesis and degradation of purines and pyrimidines; Biosynthesis and  $\beta$ -oxidation of fatty acid, ketone bodies, metabolism of phospholipids, glycolipids, cholesterol and HDL.

**Textbook:**

1. Voet D and Voet G. (1995). *Biochemistry*. 2<sup>nd</sup> Ed, John Wiley and sons, New York.

**References:**

1. Lehninger AL, Nelson DL and Cox MM. (2012). *Lehninger Principles of Biochemistry*. 6<sup>th</sup> Ed. CBS Publishers and Distributors, USA.
2. Murray, RK and Grammer DK. (2007). *Harper's Biochemistry*. 25<sup>th</sup> Ed., McGraw Hill, Lange Medical Books.

**MIM 4527**

**Cell Biology**

**7Hrs/5Cr**

In this course, the basic principles that guide the structure of prokaryotic and eukaryotic cell, and the tools used to understand them are covered. Topics such as membrane structure and composition, transport, and trafficking; the cytoskeleton and cell movement; and the integration of cells into tissues will be discussed. Important cellular processes such as cell cycle regulation, signal transduction, apoptosis (programmed cell death), and cancer cell biology will also be dealt in depth.

**Specific Learning Outcome:**

Upon completion of this course, the student will be able to

- describe the fundamental principles of cellular biology
- apply these principles to current biological questions of today
- develop a deeper understanding of cell structure and how it relates to cell functions
- understand cell movement and how it is accomplished
- understand how cells grow, divide, and die and how these important processes are regulated
- understand cell signaling and how it regulates cellular functions. also how its dysregulation leads to cancer and other diseases

## MIM 6

- I. **Introduction to Cell:** universal principles, properties, origin and evolution of cells, prokaryotic and eukaryotic cell structure and function, cells as experimental models: *E. coli*, yeasts, vertebrates; tools of cell biology: light and electron microscopy, subcellular fractionation, growth of animal cells and plant cells
- II. **Membranes and Transport Mechanisms:** membrane structure and function, dynamics, pumps, carriers, channels, physiology; cellular organelles and membrane trafficking, posttranslational targeting of proteins, mitochondria, chloroplasts, peroxisomes, endoplasmic reticulum, secretory membrane system and golgi apparatus, endocytosis and the endosomal membrane, processing and degradation of cellular components
- III. **Cell Communication:** signaling mechanisms, plasma membrane receptors, protein hardware for signaling, second messengers, integration of signals; cellular adhesion and the extracellular matrix, extracellular matrix molecules, cellular adhesion, intercellular junctions, connective tissues
- IV. **Cytoskeleton and Cell Movement:** cytoskeleton and cellular motility, actin and actin-binding proteins, microtubules and centrosomes, intermediate filaments, motor proteins, intracellular motility, cellular motility, muscles
- V. **Cell Division, Apoptosis, and Cancer:** cell cycle, G1 phase and regulation of cell proliferation, S phase and DNA replication, G2 phase, responses to DNA damage, and control of entry into mitosis, mitosis and cytokinesis, meiosis, programmed cell death; cancer: principles and overview

### Textbooks:

1. Geoffrey, M., Cooper, H., & Robert, E. (2015). *Cell: A Molecular Approach*. Sinauer Associates Incorporated, U.
2. Pollard, T. D., & Earnshaw, W. C. (2017). *Cell biology*. 3<sup>rd</sup> Edition. Elsevier

### References:

1. Plopper, G., Sharp, D., & Sikorski, E. (Eds.). (2013). *Lewin's Cells*. Jones & Bartlett Publishers.
2. Karp, G. (2016). *Cell and Molecular Biology: Concepts and Experiments 8th Edition with Plus Set*. John Wiley & Son.
3. Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., ... & Walter, P. (2017). *Molecular Biology of The Cell*. Garland Science.
4. Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., ... & Walter, P. (2013). *Essential cell biology*. Garland Science.
5. Lodish, H., Berk, A., Zipursky, S. L., Matsudaira, P., Baltimore, D., & Darnell, J. (2016). *Molecular cell biology* (Vol. 8). New York: WH Freeman.

**MIM 4229 Lab. in Biological Chemistry, Cell and Molecular Biology 3Hrs/2Cr**

This course includes laboratory experiments involving acidic and alkalimetry, colorimetric estimation of biomolecules, centrifugation, chromatographic separation of amino acids. Estimation and isolation of nucleic acids are also part of this coursework.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- learn the principle of basic instruments
- undertake qualitative analysis and quantitative estimation of biomolecules
- analyse the separation of biomolecules
- isolate nucleic acids from different samples

**List of Experiments:**

1. Preparation of biological buffer and solutions
2. Preparative centrifugation
3. Colorimetry
4. Reactions of Carbohydrates
5. Reactions of Proteins
6. Reactions of Lipids
7. Chromatography– (a) Paper (b) Thin Layer (c) HPLC
8. Estimation of DNA by Diphenylamine reaction
9. Estimation of RNA by Orcinol reagent
10. Isolation of Genomic DNA from microorganisms
11. Isolation of Genomic DNA from plant tissue
12. Isolation of Genomic DNA from animal tissue
13. Isolation of plasmid from bacterial cells

**References:**

1. Palanivelu P. (2009). *Analytical Biochemistry & Separation Techniques - Lab Manual*. 4<sup>th</sup>edn. Twenty first Century Publications.
2. Geetha KD. (2010). *Practical Biochemistry*. Jaypee Brothers, Medical Publishers Pvt. Limited
3. Jayaraman J. (1996). *Laboratory Manual in Biochemistry*. 5<sup>th</sup> ed. New Age International Pub, New Delhi.
4. Plummer DT. (1997). *An Introduction to Practical Biochemistry*. Tata McGraw Hill Pub Co, New Delhi.

**MIM 4331 Human Health and Hygiene - CBCS 4Hrs/3Cr**

The course is designed to address broad spectrum of health-related issues within the industry, community, hospitals and health sector. The content covers up para-medical, administrative, financial, social, informational and occupational aspects around the modern healthcare standards. Studies will include, among others, courses in medical, biological, technological, legal, administrative and social foundations areas. The program provides the student with a wider perspective of modern healthcare system and associated health facilitates.

## MIM 8

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- understand issues related to the present day health care system
- acquire basic understanding of other healthcare systems
- apply the principles of health administration, education and promotion of healthcare
- analyze delivery of healthcare services, management, and human resources
- learn about the health planning and management of personnel in occupation
- aware of the schemes available for public for individual's betterment

**I. Health Determinants and Standards:** Individual health parameters; determinants of health, key health indicators; importance and source of public-health data health status in India: standards, relevance to social aspects. Future challenges in public health.

**II. Community Health Concepts:** Determinative factors: Family health history, Physique, Environment, Life-style and Social cultural aspects. Overview of Healthcare Systems in India; Primary healthcare hand-washing, immunization, Secondary healthcare, Tertiary healthcare Hospital interventions intravenous rehydration and surgery.

**III. Occupational Health:** Risk factors for disease; Diseases and occupational relevance Drugs, Tobacco and Alcohol: Chemical agents, Effects and Side effects.

**IV. Health Planning and Education:** Need and Demands, Objectives- Planning Cycle, Management methods, techniques, need and demands – Health Planning and systems in India - History of Public Health in India – role of Union Ministry Health and Family Welfare. Understanding the significance of the environment for human health -Human population pressures and pollution dynamics. Principles and Practices of health education.

**V. Health Care Agencies:** Role of Public, Private and NGO in Health sector; Expenditure in Health-care Government Plans and Policies in India - UNITAID and Debt2 Health finance schemes; The Global Health Council, The Global Alliance for TB Drug Development, The International AIDS Vaccine Initiative, Malaria Vaccine Initiative World Health Organization (WHO) and Centre for Disease Control and Prevention (CDC): Organization, Objectives and Role of UN Millennium Development Goals.

### Textbooks:

1. Edlin G and Golanty E. (2010). *Health & Wellness*. 10<sup>th</sup> Ed. Jones & Barlett Publisher.
2. Skolnik R. (2012). *Global Health 101*. 2<sup>nd</sup> Ed. Jones & Barlett Learning.

### References:

1. Schneider MJ. (2014). *Introduction to Public Health*. 4<sup>th</sup> Ed. Jones & Barlett.
2. Talaro K. and Talaro A. (1996). *Foundations in Microbiology*. 2<sup>nd</sup> Ed. WnC. Brown Publishers, Chicago.
3. Parker JE and Park K. (1989). *Textbook of Preventive and Social Medicine*. 12<sup>th</sup> Ed. Banarsidas Bhanot Publishers, India.

MIM 4522

Medical Microbiology

7Hrs/5Cr

This course is to provide the students with detailed insight in epidemiology, pathogenesis, prevention and treatment of important infectious diseases, and contemporary issues and novel developments in the field of Medical Microbiology. As the (re-) emergence of infectious diseases and antimicrobial resistance development, the course will also address the global health aspects of infectious diseases.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- understand the epidemiology, stages, types of infections and interactions of microorganism with host
- learn the methods in collection and processing of clinical specimens and prevalence and development of hospital-acquired infections
- know the origins and mechanisms of antimicrobial resistance and bioterrorism
- comprehend the evolution of human microbiome along with changing lifestyle and health trends
- acquire understanding of pathogenesis, transmission of infection, diagnosis, prevention and treatment of clinical significant bacterial and fungal pathogens
- acquire understanding of pathogenesis, transmission of infection, diagnosis, prevention and treatment of clinical significant viral and parasite pathogens

- I. **Introduction to Medical Microbiology:** History; Epidemiology – Infection: stages and types, Host-microbe interactions, microbial pathogenesis; Human microbiome in health and disease: Nosocomial infections, Antimicrobial resistance; Bioterrorism; collection and processing of clinical specimens.
- II. **Medical Bacteriology:** Epidemiology, pathogenesis, clinical manifestation, diagnosis, treatment and prevention of *Staphylococcus*; *Streptococcus*; *Neisseria*; *Corynebacterium*; *Bacillus*; *Enterobacteriaceae*, *Vibrio*, *Mycobacterium*; *Spirochetes*; *Mycoplasma*; *Rickettsia*; *Chlamydia*.
- III. **Medical Mycology:** Epidemiology, pathogenesis, clinical manifestation, diagnosis, treatment and prevention of superficial and cutaneous mycoses; subcutaneous mycoses; systemic mycoses caused by dimorphic fungi; opportunistic mycoses; fungal and fungal-like infections of unusual or uncertain etiology; mycotoxins and mycotoxicoses.
- IV. **Medical Virology:** Epidemiology, Pathogenesis, Clinical Manifestation, Diagnosis, Treatment and Prevention of Adenoviruses, Human Herpesviruses, Poxviruses, Picornaviruses, Paramyxoviruses, Orthomyxoviruses, Rhabdoviruses, Reoviruses, Retroviruses, Hepatitis Viruses, Unconventional Slow Viruses: Prions, Recent evolutions – Zika, Dengue, Chikungunya, MERS, SARS, Ebola
- V. **Medical Parasitology:** Epidemiology, pathogenesis, clinical manifestation, diagnosis, treatment and prevention of Protozoans; Amoeba; Flagellates; Ciliates; Helminths

### Textbooks:

1. Murray PR., Rosenthal KS and Pfaller, MA. (2015). *Medical Microbiology*, 8<sup>th</sup> ed. Elsevier Health Sciences.
2. Ryan, KJ and Ray CG. (2014). *Medical microbiology*. McGraw Hill.

## MIM 10

### References:

1. Tille P. (2015). *Bailey & Scott's Diagnostic Microbiology*. 14<sup>th</sup>edn. Elsevier Health Sciences.
2. Paniker AA. (2005). *Ananthanarayan and Paniker's Textbook of Microbiology* (reprint edn.). Orient Blackswan.
3. Sastry SA. & Bhat S. (2015). *Essentials of medical microbiology*. Jaypee Brothers, Medical Publishers Pvt. Limited.
4. Greenwood D. (ed). (2012). *Medical Microbiology*, With STUDENTCONSULT online access, 18. Elsevier Health Sciences.

## MIM 4224

### Lab. in Medical Microbiology

3Hrs/2Cr

This labcourse is designed to give the students clinical experience in the area of bacteriology and mycology. Test procedures routinely applied are covered with an emphasis on the isolation, identification, and antimicrobial susceptibility testing of pathogenic microorganisms.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- understand the scientific and administrative direction of a clinical microbiology laboratory
- learn provisions of the investigation, diagnosis, and treatment of patients suffering from infectious diseases.
- understand the epidemiology of public health and communicable disease and prevention

### List of Experiments:

1. Laboratory Safety
2. Epidemiology
  1. Effectiveness of Handwashing
  2. A Synthetic Epidemic
  3. Morbidity and Mortality Weekly Report (MMWR) Assignment
3. Bacteriology and Mycology
  1. Enumeration of potential nosocomial infective agents in Health Care Facility (HCF)
  2. Antimicrobial effect of body fluids (saliva, tears, sweat)
  3. Isolation of Normal Microbiota from the Human Body
  4. The Snyder Caries Susceptibility Test
  5. Examination of skin smears, sputum specimens, throat swabs and nasal scrapings: The Staphylococci and Streptococci: Isolation and Identification
  6. Microbiological Analysis of Blood Specimens
  7. Examination of urine: Physical and Microbiological Analysis of Urine Specimens
  8. Examination of skin and hair for fungi
  9. Oral candidiasis
4. Antimicrobial Susceptibility Test (Kirby-Bauer Method) against specific pathogens
5. Broth dilution method
6. Microbial evaluation of cosmetics
7. Microbial evaluation of antidandruff products



**Textbooks:**

1. Cappuccino JG and Welsh CT. (2017). *Microbiology: A Laboratory Manual*. Pearson education.
2. Benson HJ. (2001). *Microbiological Applications: A Laboratory Manual in General Microbiology*. The McGraw– Hill Companies.
3. World Health Organization. (2003). *Manual of basic techniques for a health laboratory*. World Health Organization.

**References:**

1. Harley J & Prescott L (2002). *Harley J, Prescott L. Harley-Prescott: Laboratory Exercises in Microbiology*, 5<sup>th</sup> Ed. McGraw-Hill Company.
2. Pollack RA. (2011). *Laboratory exercises in microbiology*. Wiley Global Education.

**MIM 4526****Immunology****7Hrs/5Cr**

This course introduces the fundamental concepts of Immunology, with an emphasis on immune system, immune response against different diseases and the genetic basis of immune polymorphism. Topics covered are the basic elements of immune system including lymphoid tissues/ organs and cells with immune functions; principles of natural immunity and acquired immunity; cellular and molecular basis of B cell and T cell development and activation, cytokines, immune tolerance. This course also highlights the clinical aspects of immunology including autoimmunity; transplantation immunology, Hypersensitivity reactions, Immune deficiency disorders, tumour immunology and Immunoprophylaxis.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- understand the cells, organs, antigens, antibody, antibody diversity and antigen-antibody interactions.
- appreciate the roles of MHC, maturation, activation and differentiation of T & B cells, cytokines and cytokine receptors in fighting infections
- recognize the effector mechanisms specific against bacterial, viral, fungal and parasitic pathogens
- know the adverse effects of immune system in hypersensitivity reactions, autoimmunity and immunodeficiency diseases.
- gain deeper understanding of the role of immune system in transfusion, and transplantation.
- comprehend the immune surveillance of cancer cells in host and consecutive immune response against tumor

- I. Overview and Components of Immune System:** Cells, tissues and organs of immune system; Innate immunity- anatomical barriers, phagocytosis- induced cellular responses- inflammatory responses-natural killer cells. Adaptive immunity- Interaction between innate and adaptive immunity. Antigens – types and properties– Complement system- Cytokines – properties –functional categories – receptors – role in therapy.

## MIM 12

- II. B, T lymphocytes & MHC molecules:** Biology & activation of T & B lymphocytes; Immunoglobulins - structure, isotypes, biological properties, generation of antibody diversity; Antigen and antibody interaction – Kinetics of immune response. Effector responses- cell and antibody mediated immunity. MHC molecules – variability – molecular structure - antigen processing & presentation-MHC haplotypes and polymorphism
- III. Immune tolerance, Hypersensitivity reactions, and Autoimmunity:** Immune tolerance – types – mechanism – immunologically privileged sites; Gell and Coombs classification; Immediate type I – components – factors – consequences; Antibody mediated (type II) –transfusion and hemolytic disease; Immune complex-mediated (type III) –systemic and localized diseases; Delayed type (type IV) – mechanism and examples of DTH. Autoimmunity – factors – organ-specific & systemic diseases – mechanism – therapeutic strategies.
- IV. Transfusion and Transplantation Immunology:** ABO system - ABO antigens - isohaemagglutinins - Rh antigens - transfusion reactions - transfusion transmitted infections - cross-matching; Transplantation –types of grafts – allograft rejection & its mechanism – immunosuppression – Graft-vs host disease – fetus as allograft.
- V. Immune deficiency disorders, Tumor Immunology, Immunity and infection:** Primary Immunodeficiency; Secondary immunodeficiency and AIDS; Immunoprophylaxis; Malignant transformation– Tumor antigens – Effector response to tumor cells – cancer immunodiagnosis and immunotherapy. Innate and acquired immunity to intracellular and extracellular bacterial infections, viral infections, fungal infections and protozoal infections- evasion strategies.

### Textbooks:

1. Owen JA., Punt J and Stranford SA. (2013). *Kuby Immunology*. 7<sup>th</sup> Ed. WH Freeman and Company, New York.
2. Delves PJ, Martin SJ, Burton DR and Roitt IM (2006). *Essential Immunology*. 11<sup>th</sup> Ed. Blackwell Pub Ltd, UK

### References:

1. Pier GB., Lyczak JB and Wetzler LM (2004). *Immunology, Infection, and Immunity*. ASM press.
2. Coico R. and Sunshine. G. (2015). *Immunology – A Short Course*. 7<sup>th</sup> edn. Wiley Blackwell, UK.
3. Murphy K. and Weaver C. (2017). *Janeway's Immunobiology*. 9<sup>th</sup> edn. Garland Science, New York and London.

## MIM 4228

### Lab. in Immunology

3Hrs/ 3Cr

This laboratory course includes preparation of antigens, various bleeding techniques, serological reactions, identification and counting of different types of cells. Surveys of lymphoid organs are also done. Students are taught to immunize animals and assay antibody response by complement mediated hemolysis. Isolation of macrophage and *in vitro* phagocytosis are done.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- study the lymphoid organs
- learn the basic experiments in immunology such as preparation of antigen, serum separation and isolation of immunoglobulins.
- evaluate the cellular immune response

**List of Experiments:**

1. Survey of lymphoid organs of fish or chick or mice
2. Separation of serum and plasma from whole blood
3. Differential staining of white blood cells and enumeration of WBC by hemocytometer
4. Preparation of Antigens – Soluble, insoluble and adjuvant antigens.
5. Routes of administration and repetitive bleeding.
6. Isolation of lymphocytes – Density gradient centrifugation
7. Isolation and purification of Immunoglobulins – Ammonium Sulphate precipitation
8. Antigen – antibody interactions – Precipitation reactions
9. Antigen – antibody interactions – Haemagglutination assay
10. Viable Cell count – Trypan blue dye exclusion test.
11. Complement mediated hemolysis
12. Serum bactericidal activity
13. Isolation of macrophage from peritoneal cavity of fish.
14. *In vitro* phagocytosis.
15. Complement mediated hemolysis
16. Serum lysozyme activity

**References:**

1. Myers RL. (1989). *Immunology: A Laboratory Manual*. Wm. C. Brown, Dubuque, Iowa.
2. Hay FC and Westwood OMR (2003). *Practical Immunology*. 4<sup>th</sup> Ed. Blackwell Science UK.
3. Garvey JS., Cremer NE and Sussdorf DH (1993). *Methods in Immunology – A Laboratory Text for Instruction and Research*. 3<sup>rd</sup> Ed. The Benjamin/Cummings Publisher, London.

**MIM 4430****Molecular Biology and Microbial Genetics****6Hrs/4Cr**

The course is an introduction to molecular biology and genetics and methods used within these fields. The structure of the genomes, chromosomes, chromosomal structure, and extrachromosomal inheritance is discussed, along with the molecular basis of transmission of genetic information: nucleic acids and proteins. DNA replication, DNA repair, mutations, recombination, transposition, transcription, translation, and transfer of DNA between bacteria.

## MIM 14

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- account for structure, formation and function of DNA, RNA and proteins
- describe the principles of gene regulation in prokaryotic and eukaryotic cells
- describe the consequences of different types of mutations and DNA-repair systems
- explain the processes behind mutations and other genetic changes
- identify and distinguish genetic regulatory mechanisms at different levels
- understand genetic aspects of extrachromosomal elements such as bacteriophages and plasmids.

**I. Maintenance of Genome:** genome structure, chromatin, and the nucleosome; replication of DNA; the mutability and repair of DNA; homologous recombination; site-specific recombination and transposition of DNA

**II. Expression and Regulation of Genome:** mechanisms of transcription, RNA splicing, translation, genetic code, transcriptional regulation in prokaryotes and eukaryotes, regulatory RNAs, gene regulation in development and evolution, systems biology

**III. DNA damage, repair, mutation and recombination:** Genetic nomenclature - Mutagenesis – causes, types, detection. Mutants - isolation and characterization - significance - analysis. - Genetic recombination – types - mapping - complementation analysis; Extrachromosomal DNA: Plasmids – Properties, detection, purification, replication, types, amplification, gene transfer, Partitioning; Mobile DNA – terminology, types, detection, mechanism, Genetic Phenomena, Evolution; Retroposons; Mu DNA.

**IV. Phage and Yeast Biology:** general properties, structure, stages, counting, Host Restriction and Modification, Lysogenic Cycle; Genetics of Phage T4 - Genetic Mapping; Lytic Growth of Phage λ; Lysogeny; Construction of Phage Mutants; Elements of Yeast Genetics - cell cycle, Mating Type Conversion, Expression and Recombination Paradoxes

**V. Bacterial Genetic Exchange Mechanisms:** Bacterial Transformation- discovery, mechanism and significance; Conjugation- F factor- R factor, chromosome transfer by plasmids and integrative conjugative elements; Transduction- discovery, mechanism, specialized transduction, generalized transduction and significance

### Textbooks:

1. Watson, J. D. (2013). Molecular Biology of the Gene. *Molecular biology of the gene.*, 7<sup>th</sup> Ed. Garland Science.
2. Maloy SR, Cronan JE and Freifelder D. (1994). *Microbial Genetics*. 2<sup>nd</sup> Ed. Jones and Bartlett publication.

### References:

1. Snyder L, Champness W & Champness W. (2013). *Molecular Genetics of Bacteria*. American Society for Microbiology.
2. Clark DP and Pazdernik NJ. (2013). *Molecular Biology*. Elsevier.

MIM 4332

Dairy Science – CBCS

4Hrs/3Cr

The aim of the course is to provide an insight into milk, the most loved and widely used food product. Its aim is also to satiate the curiosity of arts and students about milk, the various types available, different milk-yielding animals and the variety of milk products available.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- recognize the history, economics and demographics behind dairy and dairy product consumption
- understand physicochemical and biological properties of milk and its products
- learn where dairy products come from and how it is processed and marketed
- learn the different dairy products we consume and to know their health benefits
- know the role of microorganisms in milk, and production of milk products
- be aware of the handling, collection, transportation and distribution of dairy products and equipment involved

**I. Introduction to Dairy Science:** History- Worldwide milk consumption- Production. Milk Production in India- White revolution - Various Milk societies in India- Modern milk production- Animal farms

**II. Composition of milk:** Biosynthesis of milk- structure of milk and milk products- Nutritional composition of commercially available milk- Types of Milk - Milk grading and defects- milk grading techniques- Characterization of flavour defects- effects of milk handling on quality and hygiene of milk

**III. Dairy Microbiology:** - Normal microflora of milk - Pathogenic microorganisms – contamination, preservation and spoilage - Role of microorganisms in the production of milk products

**IV. Dairy Processing and quality control:** Dairy collection and transportation - Plant design and development- Pasteurization- packaging and storage of Milk-Distribution of milk- Cleaning and sanitization of dairy equipment -Automatic milking- High quality milk yielding animals- different animals used for milk production

**V. Milk Products:** Fermented and non-fermented milk products - dried milk products- ice cream- cream-curd/yogurt – butter – cheese- Indian Dairy products-types, nutrition, worldwide production-health benefits.

### Textbook:

1. De S. (1980). *Outlines of Dairy Technology*. Oxford University Press, New Delhi.

### References:

1. Black JG. (2013). *Microbiology*. 8<sup>th</sup> Ed. John Wiley and Sons, Singapore Inc.
2. Sherwood L., Willey JM and Woolverton, C.(2011). *Prescott's Microbiology*. McGraw-Hill.

This course comprises various techniques for studying the gene, manipulation of gene sequences, cloning strategies and their applications. Special emphasis is given to basic techniques used in genetic engineering such as different vectors, manipulative enzymes, library construction and methods of gene of transfer. The course also covers important topics such as production of transgenic plants & animals, gene therapy and their applications, patenting, rDNA regulations and ethical concerns.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- understand the tools and techniques used to extract, quantify, and synthesis nucleic acids
- learn the various enzymes, vectors and cloning techniques to manipulate nucleic acids
- comprehend types of systems used to study the expression of recombinant gene
- know the diagnostic methods that uses molecular manipulation of nucleic acids
- be aware of the ethical, legal and social implications of modern biotechnology
- explore advanced fields like transgenics, genomics, proteomics and metagenomics

**I. Introduction to rDNA technology:** Nucleic acids – manipulation, chemical synthesis, isolation, quantification, labelling, gel electrophoresis; Restriction Endonucleases - types, other enzymes, Cloning vectors - properties, types – plasmids, bacteriophage, hybrid, artificial chromosomes, expression vectors- Plasmid Cloning Vectors, Phage vectors-  $\lambda$  & M13, Cosmids, Phagemids and BAC; Cloning strategies - Construction of genomic and cDNA library, Ligation strategies; chromosome walking, subtractive hybridization, gene transformation in bacteria- selection of recombinants; PCR – types, DNA sequencing techniques.

**II. Manipulation of gene expression:** Strong and Regulatable Promoters, Fusion Proteins, Translation Expression Vectors; Eukaryotic Expression Systems Heterologous Protein Production, Fungus-Based Expression Systems, Baculo virus–Insect Cell Expression Systems, Mammalian Cell Expression Systems; Directed Mutagenesis procedures and Protein Engineering.

**III. Molecular diagnostic methods:** Molecular diagnostics – biofluorescent & bioluminescent systems, nucleic acid diagnostic systems- antisense RNA, ribozymes, chimeric RNA-DNA molecules, aptamers, SiRNAs, antibody genes and nucleic acid delivery- molecular diagnosis of genetic disease, RFLP, RAPD as tools of diagnosis

**IV. Transgenics:** Transgenic Plants – Ti plasmid mediated and physical methods of gene transfer, Chloroplast engineering, gene targeting. Development of pathogen (bacteria and fungus), drought, insecticide and stress resistance plants. Transgenic Animals – methods, applications, Transgenic mice, livestock, poultry and fish.

**V. Applications of molecular biotechnology:** Gene therapy – types and applications. Approaches for the study of Genomics, Proteomics, metagenomics and their applications. DNA chips and its applications. DNA microarray technology - Protein expression profiling and serial analysis of gene expression. Ethical, legal and social implications of modern biotechnology.

**Textbooks:**

1. Glick BR and Pasternak JJ. (2017). *Molecular Biotechnology – Principles and Applications of Recombinant DNA Technology*, Panima Publishing Co, New Delhi.
2. Brown TA. (2015). *Gene cloning and DNA analysis – an introduction*. 5<sup>th</sup> Ed. Blackwell, Oxford.

**References:**

1. Clark, D. P., & Pazdernik, N. J. (2013). *Molecular biology*. 2<sup>nd</sup> Ed. Elsevier.
2. Clark, D. P., & Pazdernik, N. J. (2015). *Biotechnology*. Newnes.
3. Satyanarayana U. (2013). *Biotechnology*. 1<sup>st</sup> Ed, Books and Allied (P) Ltd, Kolkata.
4. Desmond ST and Nicholl. (2008). *An Introduction to Genetic Engineering*. Cambridge University Press, Oxford.
5. Watson JD, (2007). *Recombinant DNA*. 2<sup>nd</sup> Ed. Scientific American Books, WH Freeman and Co, New York.
6. Primrose SB and Twyman RM. (2013). *Principles of Gene Manipulation and Genomics*. 7<sup>th</sup> Ed. Blackwell Scientific Publications, New York.

**MIM 5523****Immunotechniques & Immunotechnology****6Hrs/5Cr**

The course deals with the principles, procedures and applications of advanced immunological tools and techniques. The immunological techniques include detection and testing of antigens and antibodies, complement and cellular assays. A section on experimental animal models is included. Immunotechnology includes methods in the production of monoclonal, recombinant antibodies, their applications in clinical diagnosis and treatment. Conventional and modern strategies in vaccine development and their applications are also dealt with.

**Specific Learning Outcome:**

Upon successful completion of this course, students will be able to

- perform and understand the mechanism behind serological assays
- learn the types and principles of effector cell assays and immunofluorescence techniques
- comprehend experimental animal models, systems and vaccine technology
- gain knowledge in techniques involved in synthesis of monoclonal antibodies
- understand the genetic engineering and biotechnological strategies behind recombinant antibodies
- appreciate the applications in clinical diagnosis and treatment

**I. Serological assays:** Precipitation-double immunodiffusion, Radial immunodiffusion – Immunoelectrophoresis and other types. Agglutination – direct, viral, haemagglutination, passive; reverse passive agglutination – column agglutination technology, agglutination inhibition. Immunochromatography, evaluation of complement, complement components in disease, complement fixation test. ELISA, RIA and Immunoblotting.

**II. Effector cell assays and conjugation techniques:** Assays for human lymphocytes and monocytes – T & B lymphocyte assays- flow cytometry-lymphocyte activation, mixed lymphocyte culture & cell mediated lympholysis – Enumeration of NK cells, monocyte, macrophage assays – neutrophil functional assays. Antibody labelling- radioisotopes-enzymes and fluorochromes, avidin- biotin conjugation and protein A & G.

## MIM 18

**III. Experimental animal models, systems and immunofluorescence techniques:** Inbred strains – strategies in developing inbred strains – types – adoptive transfer systems – SCID mice and SCID human mice – Gene targeted knock out mice – Inducible gene targeting – the cre/lox system. Immunofluorescence – Direct, indirect, transmitted and epi-illumination fluorescence microscopy.

**IV. Monoclonal antibodies:** MAb through hybridoma technology production strategies – enrichment techniques – applications – nomenclature of MAbs: Rabbit monoclonal antibodies – advantages: humanizing monoclonal antibodies – HamA, HAcA and RHAs

**V. Recombinant antibody fragments:** Production strategies – display systems – expression system: types – catalytic antibodies (abzymes) – immunotoxins – chimeric antibodies – bispecific antibodies – single chain FV – diabodies – tetrabodies – intrabodies, plantibodies – plastibodies – applications.

### Textbook:

1. Sheehan C. (1997). *Clinical Immunology*. 2<sup>nd</sup>Ed. Lippincott Williams and Wilkins NY.

### References:

1. Goldsby RA., Kindt TJ and Osborne BA. (2013). *Kuby Immunology*. 4<sup>th</sup>Ed. WH Freeman New York.
2. Kontermann R and S Dubel. (2001). *Antibody Engineering*. Springer, Germany

## MIM 5225 Lab. in Immunotechniques and Molecular Biotechnology 3Hrs/2Cr

In the laboratory component students are introduced to the various tools and techniques that form the basis for the antigen-antibody assays and cellular assays. A special emphasis is given to the strategies for producing immunodiagnostic kits.

### Specific Learning Outcome:

Upon successful completion of this course, students will be able to

- perform immunodiffusion and immunoelectrophoresis experiments
- do complement fixation test and cellular assays
- demonstrate ELISA, western blot and immunodiagnostic tests

### List of Experiments:

1. Ouchterlony Double Immuno Diffusion (ODI) – Single Radial Immunodiffusion (SRID)
2. Immunoelectrophoresis – isolation and characterization of serum albumin
3. Rocket immunoelectrophoresis – semi quantitative analysis of antigen
4. Separation of T & B lymphocytes and identification of T cells
5. Microlymphocytotoxicity assay
6. DOT ELISA & Western Blot
7. Immunodiagnostic tests- RPR, WIDAL, VDRL
8. Isolation of plasmids & check by AGE
9. Transformation by CaCl<sub>2</sub> method- Competent cell preparation and blue-white screening



10. Screening of recombinants - (a) by antibiotic resistance (b) by blue-white screening
11. Restriction digestion
12. Southern blotting
13. PCR – demonstration

#### References:

1. Garvey JS, Cremer NE and DH Sussdorf. (1977). *Methods in Immunology*. 3<sup>rd</sup> Ed. Benjamin Cummings Pub Co, Massachusetts, USA.
2. Hudson L and FC Hay. (1989). *Practical Immunology*. 3<sup>rd</sup> Ed. Blackwell Science Pub, Oxford.
3. Myers RL.(1989). *Immunology – A Laboratory Manual*. Wm C Brown Pub, Dubuque, Iowa. USA.
4. Das, S. and Dash, H.R.(2014). *Microbial Biotechnology-A Laboratory Manual for Bacterial Systems*. Springer.
5. Clark, M.S. ed., 2013. *Plant molecular biology—a laboratory manual*. Springer Science & Business Media.

#### MIM 5527

#### Animal Cell Culture

6Hrs/5Cr

This course intends to provide students with basic cell culture methods and bioprocessing technology. The students will be taught with various aseptic techniques and environment, media and supplements for cell culture. The disaggregation of tissue, primary cell culture techniques, maintenance of the culture will be given due importance. The cloning and selection of specific cell types with special reference to cells of the immune system and their culturing method, substrate for the cell culture will be dealt. Cloned specific cells line induction and the bioreactors types and their uses in the industry will also be dealt. Apart from the culturing techniques and method, commercial useful products through microbes will also be mentioned.

#### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- explore the biology of cultured cells in terms of adhesion, proliferation, differentiation
- identify different culture vessels, substrates, media and serum free media used in cell culture
- demonstrate the techniques of primary explants, monolayer culture, and cell line characterization
- acquire knowledge on the wide applications of animal cell culture
- understand the characterization of cell line on basis of differentiation and immortalization
- comprehend the microscopic, cell separation and viability techniques of cell culture

**I. Introduction to Animal Cell Culture:** History, Advantages and disadvantages, types of tissue culture; Biology of cultured cells - cell types, adhesion, proliferation, differentiation, signaling, evolution, senescence, transformation; laboratory design; equipment and materials; aseptic technique; safety and bioethics

## MIM 20

**II. Culture Media and Vessels:** Culture vessels and substrates, specialized systems; Media, supplements, physico-chemical properties— serum and serum free media; preparation and sterilization; Common microbial contaminants in cell culture – sources, types, monitoring, disposal of contaminated cultures, eradication, Cross-contamination

**III. Primary culture and routine maintenance:** Primary culture – types, initiation and isolation of the tissue; subculture- propagation, choice of cell line, routine maintenance, methods - Cloning – types - dilution cloning, suspension cloning, isolation of clones - methods; isolation of genetic variants, interaction with substrate.

**IV. Induction of differentiation and the transformed phenotype:** Differentiation – in vivo expression, proliferation, commitment and lineage, stem cell plasticity, markers and induction of differentiation, transformation and immortalization – role in cell line characterization –genetic instability– aberrant growth control – tumorigenicity.

**V. Techniques used in cell culture:** Cryopreservation, Quantitation –confocal microscopy, cell counting- cell proliferation – plating efficiency. Cytotoxicity – viability, toxicity and survival – application of cytotoxicity assay – cell separation – antibody based techniques, Specialized techniques - lymphocytes preparation – autoradiography.

### Textbook

1. Freshney, RI. (2016). *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications*. Wiley-Blackwell.

### References

1. Mather, JP.& Barnes, D. (1998). *Methods in cell biology. Volume 57: Animal cell culture methods*. Academic press.
2. Sinha, BK.& Kumar, R. (2008). *Principles of Animal Cell Culture: Students Compendium*. IBDC.
3. Butler, M. (2003). *Animal cell culture and technology*. Taylor & Francis.
4. Davis, JM. (Ed.). (2011). *Animal Cell Culture: Essential Methods*. John Wiley & Sons.

## MIM 5229

### Lab. in Animal Cell culture

3Hrs/2Cr

This is a supportive course on cell culture and bioprocess technology. In cell culture part, preparation of media for animal cell culture with special emphasis on the cells of the immune system.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- acquire knowledge in preparing animal cell culture media
- establish, maintain and sub culturing of animal cells
- gain hands on practice in primary explants and cell culture preparation
- identify the monolayer & suspension culture and their viability

**List of Experiments:**

1. Aseptic and Sterilization techniques
2. Preparation of media for animal cell culture
3. Primary explants culture from chick embryo
4. Primary culture of lymphoid cells
5. Primary culture of chick organ
6. Disaggregation of tissue – Physical method
7. Disaggregation of tissue – Enzymatic method
8. Primary cell culture – Monolayer Cells
9. Primary cell culture – Suspension Cells
10. Sub culturing technique/Secondary cell culture method.
11. Lymphocytes response to mitogen
12. Cell counting and viability – Trypan blue dye exclusion test, MTT, DAPI staining
13. Visit to cell culture institutes

**References:**

1. Freshney RI. (2016). *Culture of Animal Cells. A Manual of Basic Techniques*. 2<sup>nd</sup> Ed. Alan R. Liss Inc, New York.
2. Harrison, MA. & Rae, IF. (1997). *General Techniques of Cell Culture*. Cambridge University Press.

**MIM 5531****Bioinformatics and Biostatistics****6Hrs/5Cr**

This course provides a theoretical as well as practical approach towards learning bioinformatics and Biostatistics. It comprises the basics of molecular biology, evolution and genomic tools required to understand bioinformatics concepts better. It deals with the emergence of bioinformatics as a field, its datatypes, data retrieval, databases, sequence alignment, gene and protein structure prediction and molecular phylogeny tools. Biostatistics component is designed to impart a fundamental knowledge on data, scales of measurement, sources and acquisition; organization and presentation of data; descriptive statistics and inferential statistical procedures.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- recollect the history and the evolution of bioinformatics as a field
- know basic concepts in storage, submission, retrieval of data and data formats
- apply the fundamental tools in the field of sequence analysis, and phylogeny
- understand the mechanisms of protein sequence, and structure analysis
- convey the fundamental concepts of molecular docking and drug design
- categorize the types of data, present them graphically
- apply biostatistics techniques like ANOVA to their data

**I. Introduction to bioinformatics:** - History: Margaret Dayhoff, Richard Eck, Robert Ledley; bioinformatics - definition, goals - technical toolbox; collecting and storing sequences - DNA sequencing, submission of sequences to the databases, computer storage of sequences, sequence formats; archives and information retrieval –databases indexing – format – search - retrieval systems, and genome browsers.

**II. Nucleotide analysis and Phylogeny:** Sequence Retrieval, Primer Designing, Editing Sequence Data, Sequence Assembly—CAP3 Program, Restriction Mapping Using NEBcutter, Gene Prediction Using ORF Finder, Gene Prediction Using FGENESB, Dot-Plot, Global and Local Sequence Alignment, BLAST - Interpreting Result; Multiple Sequence Alignment: T-Coffee, MUSCLE, MAFFT, Multiple Sequence Alignment and Phylogenetic Analysis Using MEGA; RNA Analysis - Predicting RNA Secondary Structure, Finding Repeats.

**III. Protein Sequence and structure analysis:** Protein Sequence Retrieval; Predicting Signal Peptides, Transmembrane Segments, Subcellular Location; Protein BLAST (blastp), (PSI)-BLAST, (PHI)-BLAST, (DELTA-BLAST); CASP; Protein Primary, Secondary, and Tertiary Structure Analysis—ProtParam, SOPMA, PSIPRED, Homology Modelling - SwissModel, Threading (Fold Recognition); ROSETTA, LINUS; Protein Tertiary Structure Analysis – RAMPAGE, SAVeS; Protein Structure Visualization – RasMol, PyMol, Protein Structure Alignment/Superimpose Using SuperPose, Protein Cleft Analysis; Protein–Ligand Interactions - AutoDock4.1 and MGLTools, ClusPro2.0; Drug discovery and development.

**IV. Introduction to biostatistics:** understanding data, data types, sources, population, sample, sampling methods, scales of measurement – nominal, ordinal, interval and ratio scales - Organizing and presenting data – raw data, organizing – arranging, grouping; tabulation and graphical representation – pie charts, bar charts, column graphs, histograms, Ogive curves, stem-leaf diagram, box plot – properties.

**V. Descriptive statistics:** measures of dispersion/central tendency – mean, median and mode; measures of spread/dispersion – range, mean deviation, inter quartile range, variance, standard deviation and standard error, distribution. **Inferential statistics:** – chi-square test/goodness of fit; Spearman's rank correlation, Karl Pearson's correlation and regression, student's t-test paired & pooled; introduction to ANOVA (one way).

**Textbooks:**

1. Lesk, A. (2014). *Introduction to bioinformatics*. Oxford university press.
2. Paulson, D. S. (2008). *Biostatistics and microbiology: a survival manual*. Springer Science & Business Media.

**References:**

1. Choudhuri S. (2014). *Bioinformatics for beginners: genes, genomes, molecular evolution, databases and analytical tools*. Elsevier.
2. Ibrahim KS., Gurusubramanian G., Zothansanga YR., Yadav RP., Kumar NS., Pandian SK., & Mohan S. (2017). *Bioinformatics-a Student's Companion*. Springer.
3. Mount, D. W. Bioinformatics: sequence and genome analysis. (2004). *Bioinformatics: Sequence and Genome Analysis*. Cold Spring Harbor Laboratory Press
4. Singh, G. B. (2015). *Fundamentals of Bioinformatics and Computational Biology*. Springer International Publishing.
5. Rosner B. (2015). *Fundamentals of biostatistics*. Nelson Education.

**MIM 5422 Environmental and Agricultural Microbiology****5Hrs/4Cr**

The objective of this course is to educate the students on environmental and agricultural microbiology. Environmental microbiology includes ecology of microbes, biogeochemical cycles, biodegradation, bioaccumulation and bioremediation. In agricultural microbiology, comprehensive role of microbes as biofertilizers, biopesticides, plant growth promoting agents, plant pathogens will be dealt in detail.

**Specific Learning Outcome:**

Upon successful completion of this course, student will be able to

- understand the role of microorganisms in the organization and processes of the biosphere
- learn the principles behind elemental cycles and ecological interactions
- distinguish different microbiological habitats and niches
- identify the microbial ecology of different biomes and biotopes
- learn the applications of microorganisms in agricultural microbiology
- acquire knowledge of techniques and equipments in environmental sample collection, processing and storage

- I. Basics of Microbial Ecology:** biosphere organization; nature, energy and nutritional flow in ecosystems; ecological interactions; biogeochemistry – atmospheric cycles – carbon, nitrogen; sedimentary cycles - water, phosphorus, sulfur; techniques - environmental sample collection and processing techniques; measurements of microbial biomass - primary production, respiration, predation and enzymatic activities.
- II. Soil and Aeromicrobiology:** Earth environment – soil functions, physicochemical properties, types, rock and subsurface, rock varnish, cave, deep subsurface habitats; and air – aerosol, nature and control of bioaerosols, aeromicrobiological pathway, microbial survival in the air, extramural and intramural aeromicrobiology.
- III. Aquatic Microbiology:** aquatic environments - microbial habitats - physical and chemical characteristics; planktonic and benthic microbes, biofilms and microbial mats; aquatic microbial lifestyles – primary and secondary production; marine environments; freshwater environments - springs, streams and rivers, lakes; others - brackish, hypersaline, subterranean waters, wetlands; extreme environments - low and high temperature, geothermal hot springs, desiccation, UV stress, aphotic environments, deep-sea hydrothermal vents, acid mine drainage system, desert carbonate cave
- IV. Applied Environmental Microbiology:** water quality and fecal contamination - microbial source tracking; Wastewater treatment; microbial fuel cells and Biogas, bioremediation and biodegradation – technology, biofarming; bioremediation of organic compounds and inorganic pollutants, degradation of hydrocarbons, xenobiotics, microbial weathering and biomineralization

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- V. **Agricultural Microbiology:** plant – microbe interaction - rhizosphere – mycorrhizae, nitrogen-fixing bacteria, plant growth promoting bacteria; phyllosphere associated microorganisms; interactions with pathogens; biocontrol of pests and pathogens; Biofertilizers – Vermicomposting, Agroforestry

### Textbooks:

1. Pepper, I. L., Gerba, C. P., Gentry, T. J., & Maier, R. M. (Eds.). (2011). *Environmental microbiology*. Academic Press.
2. Barton, L. L., & Northup, D. E. (2011). *Microbial ecology*. Wiley-Blackwell.
3. Bagyaraj, D. J., & Rangaswami, G. (2007). *Agricultural microbiology*. PHI Learning Pvt. Ltd.

### References

1. Black, J. G. (2014). *Microbiology: principles and explorations*. John Wiley & Sons.
2. Tortora, G. J., Funke, B. R., & Case, C. L. (2018). *Microbiology: An Introduction*. Pearson.
3. Subba Rao NS. (2000). *Soil Microbiology*. 4th Ed. Oxford & IBH, New Delhi.

## MIM 5224 Lab. in Environmental and Agricultural Microbiology 3Hrs/2Cr

The objective of this course is to give practical experience in understanding the principles of environmental and agricultural and veterinary microbiology. Experiments in environmental microbiology deals with the survey and monitoring of pathogens, analysis of effluents for their biochemical characters that helps in their treatments. Agricultural microbiology experiments are designed to enrich the students a practical knowledge in the isolation, identification and mass production of biofertilizers and biopesticides.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- study microbial interactions
- investigate physicochemical properties of soil and water samples
- isolate and enumerate microbial populations from soil, water and air
- identify biodegradation of pollutants
- isolate and enumerate microorganisms involved in plant rhizosphere

### List of Experiments:

#### A. Microbial Ecology

- a. Demonstration of associative activities of bacteria: Competition and antagonism
- b. Soil biofilm

#### B. Soil Microbiology

- a. Winogradsky Column
- b. Determination of the soil pH and soil water content by dry-weight analysis
- c. Enumeration and examination of soil microorganisms via dilution plating and contact slide assay
- d. Isolation of saccharolytic, proteolytic and lipolytic bacteria from soil
- e. Enrichment and isolation of bacteria that decolorize dyes
- f. Adaptation of soil bacteria to metals and pesticides

- C. Water Microbiology
- Determination of dissolved oxygen (DO), Chemical oxygen demand (COD) and Biochemical oxygen demand (BOD) of water
  - Quantitative Analysis of Water: Coliform MPN Test and Membrane Filter Method
  - Isolation of *Escherichia colibacteriophages* from sewage and determining bacteriophage titers
- D. Aeromicrobiology
- Determination of air microflora and Index of Microbial contamination of air (IMA)
- E. Agricultural Microbiology
- Isolation and identification of *Rhizobium*, *Azospirillum*, phosphobacteria and *Azotobacter* from soil
  - Observation of mycorrhizal fungi
  - Screening for plant growth promoting traits

### References:

- Gerba, C. P., Josephson, K., & Pepper, I. L. (2011). *Environmental microbiology: A laboratory manual*. Elsevier.
- Pollack, R. A. (2011). *Laboratory exercises in microbiology*. Wiley Global Education.
- Aneja, K. R. (2003). *Experiments in microbiology, plant pathology and biotechnology*. New Age International.
- Tiwari, R. P., Hoondal, G. S., & Tewari, R. (2008). *Laboratory techniques in microbiology and biotechnology*. Global Media.

**MIM 5426**

**Food and Industrial Microbiology**

**5Hrs/5Cr**

This course deals with the basics of food, their composition and factors responsible for spoilage. Emphasis will be given to preservative methods, their merits, contamination, preservations and spoilage of various foods. It also provides knowledge about food borne diseases. Equal importance is given to the basic concepts of fermentation, isolation, improvement of microbes, designing of media, fermenter and their types. This course also highlights the recovery of products and production of fermented foods and other products.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- gain knowledge about the basic concepts of food composition and its properties
- learn the principles and techniques of preservation and preservatives
- understand the contamination, preservation and spoilage about various foods
- know about the fermentation, fermenters and recovery of products
- comprehend the mechanisms behind recovery of fermented products
- appreciate the role of microorganisms in the production of fermented food products

- Food and its preservation:** Classification of foods; composition of food – intrinsic and extrinsic factors; Principle methods of preservation – asepsis – removal – anaerobic conditions – Uses of high temperature and low temperature – Drying – radiation – food additives – antimicrobials – inorganic and organic and developed preservatives.

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- II. **Contamination and spoilage of foods:** Vegetables and fruits, meat and meat products, fish and other sea foods, egg and poultry, cereals and its products, milk and milk products – food borne diseases – Bacterial, fungal and viral
- III. **Fermentation technology:** Isolation, preservation and improvement of industrially important microorganisms – formulation of media – fermenter design – control of temperature, pH and foam – Computer applications in fermenter. Types of fermenter – Batch, continuous and air lift fermenter.
- IV. **Downstream process:** Recovery of fermented products – separation – centrifugation, chromatography, filtration and flocculation – Extraction - Purification – concentration – precipitation, ultra-filtration and reverse osmosis – Drying and Crystallization.
- V. **Fermented foods and other products:** SCP – beverages – pickles – Sauerkraut – cheese – yogurt - bakery products - antibiotics – enzymes – organic acids – amino acids and vitamins - probiotics

### Textbooks:

1. Doyle MP, Beuchat LR and TJ Montville. (2012).*Food Microbiology: Fundamentals and Frontiers*. 4<sup>th</sup> Ed. ASM Press, Washington DC.
2. Patel AH. (2012).*Industrial Microbiology*. 2<sup>nd</sup>Ed. Macmillan India Limited.

### References:

1. Frazier WC and DC Westhoff. (2013).*Food Microbiology*. 4<sup>th</sup> Ed. Tata McGraw Hill, New Delhi.
2. Adams K. (2000).*Food Microbiology*. 2<sup>nd</sup>Ed. Panima, New Delhi.
3. Stanbury, PF., Whitaker, A. and Stephen JH. (2003).*Principles of Fermentation Technology*. 2<sup>nd</sup> Ed. Butterworth-Heinemann Elsevier Ltd, Oxford, United Kingdom.

## MIM 5228

### Lab.in Food and Industrial Microbiology

3Hrs/2Cr

This lab courses provides the microbial analyses and grading of various foods such as bakery foods, beverages and soft drinks, pickles, confectioneries, eggs and milk and its products. This course will train the students to examine microbes from spoiled foods. Preparation of wine and immobilization technique will also be covered in this course.

### Specific Learning Outcome:

Upon successful completion of this course, student will be able to

- analyze different kinds of foods
- identify microorganisms from spoiled foods
- gain information about fermentation and immobilization

### List of Experiments:

1. Microbial analyses of bakery products.
2. Microbial analyses of carbonated beverages and soft drinks.
3. Microbial analyses of pickles
4. Microbial analyses of confectioneries
5. Microbial examination of eggs



6. Microbial analyses of milk and milk products.
7. Grading of milk quality using Methylene Blue Reduction Test
8. Analysis of fruits and vegetable spoilage by survey method
9. Examination of microorganisms from spoiled foods
10. Production of wine by anaerobic fermentation
11. Immobilization of yeast and bacteria
12. Crowded plate technique for screening antibiotic producing microorganisms
13. Visit to food industries

**Reference:**

1. Cappucino R. (2017). *Microbiology – A Laboratory Manual*, 6<sup>th</sup> Ed. Benjamin/Cumming Publication Co, California

**MIM 5530**

**Vaccinology**

**4Hrs/5Cr**

The concept of vaccines and their application have saved, and continue to save millions of people across the world from many dreaded diseases like small pox and polio. This course gives a comprehensive account of basis and purpose of vaccination tracing the origin and development of various kinds of vaccines from whole cell vaccines through DNA, edible and designer vaccines. The challenges faced by vaccinologists in developing vaccines against AIDS and tropical diseases like malaria & leprosy are given due emphasis. Fertility control and Veterinary vaccines are also included. Passive immunization with preformed antibodies, their prophylactic and therapeutic effects are also to be discussed.

**Specific Learning Outcome:**

Upon successful completion of the course, students will be able to

- understand the basic concept and types of immunization
- know the characteristics of an ideal vaccine and the process of vaccine development
- comprehend the evolution of diverse types of vaccines available in the market
- learn the methods of killed and attenuation vaccine
- study the modern vaccines against aids, malaria & leprosy
- gain information about antifertility vaccine development and passive immunization

1. **Introduction to vaccines:** Principles and purpose of vaccination, historical milestones, types of immunization, characteristics of an ideal vaccine, vaccine development. Factors affecting efficacy of vaccines, vaccine delivery systems – microbial- and material- based.
2. **Whole and Non whole cell vaccines:** Killed vaccines - heat, formaldehyde, radiation; live attenuated vaccines - methods of attenuation; relative merits of killed and attenuated vaccines. Macromolecules as vaccines - polysaccharides, toxoids, recombinant proteins; recombinant vector vaccines - viral and synthetic peptide vaccines and anti-idiotypic vaccines - methods of development, multivalent sub unit vaccines - micelle, liposome and ISCOM.
3. **Modern vaccines:** Recombinant vector vaccines - viral, bacterial vectors; DNA vaccines - advantages, issues; edible vaccine - advantages - selection of plant (criteria). AIDS vaccines - problems, challenges in development of vaccines, vaccines against leprosy, tuberculosis and malaria. Veterinary vaccines- Vaccines against viral, bacterial and parasitic infections in cattle, dogs and poultry; fish vaccines - vaccination methods and their relative merits.

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4. **Vaccines for control of fertility:** Anti HCG vaccines - natural and synthetic; antisperm antigen vaccines. Challenges and issues.
5. **Passive immunization:** Natural passive immunization - transplacental, colostrum; artificial passive immunization - passive antibody therapy, serum therapy, monoclonal and polyclonal preparations. Human immune serum globulin, indication and precautions on use of immunoglobulin therapy.

### Textbooks:

1. Talwar GP, Rao KVS and Chauhan VS. (1994). *Recombinant and synthetic vaccines*, Narosa, New Delhi
2. Plotkin, Stanley A., et al. *Plotkin's Vaccines*. Elsevier, 2018.
3. Milligan, GN. & Barrett, AD. (2014). *Vaccinology: An essential guide*. John Wiley & Sons.

### References:

1. Benjamini E, Coico R and Sunshine G (2000). *Immunology a short course*. 4<sup>th</sup> Ed. Wiley-Liss Publication, NY.
2. Owen JA, Punt J and Stranford SA. (2013). *Kuby Immunology*. 7<sup>th</sup> Ed. WH Freeman and Company, New York.
3. Outteridge PM. (1985). *Veterinary Immunology*. Academic Press, London.
4. Morrow, WJW., Sheikh, NA., Schmidt, CS., & Davies, DH. (Eds.). (2012). *Vaccinology: principles and practice*. John Wiley & Sons.

## MIM 5732

## Research Project

9Hrs/7Cr

This course aimed at orienting students towards research methodology and to do independent research work. The students will do experiments individually after designing them by standard statistical procedures followed by critical interpretation and drawing valid conclusions. The research project is evaluated at the end of the fourth semester.

**DEPARTMENT OF FOOD SCIENCE & NUTRITION**  
**M.Sc. FOOD SCIENCE**  
**Proposed Curriculum Plan (2018-2019)**

Semester	Course Code	Course Title	Hours	Credits	Marks
<b>I</b>	PFS 4401	Food Science	6	4	80
	PFS 4403	Food Chemistry	6	4	80
	PFS 4305	Food Microbiology	5	3	60
	PFS 4407	Principles of Food processing and Preservation	6	4	80
	PFS 4309	Laboratory - Food Chemistry and Food Microbiology	3	3	60
	PFS 4311	Functional foods and Nutraceuticals	4	3	60
		<b>Total</b>	<b>30</b>	<b>21</b>	<b>420</b>
<b>II</b>	PFS 4402	Advances in Food Science	6	4	80
	PFS 4404	Sensory evaluation of Processed Foods	6	4	80
	PFS 4406	Technologies of Fruits and Vegetables	6	4	80
	PFS 4308	Research methodology and biostatistics	5	3	60
	PFS 4310	Laboratory - Advances in Food Science	3	3	60
	PFS 4315	Obstetrics and Neo Natal Nutrition	4	3	60
			<b>Total</b>	<b>30</b>	<b>21</b>
		Summer Internship			
<b>III</b>	PFS 5501	Food Analysis, Safety and Food Laws	6	5	100
	PFS 5503	Dairy Technology	6	5	100
	PFS 5405	Food Packaging	6	4	80
	PFS 5407	Food Biotechnology	6	4	80
	PFS 5309	Laboratory - Food Analysis and Food Biotechnology	3	3	60
	PFS 5311	Project work	3	3	60
		<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>
<b>IV*</b>	PFS 5502	Clinical nutrition and diet therapy	6	5	100
	PFS 5302	Laboratory – Clinical nutrition and diet therapy	4	3	60
	PFS 5504	Technologies of Meat and poultry	6	5	100
	PFS 5304	Laboratory – Technologies of meat and poultry	4	3	60
	PFS 5506	In-Plant Training	6	5	100
	PFS 5306	In-Plant Training	4	3	60
	PFS 5508	Technologies of cereals and legumes	6	5	100
	PFS 5308	Laboratory - Technologies of cereals and legumes	4	3	60
	PFS 5810	Project report	10	8	160
		<b>Total</b>	<b>30</b>	<b>24</b>	<b>480</b>

\* (Any two)

**Courses offered by the Department of Food sciences to Non-Major Students:**

**Buffer Courses**

<b>SEM</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Hrs.</b>	<b>Cr</b>	<b>Marks</b>
I	PFS 4313	Food Service Management	4	3	60
II	PFS 4317	Ethnic foods	4	3	60
<b>Total</b>			<b>8</b>	<b>6</b>	<b>120</b>

PFS 4401

FOOD SCIENCE

(6h/wk) (4cr)

This course on Food Science deals with sensory science and various food products such as cereal, legumes, fats and oil seeds, fruits, vegetable and dairy products, poultry, meat and marine foods and confectionery products.

**UNIT 1. Introduction to Food Science:** Food science - aims and scope - branches. Water - properties, biological importance, activity and role in food processing & preservation. Dietary sources - Constituents of foods - Quality factors in food - Quality standards -Government regulation of food supply and labeling - Federal food, drug and cosmetic act - Additional food laws - Legal categories of food substances - food additives and color additives - International food standard and Codex Alimentarius.

**UNIT 2. Cereals, Millets, Fats and Oil Seeds** Rice: Composition, primary and secondary processing-raw and boiled rice. Millets: Types, composition, processing. Legume: Types, composition, milling, germination, cooking & processed products. Oilseeds: Use of oilseeds and oilseed meals, sunflower and gingelly oil- composition-processing.

**UNIT 3. Fruits and vegetables:** Fruits and vegetables: Composition, pectin, plant acids, types of pigments, effect of cooking on colour and texture of vegetables. Dairy and Dairy Products-Milk and milk products: Composition, functionality in food system, processing of different products like ghee, butter, milk powders, khoa, paneer, cheese, milk products and ice creams.

**UNIT 4. Poultry, Meat and Marine Foods:** Eggs - Quality grading, structure, composition, functional properties and products. Flesh foods - Types, composition, structure of muscle, and conversion of muscle to meat - physicochemical changes, cooking and processing. Marine foods - Types, composition, cooking and processing.

**UNIT 5. Confectionery:** Sugar and Jaggery: Principles of sugar crystallization, stages of cookery and role in Indian traditional sweet preparations, manufacturing of candies and sweets

**Text Book:**

1. Meyer, I.H. Food Chemistry. Reinhold Pub. Corpn., New York, Charles R. Turtle Co., Tokyo, [1960].

**References:**

1. Deman, J. M. Principles of Food Chemistry, AVI Publishing Company, [1980].
2. Stryer L. Biochemistry, 4th Ed. W. H. Freeman and Company, [1995].
3. Stanier R Y and others. General Microbiology, Macmillan, India.[1986]
4. Frazier and Westhoff. Food Microbiology.3rd Ed. Tata McGraw Hill, [1978].

Theory course on Food chemistry includes introduction, methods of analysis, chemistry of carbohydrates, amino acids, proteins, lipids, plant pigments and essential oils.

**UNIT 1. Introduction to chemistry of foods:** composition and factors affecting the composition of foods, Proximate Composition of Foods; Instrument and methods used in food analysis, Colorimetry, Spectrophotometry, Fluorimetry, Atomic absorption spectroscopy and Chromatographic methods

**UNIT 2. Carbohydrates:** occurrence and classification; structure determination, diagrammatic representation of isomers, sugar derivatives; caramelization; Chemistry of cellulose, starches and other polysaccharides; starch degrading enzymes; commercial sources gel formation and starch retrogradation; pectic substances: their occurrence, structure, properties and use in foods; gums, mucilages and their commercial sources. Metabolism of carbohydrates.

**UNIT 3. Amino acids and proteins:** classification of proteins, chemical and physical properties of proteins, structure of proteins and techniques used in elucidation of protein structure; denaturation of proteins; forces involved in protein conformation, functional properties of proteins in foods, hydrolysis of proteins, major food proteins and their sources; changes in proteins during processing- Metabolism of proteins.

**UNIT 4. Lipids and plant pigments:** chemistry, occurrence, classification and composition; physical and chemical properties of fats. Emulsions-types of emulsions, emulsifying agents; metabolism of lipids. Plant pigments: their occurrence, chemistry, functions and changes during processing, Plant acids, acid and taste relationship; Essential oils: Chemistry, occurrence and extraction; Terpeneless oils and their use in foods

**UNIT 5. Enzymes:** Classification, nomenclature, general properties, mechanisms of enzyme action, regulation of enzyme activity. Role of Coenzymes and cofactors in enzyme activity. Factors affecting enzyme activity Enzyme inhibition, Isoenzymes, immobilized enzymes, clinical significance of enzyme assays.

**Text Book:**

1. Owen R. Fennema (1996) Food Chemistry Third Edition Marcel Dekker, Inc. New York.

**References:**

1. H.D.Belitz, W.Grosch, P.Schieberle (2009) Food Chemistry 4<sup>th</sup> revised and extended edition Springer publishers.
2. Potter, N.N. and Hotchikiss, J.H. (2006), Food Sciences, Fifth edition, CBS publishers and Distributors, New Delhi.
3. Fennema, O.R, 2006, Food Chemistry, Academic Press.
4. Meyer, L.H. 1987. *Food Chemistry*. CBS publishers and Distributors, New Delhi.

PFS 4305

FOOD MICROBIOLOGY

(5h/wk) (3cr)

This course provides information on basic microbiology, food spoilage and preservation, food borne bacterial and viral diseases and food borne parasitic diseases. It also provides information on use of microorganisms in food preparation.

**UNIT 1. Overview of Basic Microbiology** An introduction to microbial world: Bacteria, Fungi, Yeast, Viruses Importance and significance of microorganisms in food science - Factors affecting the growth of microorganisms in food - Intrinsic and extrinsic factors that affect microbial growth.

**UNIT 2. Food Spoilage and Preservation** Definition, sources of contamination and microorganisms involved in spoilages of various foods: Milk, Bread, Canned food, Vegetables and fruits, Fruit juices, Meat, Eggs and Fish Physical and chemical means used in destruction of microbes: Definition of sterilization and disinfection, Thermal- role of heat, pasteurization, Non-thermal- filtration and radiation in sterilization, use of chemical agents- alcohol, halogens and detergents.

**UNIT 3. Food Borne Bacterial and Viral Diseases** Bacterial food borne diseases (*Staphylococcal* in toxification, Botulism, Salmonellosis, Shigellosis, Enteropathogenic *Escherichia coli* Diarrhoea, *Clostridium perfringens* gastroenteritis, *Bacillus cereus* Gastroenteritis) Food Borne Viral Pathogens (Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus). Preventive and control measures.

**UNIT 4. Food Borne Parasitic Diseases** Food Borne Animal Parasites Protozoa – Giardiasis, Amoebiasis, Toxoplasmosis, Sarco cystosis, Crypto sporidiosis, Cysticercosis/Taeniasis. Roundworm – Trichinosis, Anisakiasis Mycotoxins: Aflatoxicosis, Deoxyvalenol Mycotoxicosis, Ergotism. Preventive and control measures.

**UNIT 5. Microorganisms and Food Preparation** Fermentation process-kinetics of fermentation process. Prebiotics-Probiotics and single cell proteins. Dairy products (cheese and yoghurt) and traditional Indian fermented foods and their health benefits. Fermented Beverages- wine, beer, toddy and vodka.

**Text Book:**

1. Frazier Food Microbiology 4<sup>th</sup>edi. Tata McGraw-Hill Education.

**References:**

1. James Jay, Loessner, Martin J., Golden, David A., Modern Food Microbiology - Springer publishers
2. Bibek Ray & Arun Bhunia Fundamental Food Microbiology, Fifth Edition CRC Press
3. M. R. Adams, M. O. Moss Food Microbiology Royal Society of Chemistry,

**PFS 4407 PRINCIPLES OF FOOD PROCESSING AND PRESERVATION (6h/wk) (4cr)**

This theory course on Food processing and preservation includes principles of food storage, processing and preservation by heat and water removal. It also includes cold preservation, preservation of food by irradiation, chemical and Nonthermal methods.

**UNIT 1. Pre and post-harvest processing:** Nature of harvested crop, plant, animal products. Maturity index-assessing the maturity index of different crops. storage of grains, storage conditions, effect of cold storage and quality

**UNIT 2. Processing and Preservation by Heat and Water Removal:** Blanching, pasteurization, sterilization and UHT processing, canning, extrusion cooking, dielectric heating, microwave heating, baking, roasting and frying. Retort processing of Ready to eat (RTE) products. Drying – water activity, microbial spoilage due to moisture. Dehydration of fruits, vegetables, milk- freeze drying.

**UNIT 3. Cold Preservation:** Mechanism of action, effect on food and micro-organisms refrigeration, freezing- methods of freezing, chilling injuries, defects in cold storage- psychrotrophs, cryopreservation- refrigerated gas storage.

**UNIT 4. Food Irradiation and Chemical Preservation:** Technology, application and safety assessments, legal aspects for UV, IR and gamma irradiation. Effects on food and microorganisms. Chemicals in food preservation, safety of preservatives, GRAS and permissible limits for chemical preservatives. Food additives; Definition, types and functions, permissible limits and safety aspects. Merits and demerits.

**UNIT 5. Processing and Preservation by Non-Thermal Methods**

High pressure, pulsed electric field, ultra sound, Cold plasma technology, Use and application of enzymes and microorganism in processing and preservation of foods; food fermentations and pickling.

**Text Book:**

1. Chakraverty, A. 1988. Postharvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.

**References:**

1. Girdhari Lal, Siddappa, G.S. and Tandon, C.L. "Preservation of Fruits and Vegetables". ICAR, New Delhi. [1967].
2. Potter. Food science, 2nd Edition, AVI Publishing Company, [1973].
3. Norman W. Desrosier and Donald K. Tressler, Fundamentals of food freezing, AVI publishing company [1977].
4. Ranganna, S. Hand book of analysis of quality control for fruit and vegetable products. Second edition, Tata McGraw Hill Pub. Co., New Delhi [1986].



**PFS 4309      LAB - FOOD CHEMISTRY AND MICROBIOLOGY      (3h/wk) (3cr)**

Laboratory course on Food Chemistry and microbiology includes exercises such as basic analytic techniques, quantitative estimation of proteins, carbohydrates, lipids, oils and crude fibre and also includes exercises such as preparation of media, various staining procedures, isolation of specific culture and microbiological analysis of unprocessed and processed food.

- Quantitative analysis of proteins- Kjeldahl method
- Qualitative and quantitative analysis of carbohydrates, such as free and total sugar, starch and pectin; Determination of sugars- polarimetry
- Analysis of oils and fats; methods for physical and chemical characterization of fats
- Estimation of crude fibre
- Analytical techniques – Basics of spectrophotometer
- Blood analysis – Glucose, cholesterol, protein; Hematology – hemoglobin, hematocrit, Differential count, RBC, WBC
- Precautions and safety regulations, sterilization techniques
- Staining: Gram's staining, acid-fast, spore, capsule and flagellar staining, Motility of bacteria, Staining of yeast and molds.
- Microbiological analysis of a typical unprocessed food
- Microbiological analysis of typical processed food.
- Isolation of specific culture – Monoculture
- Wine fermentation –fermentation kinetics

**Text Book:**

1. Berg JM, Tymoczko JL and Stryer L. (2002) Biochemistry 5th ed. W.H.Freeman.

**References:**

1. Conn EC, Stumpf PK, Bruening G and Doi RH (2001) Outlines of Biochemistry. 5th ed. John Wiley and Sons (Asia).
2. Devlin TM. (2002) Text Book of biochemistry with Clinical Correlations 5<sup>th</sup> ed. John Wiley and Sons.
3. Bibek Ray & ArunBhunja Fundamental Food Microbiology, Fifth Edition CRC Press
4. M. R. Adams, M. O. Moss Food Microbiology Royal Society of Chemistry,

This course on Advances in Food Science deals with sensory science and various food products such as cereal, legumes, fats and oil seeds, fruits, vegetable and dairy products, poultry, meat and marine foods and confectionery products.

**UNIT 1. Sensory Science** Sensory science - Introduction to sensory science - Panel selection methods in sensory analysis, Instrumentation - Recent Development in sensory science - Colour and texture of foods - Colour measuring systems- CIE system, tintometers - Physical characteristics of foods - Texture measurement- instrumental methods - Texture profile analysis - Rheology of foods - Flow behaviour of fluid foods - Viscosity measurement- consistometers and viscometers - On-line viscosity measurement

**UNIT 2. Emerging trends in food processing** -Emerging technologies in food processing – necessity and advantages. Minimal processing, power ultrasound, Microwave, PEF, HPP, Ohmic Heating, Spray-freeze drying, Dense phase CO<sub>2</sub>, super critical fluid extraction processes in food materials.

**UNIT 3. Value added products** - Extrusion - cold and hot extrusion – production of pasta - principles- extrusion cooking, applications, - value addition by flaking, Puffing, Parching, - encapsulation – micro and nano level process – process and methods – selection of core and wall materials – quality of encapsulated products - coating – coating materials and equipments – battering and breading, seasoning. Foods for future- Space foods.

**UNIT 4. Waste and by-product utilization and disposal** -Waste materials, sources and classification, Utilization of by-products and wastes from food industries- meat and fish processing industries, Dairy plants, Milling Industries, Beverage industries. Waste treatment. and – production of paper and paperboards, particle board, fuel briquettes - production of fibre, activated carbon, furfural and adhesive

**UNIT 5. Energy auditing and pollution control in food industries** - Energy management and audit – definition – objectives – types, Energy auditing case studies. Industrial energy auditing and conservation measures - Policy recommendations. Energy auditing report preparation, pollution control- Environmental Audits-Regulations on pollution control.

**Text Book:**

1. Stanier R Y (1986). General Microbiology, Macmillan, India.

**References:**

1. Frazier and Westhoff. (1978). Food Microbiology.3rd Ed. Tata McGraw Hill,
2. Fellows, P. (1988). Food Processing Technology. Ellis Horwood International Publishers, Cambridge.
3. Marcus Karel Owen R. Fennema and Daryl B.Lund. (1975). Principles of Food science Part II, Physical principles of Food Preservation, Marcel Dekker, Inc. New york.

**PFS 4404 SENSORY EVALUATION OF PROCESSED FOODS (6h/wk) (4cr)**

This course on sensory evaluation of processed foods deals with sensory science and various methods of sensory and objective evaluation for different food products followed by textural profile analysis and factors influencing sensory verdicts.

**UNIT 1. Introductions to sensory techniques and sense organs:** Introduction, History, Development of Sensory Testing, Human Subjects as Instruments, Conducting a Sensory Study. The Human Senses – Vision, Touch, Olfaction, Chemical/Trigeminal Factors, Gustation, Hearing.

**UNIT 2. Sensory attributes and sensory evaluation methods:** Introduction, Sensory Attributes -Appearance, Odor/Aroma/Fragrance, Consistency and Texture, Flavor, Noise. Introduction - The Unified Approach to Difference and Similarity Testing, Triangle Test, Duo-Trio Test, Two-out-of-Five Test, Same/Different Test (or Simple Difference Test), “A” – not “A” Test, Difference-from-Control test, Sequential tests.

**UNIT 3. Controls for Testing Panels: Introduction, Test Controls** -Development of Test Room Design, Location, Test Room Design, The Booth, Descriptive Evaluation and Training Area, Preparation Area, Office Facilities, Entrance and Exit Areas and Storage.

**UNIT 4. Factors Influencing Sensory Verdicts:** Introduction, Physiological Factors – Adaptation, Enhancement or Suppression. Psychological Factors - Expectation Error, Error of Habituation, Stimulus Error, Logical Error, Halo Effect, Order of Presentation of Samples, Mutual Suggestion, Lack of Motivation, Capriciousness vs. Timidity -Poor Physical Condition.

**UNIT 5. Objective evaluation techniques:** chemical methods, physico- chemical methods (pHmeter, digital salt meter, Brik’s refractometer, polariscope, butyrometer) - Microscopic examination - Physical methods. Instruments used for textural evaluation – bakers jel meter, visco meter, consisto meter, penetro meter, farino graph, pressure tester, succulo meter. Texture meter, tenduro meter, compressimeter.

**Text Book:**

1. Meilgaard, M., Civille, G.V., Thomas Carr, (1999). Sensory Evaluation Techniques, third edition, CRC Press, New York.

**References:**

1. Meyer, I.H. (1960) Food Chemistry. Reinhold Pub. Corpn., New York, Charles R. Turtle Co., Tokyo.
2. Deman, J. M. (1980) Principles of Food Chemistry, AVI Publishing Company.
3. Stryer L. (1995) Biochemistry, 4th Ed. W. H. Freeman and Company.

**PFS 4406 TECHNOLOGIES OF FRUITS AND VEGETABLES (6h/wk) (4cr)**

This course focuses on post-harvest technology of fruits and vegetables, storage and transportation, thermal processing of vegetables and fruits, preparation of juices, jam, tomato products, pickles and chutney.

**UNIT 1. Post-harvest technology:** Pre- and post-harvest physiology, maturation changes, and maturity indices. Pre- and post-harvest pathology, pathological spoilages. During storage and ripening and control measures. Storage disorders. Post-harvest handling, packaging, storage, transportation, marketing and export. Methods of precooling, post-harvest treatments to hasten and delay ripening.

**UNIT 2. Storage and Transportation:** Cold storage, controlled/modified atmosphere storage. Cold storage construction and requirements. Transportation by road/ rail /air /surface. Export requirements. Quarantine requirements, quality management, insect and pest infestation and control measures.

**UNIT 3. Minimal and thermal processing:** Minimal processing of fruits and vegetables. Thermal processing. Quality requirements for processing. Raw material - preparation, blanching, preparation of syrups and brines, canning and bottling operations for commercially important fruits and vegetables. Machinery used for the operations. Dehydrated fruits and vegetables.

**UNIT 4. Juices and Jams:** Beverages, RTS, Squashes, syrups, sherbat, recipes, preparation, packaging, quality standards and specifications. Juice concentrates, unit operations and equipments. quality control and specifications. Packaging and storage. Jams, jellies, preserve and marmalades and technology of their production. Packaging, quality control and specifications.

**UNIT 5. Purees, pickles and chutney:** Tomato products, raw material quality for different types of products, preparation of products - juice, puree, paste, ketchup, soup and sauces. Packaging, storage, quality control and specifications. Pickles and chutney, their types and production. Packaging of pickles and chutneys. Spoilage, quality control and specifications.

**Text Book:**

1. Thompson A K. (2003). Fruit and Vegetable-Harvesting, Handling and Storage, 2<sup>nd</sup> Edition, Wiley-Blackwell publishers.

**References:**

1. Salunkhe D.K., Kadam, S.S. (1995) Hand book of fruit science and technology: Production, composition, storage, and processing. Marcel Dekker, Inc. 270 Madison Avenue, New York, New York.
2. Wills, R.B.H.; Lee, T. H.; Graham, D. McGlasson, W. B. and Hall, E. G. (1981) Postharvest: An introduction to the physiology and handling of fruits and vegetables. AVI Publishing Co. Westport, Conn.
3. Kader, A. A. (1991) Postharvest Technology of Horticultural Crops. University of Calofornia Publication No 3311, Oakland, Calif.

**PFS 4308 RESEARCH METHODOLOGY AND BIOSTATISTICS (6h/wk)(3cr)**

This course has two parts. First part deals with research methodology, research problem and methods of data collection. The second part deals with statistics and data analysis using statistical tools.

**UNIT 1. Research Methodology:** Meaning, objectives and Significance of research. Types of research, research approaches and scientific methods. Research process and criteria of good research.

**UNIT 2. Definition and Identification of a Research Problem:** Selection of research problem, Justification, development of hypothesis, basic assumptions. Limitations and delimitations of the problem.

**UNIT 3. Methods of Data Collection:** Schedules and questionnaires; Interview, Case study, Home visits, scaling methods, Reliability and validity of measuring instruments, Statistical issues, Basic principles and regulations in humans and animal research, Analysis and reporting of data.

**UNIT 4. Introduction to Statistics:** Introduction and Describing data: frequency distributions and descriptive statistics – Sampling and Experimental design – classification, tabulations of statistical data – Diagrammatic representation – graphs – plotted curve – Sampling method and standard errors – random sampling – means – confidence limits – standard errors – variance.

**UNIT 5. Data Analysis:** Hypothesis Testing, Paired Comparison Designs, Pairwise Ranking Test: Friedman Analysis—Comparing Several Sample, Multisample Difference Tests — Block Designs, Simple Ranking Test: Friedman Analysis — Randomized (Complete) Block Design, Parametric Tests: t-test, z-test, chi-squares test, ANOVA.

**Text Book:**

1. Myra L. Samuels, Jeffrey A. Witmer, Andrew Schaffner. (2012). Statistics for the Life Sciences, 4<sup>th</sup> edition. Prentice Hall.

**References :**

1. John A. Rice. (2010). Mathematical Statistics and Data Analysis, Duxbury Press.
2. John M. Lachin. (2010). Biostatistical Methods: The Assessment of Relative Risks, 2nd Edition, Wiley-Blackwell Pub.
3. Snedecor, George, W.Cochran and William, G. (1967). Statistical Methods, Sixth edition, Oxford and IBH Publishing Co., Oxford.

Laboratory course on advances in food science deals with recent processing techniques, which enhances the texture and quality of the finished food products. It also focuses on the importance of water treatment plant analysis in food industry.

- 1) Sensory Evaluation ..... (Same as per given syllabus)  
Analysis and Interpretation of sensory data.
- 2) Minimal processing of fruits and vegetables.
- 3) Color measurement
- 4) Viscosity measurement
- 5) Textural Profile Analysis (TPA) of fresh and processed foods
- 6) Value added product using extrusion technology and quality assessment.
- 7) BOD and COD analysis of waste
- 8) Case study on energy auditing of a food industry
- 9) Visit to a modern food industry.

**Text Book:**

1. Potter,N.N., Joseph,H., Hotchkiss. (1997). Food Science. CBS Publishers and Distributors. New Delhi.

**References:**

1. Balasubramanian, P. (2013) Energy Auditing made Simple, Consultancy Services Publishers, India.
2. Fellows, P. (1988). Food Processing Technology. Ellis Horwood International Publishers, Cambridge.
3. Marcus Karel Owen R.Fennema and Daryl B.Lund. (1975). Principles of Food science Part II, Physical principles of Food Preservation, Marcel Dekker, Inc. Newyork.

**PFS 5501            FOOD ANALYSIS, SAFETY & FOOD LAWS            (6h/wk) (5cr)**

This course has three sections. First section on food analysis focuses on preparation of the sample and sample analysis using various methods. Second unit on Food safety includes concepts of Food safety and food safety programs. The third on food laws focuses on principles of food laws and various governing bodies.

**UNIT 1. Preparatory measures of food analysis:** Sampling and preparation of samples-quality criteria for sampling-grinding dry materials, grinding moist materials, Enzymatic in activation and microbial act, and reporting results of given samples.

**UNIT 2. Methods of Food analysis:** Theory of spectroscopy absorption of radiation, Rotations, Vibration, Electro transition, Molecular Energy states, problems and measurement of color by using colorimetry and their function. Theory of Electrophoresis paper and thin layer chromatography about their functions and applications- HPLC, LCMS, GCMS.

**UNIT 3. Food Safety:** Food safety concept - Importance of food safety in the food processing industry, Risk classification, National and international food regulatory agencies, General food laws and food safety regulations, Nutritional labeling regulation (mandatory and optional nutrients, nutritional descriptors and approved health claims); Microbial contamination (including cross contamination/ indirect contamination) Chemical contamination, Physical contamination, Allergen contamination.

**UNIT 4. Food Safety Programs:** Definitions and importance, HACCP, Good Manufacturing Practices (GMPs), Pest Control Program, Facility Maintenance, Personal Hygiene, Supplier Control, Sanitary, Design of Equipment and Infrastructure, Procedures for Raw Material Reception, Storage and Finished Product Loading, Sanitation Program. (Sanitation Standard Operating Procedures (SSOPs), Product Identification, Tracking and Recalling Program, Preventive Equipment. Hurdle technology.

**UNIT 5. Food Laws:** Principles in the general National and International food laws, governing bodies. Principles of self-control, risk analysis on food, Indian Food regulations – History of Indian Food Regulations: BIS, ISI, FPO, PFA and FDA. Food Safety and Standards Act 2006.

**Text Book:**

1. Food safety: The science of keeping food safe. Ian C. Shaw, Wiley-Blackwell, 2013.

**References:**

1. The Microbiology of Safe Food, 2nd Edition. Stephen J. Forsythe, Wiley-Blackwell, 2010.
2. ILBCO's Food Safety and Standards Act, Rules, Regulations -12<sup>ed</sup>ition 2014.
3. Food safety for the 21st Century: Managing HACCP and food safety throughout the global supply chain Wallace, C. A. Wiley-Blackwell, 2010.
4. Advances in microbial food safety. Sofos, John. Woodhead Publishing, Cambridge, 2013.

The course on dairy science includes introduction to dairy science, processing of milk, principle and preparation of milk products, packaging of milk and milk products.

**UNIT 1. Introduction to milk:** chemical composition of milk, unit operations in dairy industry-filtration, clarification, pasteurization, homogenization and sterilization. Processing of milk-types of processed milk-pasteurized, toned, flavoured, fermented, powdered and infant formula milk.

**UNIT 2. Methods in milk processing:** Use of bio-protective factors for preservation of raw milk: effects on physicochemical, microbial and nutritional properties of milk and milk products, present status of preservation of raw milk by chemical preservatives.

**UNIT 3. Thermal processing of milk:** Pasteurization-Methods of determining lethality of thermal processing, UHT processed milk products, their properties and prospects, types of UHT plants, aseptic fillers, heat stability and deposit formation aspects, effect on milk quality; techno- economic considerations; retort processing.

**UNIT 4. Milk and milk products:** Preparation methods and principles- different types of milk- milk powder, ghee, butter, ghoa, paneer, cheddar cheese, curd, yoghurt, ice cream. Packaging, storage and quality evaluation packaging and storage of milk and milk products, quality evaluation. Food laws and standards of dairy products.

**UNIT 5. Current trends in cleaning and sanitization of dairy equipment:** biological; detergents; Automation; Ultrasonic techniques in cleaning; bio-detergents, development of sanitizers- heat; chemical; radiation, mechanism of fouling and soil removal; Bio-films, assessing the effectiveness of cleaning and sanitization of dairy products.

**Text Book:**

1. Modern Technology of Milk Processing & Dairy Products (4th Edition) 2013 NIIR Board Publishers.

**References :**

1. Ellen Muehlhoff, Anthony Bennett, Deirdre McMahon 2013 Milk and Dairy products in human nutrition Food and Agriculture Organization of The United Nations Rome, [www.fao.org/publications](http://www.fao.org/publications)
2. Early, Ralph 1997 Technology of Dairy Products 2<sup>nd</sup> Edition Springer US publications
3. Varnam, A., Sutherland, Jane P. 1994 Milk and Milk Products Technology, chemistry and microbiology Springer US publications



PFS 5405

FOOD PACKAGING

(6h/wk) (4cr)

This theory course on Food packaging includes introduction, packaging materials and their properties, packaging systems and methods, packaging aspects of fresh and processed foods and packaging design and environmental issues in packaging.

**UNIT 1. Introduction to food packaging:** Packaging terminology- definition. Functions of food Packaging, Packaging environment. Characteristics of food stuff that influences packaging selection.

**UNIT 2. Packaging material and their properties:** Glass, Paper and paper board, Corrugated fibre board (CFB), Metal containers: Tin and Aluminum, Composite containers, Collapsible tubes, Laminations, Metalized films, Co extruded films, physical testing of polymeric packaging materials. Food Packaging Polymers (Polyethylene, PET, PVC, Polypropylene, Polystyrene & Nylon)

**UNIT 3. Packaging Systems and methods:** Canning-Vacuum Packaging, controlled atmospheric packaging, modified atmospheric packaging, Aseptic Packaging, Retort processing, Active Packaging, intelligent packaging, shrink and stretch packaging-cling.

**UNIT 4. Packaging aspects of fresh and processed foods:** Packaging of Fruits and vegetables, Fats and Oils, Spices, meat, Poultry and sea foods, Dairy Products, Bakery, beverages, Dehydrated and frozen foods. Liquid and powder filling machines – like aseptic system, form and fill (volumetric and gravimetric), bottling machines. Form Fill Seal (FFS) and multilayer aseptic packaging machines.

**UNIT 5. Packaging Design & Environmental Issues in Packaging:** Food marketing and role of packaging-Packaging aesthetic and graphic design; Coding and marking including bar coding; Consumer attitudes to food packaging materials; Packaging Laws and regulations, safety aspects of packaging materials; sources of toxic materials and migration of toxins into food materials; Packaging material residues in food products; Environmental & Economic issues, recycling and waste disposal.

**Text Book:**

1. Gardon L. Robertson (2012) Food Packaging: Principles and Practice, Third Edition, CRC Press, India.

**References :**

1. Richard Coles, Derek McDowell, Mark J. Kirwan.(2003).Food Packaging Technology, Blackwell Publishers.
2. Aaron L. Brody, E. P. Strupinsky, Lauri R (2001). Active Packaging for Food Applications, CRC Press, U.S.A.
3. F.A.Paine (1962).Fundamentals of packaging .John Willey and Sons, London.
4. H.Y.Paine and F.A.Paine (1983). Hand book of Food Packaging, Leonard Hill Publishing Company.

Theory course on Food Biotechnology deals with use of genetic engineering, cloning and cell culture in Food Biotechnology, prospects, traditional applications, xenobiotics and its elimination and role of Biotechnology in food industries.

**UNIT 1. Prospects of Biotechnology:** Definition, scope and applications. Application of biotechnology in food. Basic principles of molecular biology and biotechnology: Recombinant DNA Technology.

**UNIT 2. Genetic Engineering, cloning and cell culture:** Fundamentals of molecular biology and genetics. Central dogma. Concept of genetic engineering and molecular cloning. Plant and animal culture, transgenic plants, application of genetic engineering in food science and technology. Genetically modified foods – concept, types and application.

**UNIT 3. Food Nanotechnology:** Nanomaterials - Definition - History – Properties. Food Nanotechnology: Current developments and future prospects; Nanotechnology and applications in food safety; Nanotechnology for food: delivery system; Nanostructured encapsulation systems: food antimicrobials. Barrier Packaging – Antimicrobial Packaging- Antimycotic Packaging- Bio-based Packaging- Bio-degradable Packaging- Active Packaging – Smart Packaging. Safety of Nanomaterials in Food

**UNIT 4. Xenobiotics:** Definition, components, drug adverse reactions, nutrient drug interactions, industrial chemicals, Bio- dynamics of xenobiotics, overall metabolic fate of xenobiotic in the body Naturally occurring food toxicants and its elimination: Sources, toxicity, elimination- protease inhibitors, goitrogens, haemagglutinins, glucosinolates, cyanogens, saponins, gossypols, lathyrogens, favism and carcinogens.

**UNIT 5. Role of Biotechnology in Food Industries:** Production of organic acids, vitamins, amino acids- downstream processing-Food additives, synthesis, sweeteners – glucose syrup and High Fructose Corn Syrup (HFCS): thickeners and gelling agents, xanthan gums. Food industry solid waste management – utilization and disposal, effluent treatment: resource recovery, recycle, reuse, treatment and disposal.

**Text Book:**

1. Green P.J (2002), Introduction to Food Biotechnology, CRC press, U.S.A.

**References :**

1. Mansi, EMT, Bryce, CFA, Demain,A.L and Allman, R (2003) Fermentation Microbiology and Biotechnology, Taylor and Francis, NewYork,.
2. Primrose, S.B (2001), Molecular Biotechnology, second edition, Panima Publishing Corporation, New Delhi.
3. Satyanarayana, U, (2007). Biotechnology, Books and Allied (P) Ltd., Kolkata.
4. Fischer, A and F. Kampers (2011). Nanotechnology in the Agri-Food Sector: Implications for the Future - Wiley-VCH.

**PFS 5309 LAB IN FOOD ANALYSIS AND FOOD BIOTECHNOLOGY (3h/wk) (3cr)**

Laboratory course on food analysis and food biotechnology deals with analysis of food composition, determination of moisture, ash, estimation of minerals, vitamins, and food additives. It also deals with fermentation and enzyme immobilization techniques.

- Analysis of food composition: Proximate analysis – Moisture, ash, crude fibre, fat and protein.
- Analysis of minerals – Iron, calcium, zinc – AAS
  
- Carbohydrates – Free sugars, Starch (Total & available), Dietary fiber.
- Mineral estimation – Dry and wet ashing, calcium, iron, phosphorous.
- Vitamin estimation – Ascorbic acid, thiamine, riboflavin and  $\beta$  carotene.
- Determination of additives (colours, preservatives, artificial sweeteners etc.,)
- Identification and estimation of common adulterants
- Identification of antinutritional factors
- Enzyme immobilization techniques
- Analysis of probiotic potential of microbial cultures
- Fermentation monitoring and control

**Text Book:**

1. Jordan, K. Woodhead (2011). Food chain integrity: A holistic approach to food traceability, safety, quality and authenticity. Cambridge Press.

**References :**

1. Nollet LML, (2013). Food analysis (2013) CRC Press Inc. USA
2. Nollet, L. Marcel Dekke (2004). Handbook of food analysis : Methods and instruments in applied food analysis r Inc., New Delhi.
3. Gould (2001). Total Quality Assurance for the Food Industries. W.A CTI Publications Inc., USA.

**PFS 5502            CLINICAL NUTRITION AND DIET THERAPY    (6h/wk) (5cr)**

This theory course on clinical nutrition and diet therapy focuses on guidelines for dietary planning, therapeutic diets, nutritional intervention and nutrient counselling. It also includes role of dietitian in clinical nutrition.

**UNIT 1. Guidelines for Dietary Planning** Weights and Measures, Determining nutritional needs, Basic Guidelines for diet planning, Nutritional status of Indians, Cultural aspects of dietary planning.

**UNIT 2. Therapeutic Diets:** Functional foods and nutraceuticals- Modifications of normal diet, therapeutic diets for various disease conditions. Identification of high risk patients - nutritional assessment, nutritional diagnosis, nutrition intervention, monitoring and evaluation of nutritional care. Assessment components-medical and nutritional care - record types and uses. Format for medical and nutrition charting and documentation record.

**UNIT 3. Nutritional Intervention** Nutritional intervention and diet modification-diet prescription, modifications of the normal diet. Nutrition care for hospitalized patients-standard hospital diet, other types of diet in hospital, modifications of food intake

**UNIT 4. Nutrition Counseling** Nutritional counseling –concept, recipient and counseling environment, the problem-solving counseling method. Activities for behavior changes, intervention counseling models, types of counseling session in patients. Empowerment, interpersonal skills. Nutritional counseling components – planning, implementation and evaluation.

**UNIT 5. Role of Dietitian** Role of dietitian for hospitalized and outdoor patients and development of nutritional care plan. Specific functions of a therapeutic, administrative and consultant dietitian. Team approach in patient care. Psychological considerations in patient care. Interpersonal relationship with patients. Objectives of diet therapy- regular diet and rationale for modifications in energy and other nutrients, texture-fluid, soft diets.

**Text Book:**

1. Sari Edelstein (2015). Life Cycle Nutrition – An evidence-based approach.2<sup>nd</sup> Edition. (Ed.) Jones & Barlett Learning.

**References :**

1. A.Catherine Ross, Benjamin Caballero, Robert J.Cousins, Katherine L. Tucker, Thomas R.Ziegler (2014). Modern Nutrition in Health and Disease.11<sup>th</sup> Edition. (Eds.). Walters Kluwer / Lippincot Williams & Wilkins, Philadelphia,.
2. L.Kathleen Mahan, Suylvia Escott – Stump, Janice L.Raymond(2012). Krause’s Food and the Nutrition Care Process. 13<sup>th</sup> Edition. (Eds.). Elsevier Saundres,.
3. P.Insel; D.Ross; K.McMahon&M.Bernstein (Eds). (2011). Nutrition.4<sup>th</sup> Edition. Jones & Bartlett Publishers, Massachusetts,
4. Gail. C.Frank (2008). Community Nutrition.2<sup>nd</sup> Edition.Jones & Bartlett Publishers,

**PFS 5302 LAB - CLINICAL NUTRITION AND DIET THERAPY (4h/wk) (3cr)**

This course emphasizes skill development in planning therapeutic diets using food exchange lists. It provides greater exposure to dietetic practices followed in Indian hospitals.

1. Planning of routine hospital diet: Clear fluid diet, Full fluid diet, Soft diet, High calorie and low-calorie diet, High residue and low residue diet.
2. Planning of diet in deficiency diseases: Vitamin A deficiency, Calcium deficiency, PEM
3. Planning of diet in infectious diseases: Typhoid, Tuberculosis.
4. Planning of diet in cancer, surgery and burns.
5. Planning of diet in kidney diseases: Low sodium diet
6. Meal planning for Diabetes Mellitus
7. Meal planning for Peptic ulcers and celiac sprue
8. Meal planning for Viral hepatitis and cirrhosis of liver
9. Meal planning for Cardiovascular disease

**Text Book:**

1. Bhala S.M.L, Bhatia N, Gopinath (1983). Diet Manual for heart patient, CTC, AHMS, New Delhi.

**References :**

1. Gibney M.J, Elia, M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co. USA.
2. Robinson. C.H. et.al., (1986) Normal and Therapeutic Nutrition, 17<sup>th</sup>edition, MacMillan Publishing Co.
3. Raheena, B (2009) A Textbook of Food, Nutrition and Dietetics, Sterling Publishers, New Delhi.
4. Joshi, S. A (1998) Nutrition and Dietetics, 4<sup>th</sup> edition, Tata McGraw Hill Publications, New Delhi.

**PFS 5504                      TECHNOLOGIES OF MEAT AND POULTRY      (6h/wk) (5cr)**

This course deals with meat and muscle, spoilage of meat, storage and preservation of meat by different methods, quality of meat and egg preservation.

**UNIT 1. Meat and Muscle:** Origin of meat animals –Sheep/goat, cattle and poultry basic aspects of slaughter techniques- pre and post slaughter techniques. Structure of Muscle- Proportion of muscle, tissue and muscle fiber structure. Chemical and Biochemical constitution of muscle- Chemical aspects, muscle protein, intramuscular fat, muscle function, post mortem glycolysis, onset of rigor mortis, conditioning. Conversion of muscle to meat- pre-slaughter handling, glycogen loss, stunning, bleeding conditioning, protein denaturation, proteolysis, and chemical changes. Meat analog.

**UNIT 2. Spoilage of meat -** Endogenous infection and exogenous infection, symptoms of spoilage, organisms associated with meat spoilage, spoilage due to temperature, pressure, pH, oxidation reduction potential, and other atmospheric conditions. Prophylaxis-hygiene conditions, biological controls, antibiotics and ionizing radiations

**UNIT 3. Storage of meat-** temperature control, storage above freezing point, fresh and chilled carcass, prepackaging and storage conditions. Storage below freezing point- effect of freezing on muscular tissue, freezing of meat. Thermal processing- Pasteurization, sterilization process.

**UNIT 4. Preservation of meat:** Principal of dehydration, freezing and hurdle concept, biochemical aspects, physical aspects and sensory aspects. Preservation by curing - chemical and biochemical aspects of curing ingredients, smoking, and maturing. Functional properties of additives used in meat product formulations and fresh meat processing, Preservation by ionizing radiation and by chemicals- chemical and biological aspects

**UNIT 5. Quality of meat, Cooked meat and Egg preservation -** Quantity and chemical nature of myoglobin, discoloration, water holding capacity, juiciness, Drip loss. Quality of cooked meat- protein aspects on cooking under different conditions, texture and tenderness and flavour components in meat. Toxic compounds formed during processing and cooking of meat. Tenderization by Marination, natural and artificial tenderizers, Egg structure, preservation of egg, physiological and chemical changes during egg preservation. Chemical aspects of protein and lipid associated with egg and functional properties. Nutritional aspects of meat, poultry and egg

**Text Book:**

1. Warriss, P.D. (2000) Meat Science: An Introductory Text, CABI Publishesrs.

**References :**

1. Lawrie, R.A and David Ledward, (2006), Lawrie's Meat Science, 7<sup>th</sup> Edition, Woodhead Publishers..
2. Olson, V.M, Shemwell G A and Pasch, S (1998) Egg and Poultry Meat Processing, VCHP, New York

**PFS 5304 LAB- TECHNOLOGIES OF MEAT AND POULTRY (3h/wk) (3cr)**

This laboratory course on meat and poultry deals with basic composition of meat, hygienic meat production, measurement of physical properties of meat, tenderization, egg quality evaluation and meat evaluation.

- Basic composition- Moisture, pH, fat, protein
- Rigor mortis-change in pH and drip loss
- Hygienic meat production
- Microorganisms in meat-
- Dehydration and Freezing of meat-textural changes
- Measurement of meat texture and colour
- Water holding capacity of meat
- Traditional/Convenience/novel meat products-processing effects on protein, and sensory
- Meat tenderization-Marinating, additives identifications
- Egg quality evaluation
- Salting and curing of meat
- Sensory quality evaluation, products formulation and development

**Text Book:**

1. Warriss, P.D. (2000) Meat Science: An Introductory Text, CABI Publishers.

**References :**

1. Lawrie, R.A and David Ledward, (2006), Lawrie's Meat Science, 7<sup>th</sup> Edition, Woodhead Publishers..
2. Olson, V.M, Shemwell G A and Pasch, S (1998) Egg and Poultry Meat Processing, VCHP, New York.

**PFS 5508      TECHNOLOGIES OF CEREALS AND LEGUMES      (6h/wk) (5cr)**

The course on cereals and legumes focuses on classification of cereals, physical properties, drying, parboiling of rice, wheat production, rheology, legumes, coarse cereals and pseudo cereals.

**UNIT 1. Cereals and Rice:** classification of cereals, production, chemistry, nutritional importance, usage and consumption pattern. Rice: production, agronomy, botany, varieties, chemical composition, grain structure, distribution of nutrients, classification of rice. Physical properties of paddy and rice, morphology, grain dimensions, grading systems, density, porosity, angle of repose

**UNIT 2. Processing of Rice:** Drying of paddy, occurrence and prevention of crack formation. Aging and curing of paddy Physico-chemical properties of rice, nutrients, viscosity, gelatinization, gel consistency, cooking qualities, solid loss, water uptake and volume expansion. Parboiling of rice; methods of parboiling, changes in physico-chemical properties of rice after parboiling, advantage and disadvantages of parboiling.

**UNIT 3. Wheat:** Production, varieties, chemistry, grain morphology, flour quality, protein quality in relation to baking characteristics, functional properties of wheat flour, protein-lipid-carbohydrates interaction and their influence on the quality of the baked product. Rheology: basic approaches to dough rheology, influence of flour constituents on dough rheology.

**UNIT 4. Legumes:** production, types of legumes, chemical aspects, morphological aspects, cooking quality of legumes, functional properties of legume proteins, water uptake, foaming properties, minor pulses

**UNIT 5. Coarse cereals, Millets and Pseudo cereals:** Maize, sorghum, millets, grain morphology, production, chemical composition, nutritional quality and health benefits. Pseudocereals: Production, chemistry, nutritional significance, food uses

**Text Book:**

1. Chakraverty, A. 1988. Postharvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.

**References :**

1. Khalil Khan and Peter R Shewry. Wheat: Chemistry and Technology. Fourth Edition. AACC International PRESS
2. Mathews, R.H. Ed. 1989. Legumes: Chemistry, Technology and Human Nutrition. Marcel Dekker, New York.



**PFS 5308 LAB - TECHNOLOGIES OF CEREALS AND LEGUMES (3h/wk) (3cr)**

The laboratory course focuses on physico – chemical properties of paddy, rice, wheat and millets. It also enables to know the characteristics of legumes.

- Measuring physical parameters of rice, length-breadth, 1000 kernel weight and angle of repose
- Changes in physical parameters of rice after parboiling, color measurement, crack detection
- Measuring the volume expansion and solid loss of rice on cooking, comparison between raw and parboiled rice
- Detection of cooking time of different legumes
- Morphology of cereals
- Determination of bulk density and sphericity of sorghum and millets
- Water absorption capacity of wheat flour
- Foaming capacity and water uptake of different legumes
- Estimation of equilibrium moisture content of paddy as a function of steeping temperature
- Milling experiment-milling yield.
- Estimation of moisture content analysis in grains.

**Text Book:**

1. Durbey, S.C. (1979). Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).

**References :**

1. Elaine T Champagne (2004). Rice: Chemistry and Technology. Third Edition: AACC International press.
2. Kent, N.L. (1983). Technology of Cereals.3rd edition. Pergamon Press, Oxford, UK.
3. Pomeranz, Y. (1978). Wheat: Chemistry and Technology. Am. Assoc. of Cereal Chemist. St. Paul, minnesota.
4. Pomeranz, Y. (1987). Modern Cereal Science and Technology. VCH Pub., New York.
5. Salunkhe, D.K., Kadam, S.S.(1989). Handbook of World Food Legumes: Chemistry, Processing and Utilization, (3 vol. set). CRC Press, Florida

**PFS 4311      FUNCTIONAL FOODS AND NUTRACEUTICALS      (4h/wk) (3cr)**

This course enables to gain knowledge on sources of functional foods and nutraceuticals. It also helps to understand the role of functional foods, nutraceuticals and dietary supplements in health and disease.

**UNIT 1: Functional Food and Nutraceuticals:** Definition, history, types and classification- difference between functional foods & Nutraceuticals. Health claim – FDA - FOSHU - safety - consumer acceptance.

**UNIT 2: Natural occurrence of phytochemicals-** antioxidants and flavonoids, omega 3 and 6 fatty acids, carotenoids, phytoestrogens, glucosinates, organo sulphur compounds, isoprenoid derivatives, phenolic substances, fatty acids and structural lipids

**UNIT 3: Probiotics** - Taxonomy and important features of probiotic micro- organisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc.

**UNIT 4: Prebiotics** - Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases.

**UNIT 5: Potential Health Benefits** - Role of nutraceuticals in health and management of inborn errors of metabolism, obesity, neurological disorder, diabetes mellitus, hypertension, CVD, cancer, arthritis, and AIDS.

**Text Book:**

1. Aluko Rotimi (2012). Functional Foods and Nutraceuticals, Springer-Verlag New York Inc.

**References :**

1. Brar Satinder Kaur, Surinder Kaur and Gurpreet Singh (2014), Nutraceuticals Functional Foods. Nova science pub, Newyork.
2. Robert E.C. Wildman, Robert, Wildman, Taylor C, (2002). Handbook of Nutraceuticals and Functional Foods, Third Edition, Wallace,

**PFS 4313                                      FOOD SERVICE MANAGEMENT                                      (4h/wk) (3cr)**

This course deals with the basic principles of organization and management in food service units and develop skills in food selection, purchase, storage and service of food and train students in implementing sanitary procedures in food services.

**UNIT 1.Food Service:** Introduction, Definition of food service industry, principles of food service industry, objectives, types of food service industry.

**UNIT 2.Tools of management:** Definition, classification- tangible tools, intangible tools, Organization chart, structure, function, work improvement techniques.

**UNIT 3.Kitchen Layout:** Factors in menu planning for large groups, systems for maintaining quality in food preparation and service, types of kitchen, kitchen control and maintenance of Kitchen records.

**UNIT 4.Financial Management:** Definition, scope of financial management, financial accounting, budgeting, costing, cost control-portion control.

**UNIT 5.Personnel management:** Definition, scope, concept of personnel management, approaches of personnel management, personnel policies, staff employment, training, placement, promotion, personnel records, work appraisals.

**Text Book:**

1. Mohini S (2005) Institution Food Management. New Age International Publishers. New Delhi.

**References:**

1. Bessie WB and Levelle W (1988) Food Service in Institutions. Sixth Edition. Macmillian Publishing Company New York.
- 2.Thangam Philip (2008) Modern Cookery for Teaching and Trade. Part I & II Orient Longman,Chennai.

**PFS 4315      OBSTETRICS AND NEO NATAL NUTRITION                      (4h/wk) (3cr)**

This course deals with the basic sciences relevant to obstetrics and gynecology. It Provides effective and adequate care and diet to the obstetrical and neonatal diseases.

**UNIT 1.Pre-natal Period:** Signs & symptoms, Biochemical and endocrine changes during pregnancy, complications – Food fads & taboos.

**UNIT 2.Foetal Growth and Development:** Anatomy of foetus, foetal physiology and foetal circulation - Development, structure and function of placenta, umbilical cord and amniotic fluid- importance of micro nutrients.

**UNIT 3.Postpartum Period:** Risk in Labour- Still birth -Pre-mature - cord around the neck- Cross section.

**UNIT 4.Neo natal nutrition:** Lactation -Importance of breast feeding - Infant Formula - identify normal and sick neonates – immunization schedule.

**UNIT 5.Nutritional and Food Requirements:** ICMR guidelines for Pregnancy, Lactation and infancy - nutritional needs and diet plan.

**Text Book:**

1. Chatterjee CC (1988) Text Book of Medical Physiology. W B Saunder's Co. London.

**References:**

1. Srilakshmi B (2014) dietetics, 7<sup>th</sup> edition, New Age International (P) Ltd, Publishers.
2. Guyton (1991) Human physiology and Mechanism of diseases. W.B Saunders and Co.London.

**PFS 4317****ETHNIC FOODS****(4h/wk) (3cr)**

This course helps to understand the historical perspective of traditional foods. It critically evaluates the methods of preparation of ethnic foods.

**UNIT 1.Traditional food style:** History – Concept and Principles of Traditional Foods – Benefits and nutritional content of Traditional Foods.

**UNIT 2.Healthy aspects of traditional foods:** National health benefits - impacts of consuming traditional foods.

**UNIT 3.Religious and Ethnic diversity:** Food in Christianity (Catholic and Jehovah's Witness dietary requirements) Hindu, Halal Requirements for Meat, Poultry and Seafood based on religious and cultural practices. Halal Certification.

**UNIT 4.Fermented Ethnic Foods:** Traditional fermented foods and drinks. Principles of downstream processing and Product recovery.

**UNIT 5.Traditional Cooking Methods:** Traditional chimney kiln, modern mechanical fish smoking kiln, examples of smoked and dried products.

**Text Book:**

1. Kristbergsson K and Oliveira J (2016) Traditional foods: general and consumer aspects. Springer, New York.

**References:**

1. Pathak YV (2011) Handbook of nutraceuticals Volume 2, CRC Press, USA.

**DEPARTMENT OF HINDI**  
**Syllabus for UG programme Under Part III - B.A. Hindi (SF)**  
**(Academic Year 2017 Onwards)**

Sem	Part	Code	Title	Hr	Cr.	Marks	
I	Part I	HIS1203	हिन्दी गद्य और व्याकरण (Hindi Prose and Grammar)	3	2	30	
	Part II	ENSxxx	English	3	2	30	
	Part III Major	Core	HIS1415	सामान्य निबन्ध (Samanya Nibandh)	4	4	60
			HIS1417	सामान्य व्याकरण (Samanya Vyakaran)	4	4	60
			HIS1519	कामकाज हिन्दी (Kamkaji Hindi)	5	5	75
	Part IV	Supportive	HIS1421	हिन्दी भाषा का उद्भव और विकास (Origin and Evolution of Hindi language)	5	4	60
		Non -Maj. Elect.	XXX xxx	Basic Tamil/ Advance Tamil/ Non -Major Elective	3	2	30
	Life skill	XXX xxx		3	2	30	
<b>Total</b>				<b>30</b>	<b>25</b>	<b>375</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
II	Part I	HIS1204	कार्यालय हिन्दी और अनुवाद (Official Hindi and Translation)	3	2	30	
	Part II	ENSxxx	English	3	2	30	
	Part III Major	Core	HIS1516	कहानियाँ (Kahaniyan)	5	5	75
			HIS1418	उत्कृष्ट व्याकरण (Uthkrishta Vyakran)	4	4	60
			HIS1420	आदिकाल (Aadhikaal)	4	4	60
	Part IV	Supportive	HIS1422	हिन्दी साहित्य का इतिहास Hindi Sahithya ka Ithihas	5	4	60
		Non - Maj. Elect.	XXXxxx	Basic Tamil/ Advance Tamil/ Non -Major Elective	3	2	30
	Life skill	XXXxxx		3	2	30	
Part V	Extension	XXXxxx	(NSS/SLP/PED)	2	1	-	
<b>Total</b>				<b>30+2</b>	<b>25+1</b>	<b>375</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
III	Part I	HIS2201	हिन्दी साहित्य का इतिहास History of Hindi Literature	3	2	30	
	Part II	ENSxxx	English	3	2	30	
	PartIII Major	Core	HIS2515	कम्प्यूटर हिन्दी (Computer Hindi)	5	5	75
			HIS2517	नाटक और एकांकी (Natak aur Ekanki)	5	5	75
			HIS2419	सामान्य पत्र लेखन (Samanya Patra Lekhan)	4	4	60
			HIS2521	निर्गुण भक्ति काल (Nirgun Bhaktikal)	5	5	75
	Supportive	HIS2427	हिंदी भाषा का इतिहास - सामान्य परिचय (Hindi Bhasha ka Ithihas samanya Parichaya)	5	4	60	
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
IV	Part I	HIS2202	लघुकथा, नाटक, और काव्यशास्त्र Short stories, Drama and Poetics	3	2	30	
	Part II	ENSxxxx	English	3	2	30	
	Part III Major	Core	HIS2516	भाषा विज्ञान का सामान्य परिचय (Bhasha Vighyan ka Samaanya Parichaya)	5	5	75
			HIS2518	सगुण भक्ति काल (Sagun Bhaktikal)	5	5	75
			HIS2420	कार्यालय हिंदी (Karyalya Hindi)	4	4	60
			HIS2522	रीतिकाल (Ritikal)	5	5	75
	Supportive	HIS2428	भारतीय काव्यशास्त्र - सामान्य परिचय (Bharathiya Kavya Sasthra Parichaya)	5	4	60	
V	Extension	XXXxxx	(NSS/SLP/PED)	2	1	-	
<b>Total</b>				<b>30+2</b>	<b>27+1</b>	<b>405</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
V	Part III Major	Core	HIS3615	उपन्यास (Upanyas)	6	6	90
			HIS3617	आधुनिक काल का सामान्य परिचय (Adhunik kal ka Samanya Parichay)	6	6	90
			HIS3619	अनुवाद सिध्दान्त (Anuvad Siddhanth )	6	6	90
		Innovative	HIS3521	निबन्ध साहित्य (Nibandh Sahithya )	5	5	75
	IV	Life skill	XXXxxx		3	2	30
VAL		XXXxxx		4	2	30	
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
VI	Part III Major	Core	HIS3616	नई कविता (Nayee Kavitha )	6	6	90
			HIS3618	नारीवाद - सामान्य परिचय (Narivad Samaanya Parichay)	6	6	90
			HIS3620	महाकाव्य और खडकाव्य (Mahakavya aur Khandakavya )	6	6	90
		Innovative	HIS3522	विशेष साहित्यकार - प्रेमचन्द (Vishesh Sahithyakar-Premchand)	5	5	75
	IV	EVS	HIS3200	Environmental Studies	4	2	30
Life skill		XXXxxx		3	2	30	
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>	
<b>Grand Total for semesters I- VI</b>				<b>180</b>	<b>158+</b> <b>2</b>	<b>2370</b>	

**Courses offered by Department of Hindi**

**Part-I -General Hindi**

Sem	Part	Code	Course Title	Hr/wk	Credit	Marks
1	I	HIS1203	हिन्दी गद्य और व्याकरण (Hindi Prose and Grammar)	3	2	30
2	I	HIS1204	कार्यालय हिन्दी और अनुवाद (Official Hindi and Translation)	3	2	30
3	I	HIS2201	हिन्दी साहित्य का इतिहास (History of Hindi Literature)	3	2	30
4	I	HIS2202	लघुकथा, नाटक, और काव्यशास्त्र (Short stories, Drama and Poetics)	3	2	30
<b>Total</b>				<b>12</b>	<b>8</b>	<b>120</b>



## Part-III-Supportive course

Sem	Dept.	Code	Course Title	Hr	Cr.	Marks
1	French	HIS1421	हिन्दी भाषा का उद्भव और विकास (Hindi Bhasha ka Udhbhav aur Vikas)	5	4	60
2	French	HIS1422	हिन्दी साहित्य का इतिहास (Hindi Sahithya ka Ithihas)	5	4	60
3	Hindi (Self)	HIS2423	हिन्दी भाषा का इतिहास - सामान्य परिचय (Hindi Bhasha ka Ithihas Samanya Parichaya)	5	4	60
4	Hindi (Self)	HIS2524	भारतीय काव्यशास्त्र का सामान्य परिचय (Bharathiya Kavya Sasthra Samanya Parichaya )	5	4	60
<b>Total</b>				<b>20</b>	<b>16</b>	<b>240</b>

**DEPARTMENT OF UNDER GRADUATE HINDI (SF)**  
**B.A. Hindi Programme Under Part III**  
 (With effect from 2017-2018 batch Onwards)

Sem	Part	Code	Title	Hr	Cr.	Marks	
III	Part I	HIS2201	हिन्दी साहित्य का इतिहास History of Hindi Literature	3	2	30	
	Part II	ENSxxx	English	3	2	30	
	Part III Major	Core	HIS2515	कम्प्यूटर हिन्दी (Computer Hindi)	5	5	75
			HIS2517	नाटक और एकांकी (Natak aur Ekanki)	5	5	75
			HIS2419	सामान्य पत्र लेखन (Samanya Patra Lekhan)	4	4	60
			HIS2521	निर्गुण भक्ति काल (Nirgun Bhaktikal)	5	5	75
	Supportive	HIS2427	हिंदी भाषा का इतिहास - सामान्य परिचय (Hindi Bhasha ka Ithihas samanya Parichaya)	5	4	60	
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>	

Sem	Part	Code	Title	Hr	Cr.	Marks	
IV	Part I	HIS2202	लघुकथा, नाटक, और काव्यशास्त्र Short stories, Drama and Poetics	3	2	30	
	Part II	ENSxxx	English	3	2	30	
	Part III Major	Core	HIS2516	भाषा विज्ञान का सामान्य परिचय (Bhasha Vighyan ka Samaanya Parichaya)	5	5	75
			HIS2518	सगुण भक्ति काल (Sagun Bhaktikal)	5	5	75
			HIS2420	कार्यालय हिंदी (Karyalya Hindi)	4	4	60
			HIS2522	रीतिकाल (Ritikal)	5	5	75
	Supportive	HIS2428	भारतीय काव्यशास्त्र - सामान्य परिचय (Bharathiya Kavya Sasthra Parichaya)	5	4	60	
V	Extension	XXXxxx	(NSS/SLP/PED)	2	1	-	
<b>Total</b>				<b>30+2</b>	<b>27+1</b>	<b>405</b>	

HIS2515

कम्प्यूटर हिन्दी  
(Computer Hindi)

5Hrs/5Crs

**Objectives:**

1. To give the Basic Knowledge of computer.
2. To give the Basic Knowledge of computer & its language
3. To give Introduction to Network.
4. To give Introduction to work process of the computer.
5. To teach Computer typing in Unicode format.

**इकाई I - मानवमित्र कम्प्यूटर**  
ऐतिहासिक पृष्ठभूमि  
विकासीक आयाम  
कम्प्यूटर वर्गीकरण

**इकाई II - कम्प्यूटर भाषाएँ एवं प्रोग्राम**  
बाईनरी संख्या प्रणाली  
कम्प्यूटरी भाषाएँ  
मशीनी भा।एँ

**इकाई III - कम्प्यूटर नेटवर्क**  
नेटवर्क अवयव  
नेटवर्क वर्गीकरण  
फाइल सर्वर

**इकाई IV - कम्प्यूटर कार्यप्रणाली**  
मुख्य क्रियाएँ  
सूचना सुरक्षा  
कार्यविधि

**इकाई V - कम्प्यूटर टाईपींग अभ्यास**

**Text Book :**

- 1 कम्प्यूटर: शब्द परिचय एवं परिभाषा - डॉ.सरोदनी गुप्ता सेण्ट जोसेफ पब्लिशिंग हाउस, दिल्ली- 32, 2010.

**References:**

- 1.कम्प्यूटर शब्द कोश एवं शब्द संक्षेप - विवेक कुमार श्रीवास्तव, चन्द्रा ब्रदर्थ प्रकाशन, इलाहाबाद, 2016.
- 2.कम्प्यूटर के भाषिक अनुप्रयोग, विजय कुमार मलहोत्रा, वाणी प्रकाशन, पटना, 2013.

HIS2517

नाटक और एकांकी  
(Natak aur Ekkhangki)

5Hrs/5Crs

**Objectives:**

1. To develop the reading skill.
2. To explain the origin and evolution of one act play and drama.
3. To acquire the knowledge of one act plays and play wrights in Hindi.
4. To guides the students to get the concept used in the plays.
5. To make students to perform on stage.

इकाई-1. नाटक और एकांकी का उद्भव और विकास ।

इकाई-2. हिन्दी के प्रसिध्द नाटककार और नाटक

इकाई-3. एक और द्रोणाचार्या - शंकर शेष

इकाई-4. हिन्दी के प्रसिध्द एकांकीकार और एकांकी

इकाई-5. हिन्दी के एकांकियाँ-

- दस हजार - उदयशंकरभट्ट,  
मालव प्रेम - हरीकृष्णा प्रेमी,  
दस मिनट - डॉ.रामकुमार,  
भोर का तारा - जगदीश चन्द्र माथुर,  
घर बन्द -हमी दुल्ला

**Text Book :**

1. एकांकी पंचामृत, डॉ.रामकुमार, जवहर पुस्तकालय, हिन्दी पुस्तक प्रकाशक एवं वितरक, मथुरा (उ.प्र) -281001. संस्करण- 2011

**References:**

- 1 Hindi Sahithia ka Ithikas, Dr.Nagender and Dr.Hardhayal, National Publishing House,2/35 Ansari Road, New Delhi. First Edition 1975, 47th Edition 2014
- 2 Hindi Sahithia ka Ithikas, Dr.Lakshmi seka Lokbharathi Prakasan, Mahathmagandhi Road, Allagabad 2013.
- 3 Hindi Sahithia ka Ithikas, Dr.Rajnath Sharma, Agarwal Publication, Hospital road, Agra Road, First Edition 1952, Tenth Edition 2013.
- 4 Hindi sahithia ka Uthpav aur vikas, Mr.Hajariprasad devedi, Rajmahal prakasan,1B,Nethaji Subhaschandra marga, New Delhi-2,1952.
- 5 Aadhunik Hindi Sahithia ka Ithikas, Mr.Batchan singh, Lokbharathi Prakasan, Magathma Gandhi Road, Allagabad.2012.

**Objectives:**

- 1 To develop the writing skill.
- 2 To help the students understand the meaning and usage of letter writing
- 3 To enhance the student's ability in writing letters.
- 4 To improve the vocabulary through letter writing..
- 5 To enable the students to use the different types of letters

**इकाई 1 पत्र लेखन**

- 1 पत्र लेखन का अर्थ
- 2 पत्र लेखन हेतु आवश्यक बातें
- 3 पत्र लेखन के महत्वपूर्ण अंग

**इकाई 2 औपचारिक पत्र**

- 1.आवेदन पत्र 2.व्यावसायिक पत्र 3.शासकीय पत्र 4.अर्द्धसरकारी पत्र 5.शिकायती पत्र
- 6.छुट्टी पत्र

**इकाई 3 अनौपचारिक पत्र**

- 1.बधाई पत्र 2.मित्र को पत्र 3.अनुमति पत्र

**इकाई 4 आदर्श पत्र की संरचना में ध्यान में रखने वाले विषय**

- 1.संबोधन 2.अभिवादन 3.प्रेषक-परिचय 4.पत्र का विषय और कलेवर

**इकाई 5 पत्र लेखन के नमूने**

- 1 शिक्षक पद हेतु आवेदन पत्र
- 2 प्राचार्य को तीन दिन के अवकाश हेतु आवेदन पत्र
- 3 परीक्षावधि में ध्वनि विस्तारक यंत्र पर पाबंदी हेतु 'जिलाधीश' को शिकायति पत्र
- 4 अपनी पढाई की तैयारी संबंधी जानकारी देते हुए, मनिआर्डर भेजने हेतु पिता को पत्र

**Text Books:**

- 1 Aadhunic hindi vyakaran swaroop evam prayog, Dr. Bharathi Khubalkar,Sahni Prakashan.
- 2 Vyavaharik Hindi , Dakshin Bharath Hindi Prachar Sabha,Chennai.Edition-2014.

**References:**

1. 1.Pathrakaritha Hethulekhan,Dr.Nishansingh.,Archana Publication , Lakshmi Nagar,Delhi,Edition-2011
2. Kamkaji Hindi,Dr.P.M.Thomos,Samiksha Publication, Gandhinagar,Delhi,Edition-2013
3. KahaniSankalanthathaVyavaharikHindi,Dr.Girijakumari,Dr.SasikalaNamboodhiri,Dr.Sunilkumar,Dr.Haripriya,Dr.Jayakumari,Dr.Ashaji,OrientPublication,Telangana,India,Edition 2017
4. Vyavahar Upayogi Kamkaji Evam Hindi, Ananth Kedhare,Sahithyayan Prakashan,Govind Nagar, Khanpur , Edition-2014

HIS2521

**निर्गुण भक्ति काल**  
( Nirgun Bhakthi Kal)

5Hrs/5Crs

**Objectives:**

- 1 To give the Introduction of ancient Hindi Literature...
- 2 To impart the knowledge of the Bhakthi Period.
- 3 To explain the origin and evolution of Gyan Bhakthi.
- 4 To explain the origin and evolution of Prem Bhakthi..
- 5 To give brief introduction of nirgun Bhakthi Poets.

**इकाई-1.भक्तिकाल का सामान्य परिचय ।**

विभिन्न परिस्थितियाँ और विशेषताएँ ।

**इकाई-2.निर्गुण भक्ति की स्थापना -**

1. ज्ञानाश्रयी शाखा, 2. प्रेमाश्रयी शाखा ।

**इकाई-3.ज्ञानाश्रयी शाखा -**

संत काव्य की परंपरा और विकास,संत काव्य की सामान्य प्रवृत्तियाँ और विशेषताएँ।

**इकाई-4.प्रेमाश्रयी शाखा -**

सूफी काव्य की परंपरा और विकास, सूफी काव्य की सामान्य प्रवृत्तियाँ और विशेषताएँ,

**इकाई-5.ज्ञानाश्रयी शाखा, प्रेमाश्रयी शाखा के प्रसिद्ध कवि -**

ज्ञानाश्रयी शाखा के प्रसिद्ध कवि - कबीरदास, गरुनानक, दादुदयाल,

प्रेमाश्रयी शाखा के प्रसिद्ध कवि - कुतुबन, मंझन, मलिकमुहम्मद जायसी

**Text Book :**

- 1 Hindi Sahithia ka Ithikas, Dr.Nagender and Dr.Hardhayal, National Publishing House,2/35 Ansari Road, New Delhi. First Edition 1975, 47th Edition 2014

**References:**

- 1 Hindi Sahithia ka Ithikas, Dr.Lakshmi seka Lokbharathi Prakasan, Mahathmagandhi Road, Allagabad 2013.
- 2 Hindi Sahithia ka Ithikas, Dr.Rajnath Sharma, Agarwal Publication, Hospital road, Agra Road, First Edition 1952, Tenth Edition 2013.
- 3 Hindi sahithia ka Uthpav aur vikas, Mr.Hajariprasad devedi, Rajmahal prakasan,1B,Nethaji Subhaschandra marga, New Delhi-2,1952.
- 4 Aadhunik Hindi Sahithia ka Ithikas, Mr.Batchan singh, Lokbharathi Prakasan, Magathma Gandhi Road, Allagabad.2012.

HIS2427

**हिंदी भाषा का इतिहास - सामान्य परिचय**  
(Hindi Bhasha ka Ithihas- Samanya parichya)

5Hrs/4Crs

**Objectives:**

- 1 To give the adequate necessary of language.
- 2 To give the Introduction of Hindi language.
- 3 To give the knowledge of language family
- 4 To give the knowledge of classification of language family.
- 5 To give the Introduction of Devnagari script.

**इकाई 1 भाषा का परिचय**

भाषा क्या है - भारोपिय परिवार, भारतीय आर्य भाषा, प्राकृत भाषाओं की कुछ विशेषताएँ

**इकाई 2 हिन्दी शब्द व्युत्पत्ति और अर्थ**

हिन्दी शब्द की व्युत्पत्ति  
हिन्दी भाषा का परिमर्तित रूप  
हिन्दी,उर्दू,हिन्दूस्तानी,

**इकाई 3 हिन्दी क्षेत्र और उसकी बोलियाँ**

हिन्दी की भाषी क्षेत्र  
हिन्दी की बोलियाँ  
बोली के प्रकार

**इकाई 4 देवनागरी लिपि का इतिहास**

देवनागरी अंक  
नागरी लिपि  
देवनागरी लिपि की विशेषताएँ

**इकाई 5 हिन्दी शब्द रचना का इतिहास**

समास से शब्द रचना, उपसर्ग से शब्द रचना, प्रत्यय से शब्द रचना

**Text Books:**

1. Hindi Bhasha ka ithikas, Bholanath Diwari, Vani Prakashan, New Delhi- 2014.
2. Hindi samasya ore samathan, Devendra nath Sharma, lok bharathi Prakashan, Illahabad, 2014.

**Reference:**

1. Shaisik viyakaran ore Hindi Bhasha, Dr. Krishna kumar gowswamy, saral prakshan, New Delhi- 2013.

**HIS2516**

**भाषा विज्ञान - सामान्य परिचय**  
(Bhasha Vighyan – Samanya Parichya)

**5Hrs/5Crs****Objectives:**

1. To give the need of language.
2. To give the Introduction of Hindi language.
3. To give knowledge of linguistics
4. To teach the importance of language & linguistics
5. To give the Introduction of Devanagari script.

**इकाई 1 भाषा की परिभाषा**

भाषा विज्ञान की परिभाषा  
भाषा विज्ञान कला है या विज्ञान  
भाषा विज्ञान और व्याकरण

**इकाई 2 भारत में भाषा विज्ञान का कार्य**

भाषा विज्ञान के विभिन्न अंग  
भाषा विज्ञान की उत्पत्ति संबन्धि सिद्धांत  
भाषा का पारिवारिक वर्गीकरण

**इकाई 3 ध्वनि विचार**

ध्वनियों का इतिहास  
ध्वनि विकास के कारण  
ध्वनि नियम

**इकाई 4 रूप और अर्थ विचार**

परिभाषा  
प्रकार  
विशेषताएँ



### इकाई 5 देवनागरी लिपि

- देवनागरी लिपि नामकरण
- हिन्दी में प्रचलित अंग्रेजी शब्द
- देवनागरी लिपि की विशेषताएँ

#### Text Books:

1. Shaisik viyakaran aur Hindi Bhasha, Dr.Krishna kumar goswamy, saral prakshan, Delhi 2013.
2. Hindi Bhasha ka ithikas, Bholanath Diwari, Vani Prakashan, New Delhi- 2014.

#### Reference:

1. Bhasha vigyan, Dakshi bharrath Hindi Prachar shabha, 2014.
2. Hindi Bhasha ka Uthbav ore vikas, Uthy narayan Diwari, lok bharrathi prakashan, 2014.
3. Rastra bhasha Hindi samasya oru smathan, Uthy narayan Diwari, lok bharrathi prakashan, 2014.
4. Bhasha vigyan, Dakshi bharrath Hindi Prachar shabha, 2014

HIS2518

सगुण भक्ति काल  
( Sagun Bhakthi Kal)

5Hrs/5Crs

- 1 To impart the basic knowledge about saguna Bhakthi.
- 2 To impart the basic details about the establishment Saguna Bhakthi..
- 3 To explain the origin and evolution of Lord Ram Bhakthi..
- 4 To explain the origin and evolution of Lord Krishna Bhakthi..
- 5 To give brief introduction of Sagun Bhakthi poets.

### इकाई 1 सगुण भक्तिधारा का सामान्य परिचय ।

भारत में वैष्णव,शैव भक्ति का उदय, वैष्णव और शैव धर्म के विविध रूप और मुख्य आचार्य

### इकाई 2 सगुणभक्ति की स्थापना ।

1.राम भक्ति शाखा 2. कृष्णभक्ति शाखा ।

### इकाई 3 राम भक्ति शाखा - उद्भव और विकास, सामान्य प्रवृत्तियाँ और विशेषताएँ।

### इकाई 4 कृष्णभक्ति शाखा - उद्भव और विकास, अष्टछाप की स्थापना, सामान्य प्रवृत्तियाँ

### इकाई-5 सगुण भक्ति मुख्य कवि -

राम भक्ति शाखा के मुख्य कवि - गोस्वामी तुलसीदास, नरहरिदास, रहीम।

कृष्णभक्ति शाखा के मुख्य कवि - रसखान, मीराबाई, , सूरदास

**Text Book :**

- 1 Hindi Sahithia ka Ithikas, Dr.Nagender and Dr.Hardhayal, National Publishing House,2/35 Ansari Road, New Delhi. First Edition 1975, 47th Edition 2014

**References:**

- 1 Hindi Sahithia ka Ithikas, Dr.Lakshmi seka Lokbharathi Prakasan, Mahathmagandhi Road, Allahabad 2013.
- 2 Hindi Sahithia ka Ithikas, Dr.Rajnath Sharma, Agarwal Publication, Hospital road, Agra Road, First Edition 1952, Tenth Edition 2013.
- 3 Hindi sahithia ka Uthpav aur vikas, Mr.Hajariprasad devedi, Rajmahal prakasan,1B,Nethaji Subhaschandra marga, New Delhi-2,1952.
- 4 Aadhunik Hindi Sahithia ka Ithikas, Mr.Batchan singh, Lokbharathi Prakasan, Magathma Gandhi Road, Allagabad.2012.

**HIS2420****कार्यालय हिंदी  
( Karyalaya Hindi)****4Hrs/4Crs****Objectives:**

- 1.To improve the student's writing skill
- 2.To understand the meaning of drafting and principles of drafting.
- 3.To enable them understand the specialities of drafting
- 4.To make them understand the types of drafting and usage
- 5.To enhance the vocabulary by the means of technical terms.

**इकाई 1 प्रारूपण का अर्थ और प्रमुख तत्व**

- 1.शुद्धता, 2.संक्षिप्तता 3.परिनिष्ठत भाषा 4.परंपरागति पद्धति का अनुकरण

**इकाई 2 प्रारूपण के प्रकार**

- 1.पत्र 2.तार 3.रेडियोग्राम 4.टेलीफोन संदेश 5.पृष्ठांकन 6.कूट संदेश 7.उदघोषणा
- 8.प्रेस नोट 9.विज्ञप्ति 10.प्रेस विज्ञप्ति 11.सूचना 12.कार्यालय ज्ञापन 13.कार्यालय आदेश 14.टेन्डर सूचना 15.विज्ञापन

**इकाई 3 प्रारूपण के लिए ध्यान योग्य बातें**

- 1.पत्र संख्या 2.पत्र भेजनेवाले का नाम और कार्यालय का पता 3.प्रेषक का नाम और पता
- 4.स्पष्ट विषय 5.संबोधन 6.संलग्न 7.प्रतिलिपियाँ का उल्लेख आदि

**इकाई 4 अच्छे प्रारूपण की विशेषता और नमूने**

अच्छे प्रारूपण की विशेषता

- नमूने :-1.विज्ञप्ति पत्र 2.टेण्डर सूचना पत्र 3.विज्ञापन पत्र 4.सूचना पत्र 5.कार्यालय ज्ञापन पत्र

**इकाई 5 टिप्पणी लेखन और हिन्दी के पारिभाषिक एवं तकनीकी शब्द**

- 1.टिप्पण के उद्देश्य एवं विशेषताएँ 2.टिप्पण के अंग 3.टिप्पण के प्रकार
- 4.वाणिज्यिक विषयक पारिभाषिक शब्दावली एवं तकनीकी शब्दावली

**Text Books:**

1. .Aadhunick hindi vyakaran swaroop evam prayog, Dr. Bharathi Khubalkar,Sahni Prakashan
2. Study material-Hindi Higher-5 karyalayi Hindi ,Dr.Maniram,Refer Net.

**References:**

1. Prayogik Hindi : Samanvaya Evam Sampadhan:Ramesh Goutham ,Lekhan:Raj Bardhvaj, Shanjaysingh Bahel,Jithendhraveer Kalra,Orient Publication,Delhi University,Edition-2103
2. Prayojanmoolk Hindi,Vinodh Godhre,Vani Prakashan,New Delhi,Edition:2004-2009
3. Comprehensive English-Hindi Dictionary,Dr.Bholonah Tiwari,Amanath Kapoor,Vishva Prakash Gupta .Edition

HIS2522

**रीतिकाल  
( Rithi Kal)**

**5Hrs/5Crs**

**Objectives:**

1. To give the Introduction to the Post Medieval period
2. To give in depth knowledge of Rithipath poets
3. To give in depth knowledge of Rithisidh poets
4. To give in depth knowledge of Rithimukdh poets
5. To make them understand the specialty of Rithikal

**इकाई 1 रीतिकाल का परिचय**

परिभाषा, रीतिकाव्य का स्वरूप, रीतिकाव्य और तात्पर्य, परिस्थितियें

**इकाई 2 रीतिबद्ध कवियों का परिचय**

रीतिबद्ध कवियों के ग्रंथों का वर्गीकरण  
मतिराम और उनकी रचनाएँ  
केशव और उनकी रचनाएँ

**इकाई 3 रीतिसिद्ध कवियों का परिचय**

बिहारी का परिचय, कंठस्थ दोहे - 10, बिहारी की काव्यगत विशेषताएँ

**इकाई 4 रीतिमुक्त कवियों का परिचय**

कवि आलम और रचना परिचय  
कवि घनानंद और रचना परिचय  
रीति मुक्त कवियों की विशेषताएँ

**इकाई 5 रीतिकाल की विशेषताएँ**

रीतिकालीन अन्य कवियों का परिचय  
रीतिकालीन विशेषताएँ

**Text Book :**

- 1 Hindi Sahithia ka Ithikas, Dr.Nagender and Dr.Hardhayal, National Publishing House,2/35 Ansari Road, New Delhi. First Edition 1975, 47th Edition 2014

**Reference:**

1. Saheithya vethavoom ke seithanth, Dr.ponar chanth dandan, Shive prakashan- 2013.
2. Hindi Navjagaran oru jathiya kathy prambara – Aathar prakashan, New delhi- 2008.
3. Hindi Sahithia ka Ithikas,.Dr.Lakshmi sekar, Lokbharathi Prakassan, Mahathmagandhi Road, Allagabad. 2013.
4. 2.Hindi sahithya ka samsheepth ithihas, Umhes shasthri, Azmer prakashan, jaipur- 2015.

HIS2428

**भारतीय काव्यशास्त्र - सामान्य परिचय**  
( Bharathya Kavyashastra - Samanya Parichya)

5Hrs/4Crs

**Objectives:**

1. To give an Introduction to poetics
2. To give Give knowledge about Indian poetics
3. To give an Introduction and Types of Ras.
4. To give the Introduction to chand & Alangar.
5. To give an Introduction to paschatya Kavya Sasthra.

**इकाई 1 परिचय**

काव्यशास्त्र का परिचय  
भारतीय काव्यशास्त्र परिचय  
रीतिकाल और काव्यशास्त्र

**इकाई 2 रस**

रस के प्रकार, रस सूत्र

**इकाई 3 छंद**

छंद परिचय, प्रकार

**इकाई 4 अलंकार**

प्रकार, विशेषताएँ

**इकाई 5 पाश्चात्य काव्यशास्त्र सामान्य परिचय**

प्लेटो , अरीस्टाटील - अनुकरण सिध्दांत  
अरस्तू - विरेचण सिध्दांत  
विशेषताएँ

**Text Books:**

1. Bharathiya kaviya shastra, Dr.Uthai banu singh, Sanjev offset, New delhi – 2014.
2. Hindi Kaviya ka ithihas, Ramsurub chathur veethi, Lok Bharathi prakashan, Allahabad-2012.

**Reference:**

1. Hindi Bhasha oru Sahithya shiksha, Ratha Krishna Sharma, Ramdhal Sharma, Amala nagori, Lakshmi offset, jaipur- 2016.

**Proposed Changes in the Nomenclature of Code of Courses in III & IV Semesters in the Grid**

S.No.	Existing		Proposed	
	Code	Title	Code	Title
1	HIS2421	नाटक और एकांकी (Natak aur Ekkhangki)	HIS2517	नाटक और एकांकी (Natak aur Ekkhangki)
2	HIS2519	निर्गुण भक्तिकाल ( Nirgun Bhakthi Kal)	HIS2521	निर्गुण भक्तिकाल ( Nirgun Bhakthi Kal)
3	HIS2423	हिन्दी भाषा का इतिहास - सामान्य परिचय (Hindi Bhasha ka Ithihas- Samanya parichya)	HIS2427	हिन्दी भाषा का इतिहास - सामान्य परिचय (Hindi Bhasha ka Ithihas- Samanya parichya)
4	HIS2424	भारतीय काव्यशास्त्र - सामान्य परिचय (Bharathya Kavyashastra - Samanya Parichya)	HIS2428	भारतीय काव्यशास्त्र - सामान्य परिचय (Bharathya Kavyashastra - Samanya Parichya)
5	HIS2517	पत्र लेखन (Samanya Patra Lekhan)	HIS2419	सामान्य पत्र लेखन (Samanya Patra Lekhan)

**DEPARTMENT OF FRENCH (UG)**  
**Programme Structure and Syllabus**  
**for**  
**French – Part – I**  
**With effect from the academic year 2018-2019**

**Study plan for UG students (AIDED) (2017 batch onwards)**  
**Courses offered for UG Programme under Part I**

<b>Semester</b>	<b>Category</b>	<b>Code</b>	<b>Course Title</b>	<b>Hr/ wk</b>	<b>Cr.</b>	<b>Marks</b>
<b>III</b>	<b>Part I</b>	<b>FRE 2201</b>	<b>Advanced French - I</b>	<b>3</b>	<b>2</b>	<b>30</b>
<b>IV</b>	<b>Part I</b>	<b>FRE 2202</b>	<b>Advanced French - II</b>	<b>3</b>	<b>2</b>	<b>30</b>

## FRE 2

### FRE 2201

### ADVANCED FRENCH – I

3hr / wk: 2cr

This course aims to improve the grammar and writing skills and to give an introduction to the French civilisation and literature.

#### Objectives:

Upon successful completion of this course the students will be able to

- i. Use the direct and indirect object pronouns and to write a recipe in French.
- ii. Write sentences using prepositional pronouns.
- iii. Narrate a past event using simple past and past continuous tense.
- iv. Appreciate a French poem.
- v. Write a résumé of a poem and to use the future tense.

Unit 1 Soupe à l'oignon – Les Pronoms Compléments d'Objet – Une recette française.

Unit 2 Jeanne d'arc – Les Pronoms Compléments Prépositionnels

Unit 3 Grandes écoles – Les Temps du Passé I – Raconter un évènement passé.

Unit 4 Déjeuner du matin - Les Temps du Passé II

Unit 5 Demain dès l'aube – Les Temps du Futur

#### Text:

The course material will be provided by the course teacher.

#### Reference Books:

1. Nathalie BIÉ, Philippe SANTINAN, *Grammaire pour adolescents 250 exercices*. (niveau intermédiaire), CLE International, 2006.
2. Denis C. Meyer, *Clés pour la France en 80 Icônes Culturelles*, Hachette, Paris, 2010.

### EVALUATION PATTERN

#### Distribution of Marks for the III Semester

Internal = 20 + 60 + 20 = 100

External = 60 (Duration of Examination: 2 Hrs)

<b>Section A:</b>	Civilisation - ( <b>Qns. 1 to 10</b> ) Multiple Choice Questions (4 choices)	10 x 1 = 10 Marks
<b>Section B:</b>	Grammar exercises ( <b>Qns. 11 to 15</b> ) (Internal choice – Either or)	5 x 4 = 20 Marks
<b>Section C:</b>	Answer any three (Qns. 16 to 20) <b>Qn16.</b> Comprehension (Unseen) <b>Qn 17.</b> Translation (Seen) French to English - 5marks English to French - 5 marks <b>Qn 18.</b> Recipe Writing <b>Qn 19.</b> Résumé of a poem <b>Qn 20.</b> Creative writing using past tenses.	3 x 10 = 30 Marks

Total

60 Marks

FRE 2202

ADVANCED FRENCH –II

3hr / wk: 2cr

This course aims to develop the written communication skills of the students in French and give an introduction to the French culture and literature.

**Objectives:**

Upon successful completion of the course, the students will be able to

- i. Prepare one's Curriculum Vitae in French
- ii. Understand the simple relative pronouns.
- iii. Write an informal invitation and describe a monument in France.
- iv. Get an insight into the XIX century French literature
- v. Write an informal letter and to appreciate a French fable.

Unit 1	Fromage – Les Pronoms relatifs simples I - CV
Unit 2	Napoléon - Les Pronoms relatifs simples II
Unit 3	La Tour Eiffel – Les Pronoms possessifs et Démonstratifs – Une invitation.
Unit 4	Une calligramme de Guillaume Apollinaire – Le mode Conditionnel
Unit 5	Une fable de La Fontaine – Le système hypothétique – Une Lettre

**Text:**

The course material will be provided by the course teacher.

**Reference Books:**

1. Nathalie BIÉ, Philippe SANTINAN, *Grammaire pour adolescents 250 exercices.* (niveau intermédiaire), CLE International, 2006.
2. Denis C. Meyer, *Clés pour la France en 80 Icônes Culturelles*, Hachette, Paris, 2010.

**EVALUATION PATTERN****Distribution of Marks for the IV Semester**

Internal = 20 + 60 + 20 = 100

External = 60 (Duration of Examination: 2 Hrs)

<b>Section A:</b>	Civilisation - (Qns. 1 to 10) Multiple Choice Questions (4 choices)	10 x 1 = 10 Marks
<b>Section B:</b>	Grammar exercises (Qns. 11 to 15) (Internal choice – Either or)	5 x 4 = 20 Marks
<b>Section C:</b>	Answer any three (Qns. 16 to 20) <b>Qn16.</b> Comprehension (Unseen) <b>Qn 17.</b> Translation (Seen) French to English - 5marks English to French - 5 marks <b>Qn 18.</b> CV <b>Qn 19.</b> Résumé of a poem/fable <b>Qn 20.</b> Letter writing.	3 x 10 = 30 Marks

Total

60 Marks



**DEPARTMENT OF FRENCH (UG)  
THE AMERICAN COLLEGE, MADURAI**

**Programme Structure and Syllabus  
for  
French – Part – I  
With effect from the academic year 2018-2019**

**Study plan for UG students (SF) (2017 batch onwards)  
Courses offered for UG Programme under Part I**

<b>Semester</b>	<b>Category</b>	<b>Code</b>	<b>Course Title</b>	<b>Hr/ wk</b>	<b>Cr.</b>	<b>Marks</b>
<b>III</b>	<b>Part I</b>	<b>FRS 2201</b>	<b>Advanced French - I</b>	<b>3</b>	<b>2</b>	<b>30</b>
<b>IV</b>	<b>Part I</b>	<b>FRS 2202</b>	<b>Advanced French - II</b>	<b>3</b>	<b>2</b>	<b>30</b>

**Supportive French (for HIS) – Part III  
Study plan for UG students SF (2018 batch onwards)  
Courses offered to Non-major Students by the Department of French**

**Part III Supportive**

<b>SEM</b>	<b>COURSE NO.</b>	<b>COURSE TITILE</b>	<b>Hrs.</b>	<b>Cr.</b>	<b>Marks</b>
<b>I</b>	<b>FRS 1409</b>	<b>La langue et la civilisation françaises – I</b>	<b>5</b>	<b>4</b>	<b>60</b>
<b>II</b>	<b>FRS 1410</b>	<b>La langue et la civilisation françaises - II</b>	<b>5</b>	<b>4</b>	<b>60</b>

## FRS 2

FRS 2201

ADVANCED FRENCH – I

3hr / wk: 2cr

This course aims to improve the grammar and writing skills and to give an introduction to the French civilisation and literature.

### Objectives:

Upon successful completion of this course the students will be able to

- i. Use the direct and indirect object pronouns and to write a recipe in French.
- ii. Write sentences using prepositional pronouns.
- iii. Narrate a past event using simple past and past continuous tense.
- iv. Appreciate a French poem.
- v. Write a résumé of a poem and to use the future tense.

Unit 1 Soupe à l'oignon – Les Pronoms Compléments d'Objet – Une recette française.

Unit 2 Jeanne d'arc – Les Pronoms Compléments Prépositionnels

Unit 3 Grandes écoles – Les Temps du Passé I – Raconter un évènement passé.

Unit 4 Déjeuner du matin - Les Temps du Passé II

Unit 5 Demain dès l'aube – Les Temps du Futur

### Text:

The course material will be provided by the course teacher.

### Reference Books:

1. Nathalie BIÉ, Philippe SANTINAN, *Grammaire pour adolescents 250 exercices*. (niveau intermédiaire), CLE International, 2006.
2. Denis C. Meyer, *Clés pour la France en 80 Icônes Culturelles*, Hachette, Paris, 2010.

### EVALUATION PATTERN

#### Distribution of Marks for the III Semester

Internal = 20 + 60 + 20 = 100

External = 60 (Duration of Examination: 2 Hrs)

<b>Section A:</b>	Civilisation - ( <b>Qns. 1 to 10</b> ) Multiple Choice Questions (4 choices)	10 x 1 = 10 Marks
<b>Section B:</b>	Grammar exercises ( <b>Qns. 11 to 15</b> ) (Internal choice – Either or)	5 x 4 = 20 Marks
<b>Section C:</b>	Answer any three (Qns. 16 to 20) <b>Qn16.</b> Comprehension (Unseen) <b>Qn 17.</b> Translation (Seen) French to English - 5marks English to French - 5 marks <b>Qn 18.</b> Recipe Writing <b>Qn 19.</b> Résumé of a poem <b>Qn 20.</b> Creative writing using past tenses.	3 x 10 = 30 Marks

Total

60 Marks

FRS 2202

ADVANCED FRENCH –II

3hr / wk: 2cr

This course aims to develop the written communication skills of the students in French and give an introduction to the French culture and literature.

**Objectives:**

Upon successful completion of the course, the students will be able to

- i. Prepare one's Curriculum Vitae in French
- ii. Understand the simple relative pronouns.
- iii. Write an informal invitation and describe a monument in France.
- iv. Get an insight into the XIX century French literature
- v. Write an informal letter and to appreciate a French fable.

Unit 1	Fromage – Les Pronoms relatifs simples I - CV
Unit 2	Napoléon - Les Pronoms relatifs simples II
Unit 3	La Tour Eiffel – Les Pronoms possessifs et Démonstratifs – Une invitation.
Unit 4	Une calligramme de Guillaume Apollinaire – Le mode Conditionnel
Unit 5	Une fable de La Fontaine – Le système hypothétique – Une Lettre

**Text:**

The course material will be provided by the course teacher.

**Reference Books:**

1. Nathalie BIÉ, Philippe SANTINAN, *Grammaire pour adolescents 250 exercices.* (niveau intermédiaire), CLE International, 2006.
2. Denis C. Meyer, *Clés pour la France en 80 Icônes Culturelles*, Hachette, Paris, 2010.

**EVALUATION PATTERN****Distribution of Marks for the IV Semester**

Internal = 20 + 60 + 20 = 100

External = 60 (Duration of Examination: 2 Hrs)

<b>Section A:</b>	Civilisation - (Qns. 1 to 10) Multiple Choice Questions (4 choices)	10 x 1 = 10 Marks
<b>Section B:</b>	Grammar exercises (Qns. 11 to 15) (Internal choice – Either or)	5 x 4 = 20 Marks
<b>Section C:</b>	Answer any three (Qns. 16 to 20) <b>Qn16.</b> Comprehension (Unseen) <b>Qn 17.</b> Translation (Seen) French to English - 5marks English to French - 5 marks <b>Qn 18.</b> CV <b>Qn 19.</b> Résumé of a poem/fable <b>Qn 20.</b> Letter writing.	3 x 10 = 30 Marks

Total

60 Marks

## FRS 4

### Part III Supportive

FRS 1409

La langue et la civilisation françaises – I

5 Hr / 4 Cr

**Syllabus structure:** It is a beginner's course in French Language which is designed for adults. The content is divided into five units that focuses on communication skills and highlights French civilisation. It also develops essential basic structure of the language and vocabulary required for everyday life.

Objective:

- i. To learn to introduce themselves and greet one another and to get introduced the most commonly used names in France.
- ii. To improve their ability to ask and give information about someone and have a basic knowledge about Paris and its regions.
- iii. To express their likes and dislikes and know the significance of colours.
- iv. To develop the communication skills with the help of various activities and to know how people settle in France.
- v. To improve their ability to speak French and get to know the school education system in France.

Unit 1: Je m'appelle Elise. Et vous?

Unit 2: Vous dansez? D'accord.

Unit 3: Monica, Yukiko et compagnie

Unit 4: Les voisins de Sophie

Unit 5: Tu vas au Luxembourg?

### Manual

Sylvie POISSON-QUINTON, Michèle MAHEO-LE COADIC, Anne VERGNE-SIRIEYS, FESTIVAL, CLE Internationale/SEJER, Paris, 2005

### Reference book

Catherine Hugot, Monique Waendendries, Véronique M. Kizirian, ALTER EGO + A1, Cahier d'exercice, Paris, Hachette Livre, 2012.

FRS 1410

La langue et la civilisation française – II

5 Hr / 4 Cr

**Syllabus structure:**

It aims to improve the speaking skills by applying grammar rules and regulations of all tenses and parts of speech and to have a thorough knowledge of French language. The content gives a good exposure to the students about French culture and civilisation which is an integral part of learning a language.

Objectives:

- i. To ask for information about place and understand the usage of prepositions and to get an idea about the university education.
- ii. To indicate an itinerary and how to thank and refuse and get information about metro in France.
- iii. To learn to point out the direction to a destination and have an idea about department stores in France.
- iv. To be able to ask the price of a product and purchase it and become familiar with expressions related to breakfast
- v. To order in a restaurant and get an idea about French menu

Unit 1: Nous venons pour l'inscription.

Unit 2: A vélo, en train, en avion

Unit 3: Pardon, Monsieur, le BHV s'il vous plait?

Unit 4: Au marché

Unit 5: On déjeune ici ?

**Manual**

Sylvie POISSON-QUINTON, Michèle MAHEO-LE COADIC, Anne VERGNE-SIRIEYS, FESTIVAL, CLE Internationale/Sejer, Paris, 2005, ISBN 978-209-035320-4

**Reference book**

Catherine Hugot, Monique Waendendries, Véronique M. Kizirian, ALTER EGO + A1, Cahier d'exercice, Paris, Hachette Livre, 2012.

**EVALUATION PATTERN :****FRS 1409/FRS1410****QUESTION PATTERN****Section A:**

Choisissez la meilleure réponse: (Qns 1 to 20) (20 x 1 = 20)

**Section B:**

Grammaire. (Qns. 21 to 25) (5 x 7 = 35)

(Internal Choice – Either or)

**Section C: Answer any three** (3x15=45)

Qn. 26 Lisez le texte suivant et répondez :

Qn. 27 Traduisez: (Dialogue - French to English - seen)

Qn. 28 Traduction: (15 unseen sentences – English to French)

Qn. 29 Ecrivez deux dialogues.

Qn. 30 Répondez aux questions.

**Total** 100 Marks

## DEPARTMENT OF MATHEMATICS

### Program for B.Sc. Degree in Mathematics

(w.e.f. 2018-19)

Sem.	Part	Course Code	Course Title	Hr/wk	Cr.	Marks
1	I	XXX xxxx	TAM/FRE/HIN	3	2	30
1	II	ENG xxxx	Conversational Skills	3	2	30
1	III M	MAT 1511	Classical Algebra	5	5	75
1	III M	MAT 1411	Analytical Geometry -3D	4	4	60
1	III M	MAT 1413	Differential Calculus	4	4	60
1	III S	MAT 1321	Programming in C	3	3	45
1	III S	MAT 1101	Programming in C - Lab	2	1	15
1	IV LS	XXX xxxx	Life Skill - I	3	2	30
1	IV NME	XXX xxxx	Non-major Elective - I	3	2	30
<b>Total</b>				<b>30</b>	<b>25</b>	<b>375</b>
2	I	XXX xxxx	TAM/FRE/HIN	3	2	30
2	II	ENG xxxx	Reading & Writing Skills	3	2	30
2	III M	MAT 1512	Algebra- I	5	5	75
2	III M	MAT 1412	Analysis -I	4	4	60
2	III M	MAT 1414	Integral Calculus	4	4	60
2	III S	MAT 1322	Objected Oriented Programming in C++	3	3	45
2	III S	MAT 1102	C++ Lab	2	1	15
2	IV LS	XXX xxxx	Life Skill - II	3	2	30
2	IV NME	XXX xxxx	Non-major Elective - II	3	2	30
2	V	XXX xxxx	Ext. Activity NCA/NCN/NSS/PED/SLP		1	15
<b>Total</b>				<b>30</b>	<b>26</b>	<b>390</b>
3	I	XXX xxxx	TAM/FRE/HIN	3	2	30
3	II	ENG xxxx	Study Skills	3	2	30
3	III M	MAT 2511	Algebra -II	5	5	75
3	III M	MAT 2513	Analysis -II	5	5	75
3	III M	MAT 2515	Differential Equations	5	5	75
3	III M	MAT 2411	Statistics- I	4	4	60
3	III S	PHY xxxx	Physics for Mathematics- I	5	4	60
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>

Sem	Part	Course Code	Course Title	Hr/wk	Cr.	Marks
4	I	XXX xxxx	TAM/FRE/HIN	3	2	30
4	II	ENG xxxx	Career Skills	3	2	30
4	III M	MAT 2512	Algebra- III	5	5	75
4	III M	MAT 2514	Analysis- III	5	5	75
4	III M	MAT 2516	Vector Calculus & Trigonometry	5	5	75
4	III M	MAT 2412	Statistics- II	4	4	60
4	III S	PHY xxxx	Physics for Mathematics- II	5	4	60
4	V	XXX xxxx	Ext. Activity NCA/NCN/NSS/PED/SLP		1	15
<b>Total</b>				<b>30</b>	<b>28</b>	<b>420</b>
5	III M	MAT 3611	Mechanics	6	6	90
5	III M	MAT 3613	Graph Theory	6	6	90
5	III M	MAT 3615	Operations Research- I	6	6	90
5	III M	MAT 3511	Combinatorics	5	5	75
5	IV LS	XXX xxxx	Life Skill- III	3	2	30
5	IV	MAT 3200	Environmental Studies	4	2	30
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>
6	III M	MAT 3612	Number Theory	6	6	90
6	III M	MAT 3614	Complex Analysis	6	6	90
6	III M	MAT 3616	Operations Research-II	6	6	90
6	III M	MAT 3512	Fuzzy Mathematics	5	5	75
6	IV LS	XXX xxxx	Life Skill - IV	3	2	30
6	IV	VAL xxxx	Value Education	4	2	30
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>

**Courses offered to Non-major students by the Department of Mathematics (UG)**

**Supportive:**

Sem.	Part	Course Code	Course Title	Hr/wk	Cr.	Marks
1	III S	MAT 1431	Maths for Physics- I	5	4	60
1	III S	MAT 1433	Maths for Economics (ECE & ECO)	5	4	60
2	III S	MAT 1432	Maths for Physics- II	5	4	60
2	III S	MAT 1334	Fundamentals of Computer Applications(ECE &ECO)	3	2	45
2	III S	MAT 1104	Fundamentals of Computer Applications-Lab	2	1	15
3	III S	MAT 2431	Maths for Chemistry- I	5	4	60
3	III S	MAT 2433	Business Statistics (COM)	5	4	60
4	III S	MAT 2432	Maths for Chemistry- II	5	4	60
4	III S	MAT 2434	Business Mathematics (COM)	5	4	60

**Non-Major Elective**

<b>Sem</b>	<b>Part</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hr/wk</b>	<b>Cr.</b>	<b>Marks</b>
1	IV	MAT 1221	Arithmetic & Mathematical Logic	3	2	30
2	IV	MAT 1222	Recreational Mathematics	3	2	30

**Life Skill Courses**

<b>Sem</b>	<b>Part</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hr/wk</b>	<b>Cr.</b>	<b>Marks</b>
1	IV	MAT 1231	Mathematics for Life	3	2	30
2	IV	MAT 1232	Mathematical Reasoning	3	2	30
5	IV	MAT 3231	Mathematics for Competitive Exam.	3	2	30
6	IV	MAT 3232	Developing Quantitative Aptitude	3	2	30



**DEPARTMENT OF MATHEMATICS**  
**Program for B.Sc. Degree in Mathematics (SF)**  
**(w.e.f. 2018-2019)**

Sem.	Part	Course Code	Course Title	Hrs/Wk	Cr.	Marks
1	I	XXX xxxx	TAM/FRE/HIN	3	2	30
1	II	ENS 1201	Conversational Skills	3	2	30
1	III M	MAS 1511	Classical Algebra	5	5	75
1	III M	MAS 1411	Analytical Geometry -3D	4	4	60
1	III M	MAS 1413	Differential Calculus	4	4	60
1	III S	PHS xxxx	Physics for Mathematics - I	5	4	60
1	IV LS	XXX xxxx	Life Skill - I	3	2	30
1	IV NME	XXX xxxx	Non-major Elective - I	3	2	30
<b>Total</b>				<b>30</b>	<b>25</b>	<b>375</b>
2	I	XXX xxxx	TAM/FRE/HIN	3	2	30
2	II	ENS 1202	Reading & Writing Skills	3	2	30
2	III M	MAS 1512	Algebra- I	5	5	75
2	III M	MAS1412	Analysis -I	4	4	60
2	III M	MAS 1414	Integral Calculus	4	4	60
2	III S	PHS xxxx	Physics for Mathematics - II	5	4	60
2	IV LS	XXX xxxx	Life Skill - II	3	2	30
2	IV NME	XXX xxxx	Non-major Elective - II	3	2	30
2	V	XXX xxxx	Ext. Activity NSS/PED/SLP		1	15
<b>Total</b>				<b>30</b>	<b>26</b>	<b>390</b>

Sem.	Part	Course Code	Course Title	Hrs/Wk	Cr.	Marks
3	I	XXX xxxx	TAM/FRE/HIN	3	2	30
3	II	ENS 2201	Studies Skills	3	2	30
3	III M	MAS 2511	Algebra -II	5	5	75
3	III M	MAS 2513	Analysis -II	5	5	75
3	III M	MAS 2515	Differential Equations	5	5	75
3	III M	MAS 2411	Statistics- I	4	4	60
3	III S	COS xxxx	Programming in C	5	4	60
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>
4	I	XXX xxxx	TAM/FRE/HIN	3	2	30
4	II	ENS 2202	Career Skills	3	2	30
4	III M	MAS 2512	Algebra- III	5	5	75
4	III M	MAS 2514	Analysis- III	5	5	75
4	III M	MAS 2516	Vector Calculus & Trigonometry	5	5	75
4	III M	MAS 2412	Statistics- II	4	4	60
4	III S	COS xxxx	Programming in C++	5	4	60
4	V	XXX xxxx	Ext. Activity NSS/PED/SLP		1	15
<b>Total</b>				<b>30</b>	<b>28</b>	<b>420</b>

Sem.	Part	Course Code	Course Title	Hrs/Wk	Cr.	Marks
5	III M	MAS 3611	Mechanics	6	6	90
5	III M	MAS 3613	Graph Theory	6	6	90
5	III M	MAS 3615	Operations Research- I	6	6	90
5	III M	MAS 3511	Combinatorics	5	5	75
5	IV LS	XXX xxxx	Life Skill- III	3	2	30
5	IV	MAS 3200	Environmental Studies	4	2	30
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>
6	III M	MAS 3612	Number Theory	6	6	90
6	III M	MAS 3614	Complex Analysis	6	6	90
6	III M	MAS 3616	Operations Research- II	6	6	90
6	III M	MAS 3512	Fuzzy Mathematics	5	5	75
6	IV LS	XXX xxxx	Life Skill - IV	3	2	30
6	IV	VAL xxxx	Value Education	4	2	30
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>

### Courses offered to Non-major students by the Department of Mathematics (UG)

#### Supportive:

Sem.	Part	Course Code	Course Title	Hrs/Wk	Cr.	Marks
1	III	MAS 1431	Maths for Physics- I	5	4	60
1	III	MAS 1433	Discrete Mathematics (BCA)	5	4	60
1	III	MAS 1435	Maths for Chemistry - I	5	4	60
1	III	MAS1439	Business Statistics ( CPA )	5	4	60
2	III	MAS 1432	Maths for Physics- II	5	4	60
2	III	MAS 1434	Discrete Mathematics (COS)	5	4	60
2	III	MAS 1436	Maths for Chemistry – II	5	4	60
2	III	MAS 1438	Statistics (BIT)	5	4	60
2	III	MAS 1440	Business Statistics(BBA)	5	4	60
2	III	MAS 1446	Business Mathematics ( CPA )	5	4	60
3	III	MAS 2431	Operations Research (BIT)	5	4	60
3	III	MAS 2433	Business Statistics (CME)	5	4	60
3	III	MAS 2437	Business Statistics (CIT)	5	4	60
3	III	MAS 2439	Quantitative Techniques (BBA)	5	4	60
3	III	MAS 2475	Business Statistics (CMC)	5	4	60
3	III	MAS 2477	Numerical and Statistics Methods (COS)	5	4	60
4	III	MAS 2434	Business Mathematics (CME)	5	4	60
4	III	MAS 2438	Business Mathematics (CIT)	5	4	60
4	III	MAS 2440	Operations Research (BCA)	5	4	60
4	III	MAS 2454	Biostatistics (BCH)	5	4	60
4	III	MAS 2466	Business Mathematics (CMC)	5	4	60
4	III	MAS 2472	Biostatistics (MIC)	5	4	60

**Non-Major Elective:**

<b>Sem.</b>	<b>Part</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hrs/Wk</b>	<b>Cr.</b>	<b>Marks</b>
1	IV	MAS 1221	Arithmetic & Mathematical Logic	3	2	30
2	IV	MAS 1222	Recreational Mathematics	3	2	30

**Life Skill Courses:**

<b>Sem.</b>	<b>Part</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hrs/Wk</b>	<b>Cr.</b>	<b>Marks</b>
1	IV	MAS 1231	Mathematics for Life	3	2	30
2	IV	MAS 1232	Mathematical Reasoning	3	2	30
5	IV	MAS 3231	Mathematics for Competitive Examinations	3	2	30
6	IV	MAS 3232	Developing Quantitative Aptitude	3	2	30

MAT 1511/MAS 1511

CLASSICAL ALGEBRA

5 hrs / 5cr

**Objective:**

This is a foundational course for any student aspiring to complete B.Sc., degree in Mathematics. The students are introduced to the different methods of solving polynomials with real coefficients. The second section is devoted to the relation between arithmetic mean, geometric mean and harmonic mean and their subsequent applications. The third section deals with the elementary properties of matrices and their use in solving simultaneous linear equations. The binomial, exponential and logarithmic series are introduced and is used to find out the approximate values of certain rational indices.

After the end of this course students will be able to

- acquire the knowledge of basic algebra and its applications
- solve simultaneous linear equation using matrices

**Unit I:** Theory of Equations: – Relation between roots and coefficients – Symmetric functions of roots – Formation of equation – Transformation of equation.

**Unit II:** Reciprocal equation – Descartes' rule of signs – Diminishing and increasing the roots – Newton's method of divisors – Horner's method.

**Unit III:** Inequalities: – A.M., G.M., H.M. and applications – Cauchy Schwartz inequality – Weierstrass inequality – Applications to maxima and minima.

**Unit IV:** Binomial, Exponential and Logarithmic series – Approximations.

**Unit V:** Types of Matrices – Elementary transformations – Inverse of a matrix and Rank of matrix using elementary transformations – Solution of simultaneous linear equations – Eigen values and Eigen vectors - Cayley Hamilton theorem –Diagonalization.

**Text Books:**

1. Manickavachagom Pillay. T. K, Natarajan. T and Ganapathy. K. S, Algebra Vol I and II, S.Viswanathan Pvt. Ltd., 2013.
  - Unit I:** Vol I: Chapter 6 (sec 9-12, 15.1-15.2)
  - Unit II:** Vol I: Chapter 6 (Sec 15.3, 16.1-18, 24.1-24.3 and Sec 29.4- 30.1)
  - Unit III:** Vol II: Chapter 4 (Sec 1-6, 8-13)
  - Unit IV:** Vol I: Chapter 3 (Sec 1-1.2, 10, 14); Chapter 4 (Sec2, 3,5-9)
  - Unit V:** Vol II: Page no 114-115.
2. Arumugam.S., Thangapandian Isaac .A, Modern Algebra, SciTech publications Pvt. Ltd, 1996.
  - Unit V:** Chapter 7 (sec 7.4 – 7.8)

**Reference Books:**

1. Arumugam. S, Thangapandian Isaac. A, Theory of Equations, New Gamma Publishing House, 1996.
2. Khanna .M. L, Matrices, S. Chand and Co., 1998.

MAT 1411 / MAS 1411

ANALYTICAL GEOMETRY-3D

4hrs / 4cr

**Objective:**

This is a foundational course for any student aspiring to complete B.Sc., degree in Mathematics. Analytical geometry is a conventional mathematics course which deals with geometrical objects in their analytical form. The first two units are entirely devoted for understanding objects such as planes and lines in three dimensions. The coplanarity of two straight lines or they being skew lines is dealt. The analytical form of a sphere, cone and cylinder are introduced.

After the end of this course students will be able to

- classify and identify different problem types in analytical geometry and select suitable problem solving techniques.
- identify and use applicable math study skills in analytical geometry.

**Unit I:** Rectangular Cartesian co-ordinates – Direction ratios and Direction cosines.

**Unit II:** The plane- Angle between the planes- Equation of a plane through the line of intersection of two given planes- Length of the perpendicular- Equation of the planes bisecting the angle between the planes.

**Unit III:** Straight lines-Symmetrical form of equation of the lines- Equation of straight line passing through two given points.

**Unit IV:** Plane and the straight line- Coplanarity of straight lines- Shortest distance between two given lines-Intersection of three planes- Volume of a tetrahedron.

**Unit V:** Standard equation of sphere-Results based on the properties of a sphere -Tangent plane to a sphere- Equation of a circle- Introduction to cone and cylinder.

**Text Book:**

Manicavachagom pillay. T.K, and Natarajan .T, Analytical Geometry Part II 3D, S.Viswanathan Pvt. Ltd., 2006.

**Unit I:** Chapter 1

**Unit II:** Chapter 2

**Unit III:** Chapter 3 (Sec 1-4)

**Unit IV:** Chapter 3 (Sec 5-11 except section 9)

**Unit V:** Chapter 4, Chapter 5 (Cone and cylinder –Definition and related problems in Right circular cone and Right circular cylinder)

**Reference Books:**

1. Durai Pandian. P, Analytical Geometry, Asia Publishing House, 1968.
2. Arumugam. S, and Thangapandian Isaac.A , Analytical Geometry, New Gamma Publishing house, 1996.
3. Qazi zameeruddin, khanna V K, Solid Geometry, Vikas publishing house pvt. Ltd 1997

MAT 1413 / MAS 1413

DIFFERENTIAL CALCULUS

4hrs / 4cr

**Objective:**

This is a foundational course for any student aspiring to complete B.Sc., degree in Mathematics. The calculus is the science of determining the effect of very small change. Different methods of calculating the derivative of a function and the interpretation of derivative at different circumstances are dealt in detail. The functions involving more than one variable and the rate of change with respect to one variable are attributed as partial derivative. The application of partial derivatives as a tool for engineers, scientists and social scientists are illustrated.

At the end of this course students can be able to

- understand the idea of derivative. They can use derivative to explore the behavior of given function and solve extreme value problems.
- compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule
- differentiate exponential, logarithmic, and trigonometric and inverse trigonometric functions.
- obtain expressions for higher order derivatives of a function using the rules of differentiation

**Unit I:** Differentiation – Standard form – Function of function rule – Hyperbolic function – Inverse function – Substitution - Logarithmic function – Transformation – Implicit function – one function with respect to other function.

**Unit II:** Successive differentiation,  $n^{\text{th}}$  derivatives – Leibnitz formula for  $n^{\text{th}}$  derivative of a product.

**Unit III:** Interpretation of derivatives - Tangent and Normals – Maxima and Minima of single variable.

**Unit IV:** Envelope – Curvature – Center of curvature – Radius of curvature – Evolutes and Involutives.

**Unit V:** Partial differentiation – Errors and approximation – Maxima and Minima for functions of two or more variables.

**Text Book:**

Narayanan. S. and Manickavachagom Pillay. T.K., Calculus Vol I, Viswanathan Pvt Ltd, 2013.

**Unit I:** Chapter- II (Sec 3-6)

**Unit II:** Chapter- III

**Unit III:** Chapter -V (Sec 1) and Chapter-IX

**Unit IV:** Chapter-X

**Unit V:** Chapter-VIII

**Reference Books:**

1. Arumugam. S and Thangapandian Isaac. A , Calculus Vol I, New Gamma Publishing House, 2013.
2. Shanti Narayan and Dr. Mittal.P.K, Differential Calculus, S.Chand & company Ltd, 2005.

**MAT1321****PROGRAMMING IN C****3hrs / 3cr****Objective:**

This is a supportive course for all students aspiring to complete B.Sc., degree in Mathematics. This course introduces the syntax of the programming in C and develops the skills in writing programs.

On successful completion of the course the student will be able to

- write programs in C related to the problems they encounter in day-to-day life and validate in the computer lab.

**Unit I:** Introduction to C- History- Identifiers- Keywords- Variables-Data types - Operators and Expressions - Input and Output statements.

**Unit II:** Conditional statements: simple if, if-else, nested if-else, else if ladder, switch and goto statement-Looping statements: while, do-while and for statements -Nesting of loops.

**Unit III:** Introduction to Arrays- One dimensional- Two dimensional and Multi dimensional array- Array of Characters - Strings - String functions.

**Unit IV:** Introduction to Modular Programming: Functions-Call by Value-Call by reference Category of functions-Nesting of functions-Recursion.

**Unit V:** Introduction to structures and unions- Array of structures-Array within Structures- Structures within Structures-Structures and Functions- Introduction to pointers.

**Text Book:**

Balagurusamy. E, Programming in ANSI C, Tata McGraw-Hill, Third Edition, 2013.

**Unit I:** sections 1.1-1.10; 2.2-2.14; 3.2-3.16; 4.1-4.5

**Unit II:** sections 5.1-5.9; 6.1-6.5

**Unit III:** sections 7.1-7.8; 8.1-8.8

**Unit IV:** sections 9.1-9.18

**Unit V:** sections 10.1-10.13; 11.1-11.5

**Reference Books:**

1. LesHanCock, Morris Kringer, C Primer, McGrawHill, 1997.
2. Y. Kanetkar, Understanding Pointers in C, 4<sup>th</sup> Edition, BPB publications, New Delhi.
3. D. M. Ritchie, The C programming language, Prentice Hall of India, 1977.
4. C. Gottfried, Programming in C, Schaum outline series, 1996.
5. P.Pandiyaraja, Programming in C, Vijay Nicole Imprint Private Limited, 2005.

**MAT 1101                      PROGRAMMING IN C-LAB                      2hrs/1cr**

**Objective:**

This course is mainly concentrates on programming concepts of C and its implementation.

It makes the students to be familiar with the syntax and structure of C programming language and it enables them to write programs to solve real world problems using C concepts.

- |  |      |
|--|------|
| 1. Programs on formatted input/output.                             | (2h) |
| 2. Programs using conditional statements.                          | (3h) |
| 3. Programs using looping statements.                              | (3h) |
| 4. Programs using one-dimensional array.                           | (2h) |
| 5. Programs using two-dimensional array.                           | (2h) |
| 6. Programs related to strings and string functions.               | (2h) |
| 7. Programs using functions (Nesting of functions, recursion etc.) | (2h) |
| 8. Programs on structures and unions.                              | (2h) |
| 9. Basic programs using pointers.                                  | (1h) |

**MAT 1512 / MAS 1512                      ALGEBRA - I                      5hrs / 5cr**

**Objective:**

This is a basic course for any student aspiring to complete B.Sc., degree in Mathematics. The essence of mathematical logics and its ramifications in the study of mathematics is introduced. Basic properties of sets which are needed for the study of algebra are introduced. The students are exposed to the basic algebraic structure called group. Subsequently the properties of groups and imbedding a group in a bigger group called the group of symmetries are dealt with. The algebraic equivalence of any two groups is studied by means of isomorphism.

After completing the course, the students will be able to

- write an argument using logical notation, understand the basic principles of sets and operations in sets
- demonstrate an understanding of relations, functions and groups.

**Unit I:** Statement- Negation – Disjunction – Statement formulas and truth tables – Conditional and Bi-conditional statements – Tautologies – Equivalence of formulas – Normal forms – Theory of inference and predicate calculus.

**Unit II:** Introduction to set theory – Cartesian products – Relations – Properties of binary relations – Partition and covering of a set – Equivalence relations – Compatibility relation – Partial ordering – Functions – Peano axioms and mathematical induction.



**Unit III:** Equivalent definitions of a group – Permutation groups – Cyclic group – Cosets – Lagrange's theorem.

**Unit IV:** Normal subgroup – Quotient group – Cayley's theorem.

**Unit V:** Homomorphism – Isomorphism – Automorphism – Inner Automorphism – Fundamental theorems of homomorphism.

**Text Books:**

1. Tremblay.J.P, Manohar.R, Discrete Mathematical Structure with applications to Computer science, Tata McGraw – Hill, 2011.  
**Unit I:** Chapter 1(sec 1.1 - 1- 2.11, 1.3 - 1- 3.4, 1- 4.2 and 1-6.4)
2. Arumugam. S, & Thangapandian Issac. A, Modern algebra, New gamma publication House, 2013.  
**Unit II:** Chapter 1 (sec 1.0 -1.8) and Chapter 2 (sec 2.1 - 2.5)  
**Unit III:** Chapter 3(sec 3.0 - 3.8 )  
**Unit IV:** Chapter 3(sec 3.9 and 3. 10)  
**Unit V:** Chapter 3(sec 3.11)
3. Dr. Venkataraman. M.K, Dr. Sridharan N, Chandrasekaran.N, Discrete Mathematics, The National Publication Company, 2013.  
**Unit II:** Chapter 4 (sec 2)

**Reference Books:**

1. Vijay K. Khanna and Bhambri. S.K, A course in Abstract Algebra, 1998
2. Joseph A. Gallian, Contemporary Abstract Algebra,8<sup>th</sup> Edition, Brooks/Cole Cengage Learning, 2013.
3. Rao, Abstract Algebra, Vijay Nicole, 2012.

**MAT 1412 / MAS 1412**

**ANALYSIS - I**

**4 hrs / 4cr**

**Objective:**

In many ways, this course is the true gateway into the mathematics major, requiring rigorous proofs, introducing important topological concepts and laying the groundwork for Algebra and Topology.

- Students will be able to describe fundamental properties of real numbers that lead to the formal development of Real analysis.
- They can demonstrate an understanding of limits and how they are used in sequence and series.

**Unit I:** The Algebraic and order properties of  $\mathbb{R}$  – Supremum and Infimum – Completeness property of  $\mathbb{R}$  – Archimedean property – Characterization of intervals – Countable sets – Uncountable sets.

**Unit II:** Sequences – Limits of a sequence – Convergent sequences – Divergent sequences – Bounded sequences – Monotone sequences – Operations on convergent sequences – Operations on divergent sequences.

**Unit III:** Limit superior – Limit inferior – Bolzano – Weierstrass theorem - Cauchy sequences.

**Unit IV:** Definition of infinite series – Sequence of partial sums – Convergence and Divergence – series with negative terms -Alternating series - Conditional convergence and Absolute convergence

**Unit V:** Test for absolute convergence – Series whose terms form a non-increasing sequence.

**Text Books:**

1. Shanthi Narayanan & M.D Raisinghania, Elements of Real Analysis, S.Chand & Company Ltd., 2011.

**Unit I:** Chapter 1 (sec1.5), Chapter 2 (sec 2.2 - 2.8, 2.11)

2. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH publishing co. Pvt. Ltd, New Delhi, 2010.

**Unit I:** Chapter 1 (sec 1.5)

**Unit II:** Chapter 2 (sec2.1 - 2.8)

**Unit III:** Chapter 2 (sec 2.9, 2.10)

**Unit IV:** Chapter 3 (sec 3.1 - 3.4)

**Unit V:** Chapter 3 (sec 3.6 - 3.7)

**Reference Books:**

1. Bartle. R .G and Sherbert. D.R, Introduction to Real Analysis, John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Ross.K.A, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE) Indian reprint, 2004.
3. Howie J.M, Real Analysis, Springer, 2007.
4. Ghorpade and Limaye, A course in Calculus and Real Analysis, Springer, 2006.
5. Deshpande. J.V, Mathematical Analysis and Applications, Alpha science International, 2004.

**MAT1414 / MAS 1414**

**INTEGRAL CALCULUS**

**4hrs / 4cr**

**Objective:**

This is a foundational course for any student aspiring to complete B.Sc degree in Mathematics. The concept of integration as a limit of summation is introduced. The different methods of integration dealt with. The applications of integration in physical sciences, biological sciences and social sciences are discussed. The Beta and Gamma functions in terms of integration are introduced and their properties are studied in detail.

- The students should gain the wide knowledge of Integral Calculus and its applications
- They can use the Fundamental Theorem of Calculus to evaluate definite integrals
- They can use definite integrals to calculate the area of the region under a curve and the area of the region between two curves.

**Unit I:** Integration-Standard methods-Bernoulli's formula- Definite integral.

**Unit II:** Reduction formula- Integration as summation.

**Unit III:** Geometrical Applications of Integration- Area Volume and length of the curve - Evaluation of Double and Triple Integrals.

**Unit IV:** Changing the order of Integration – Change of Variables-Applications in Double and Triple integrals.

**Unit V:** Beta and Gamma functions - Recurrence formula for Gamma functions-Properties of Beta functions - Relation between Beta and Gamma functions.

**Text Book:**

Narayanan. S, and Manickavachagom Pillay.T.K, Calculus Vol. I and Vol. II, Viswanathan Pvt Ltd, 2002

**Unit I:** Chapter 1(sec 1 to 7.4, 8, 10 – 12, 15.1)

**Unit II:** Chapter 1(sec 13.1- 13.10 and 15.2 – 15.3)

**Unit III:** Chapter 2(sec 1.1 – 1.4, 3, 4.1), Chapter 5(sec 2.2, 4)

**Unit IV:** Chapter 5: Page no.208-213; Chapter 6(sec 2.2 – 2.4)

**Unit V:** Chapter 7(Sec 2.1 – 2.3, 3 – 5).

**Reference Book:**

Arumugam. S and Thangapandian Isaac. A, Calculus Vol. I and Vol. II, New Gamma Publishing House, 2001.

**MAT1322 OBJECT ORIENTED PROGRAMMING IN C++**

**3hrs / 3cr**

**Objective:**

This is a supportive course for all students aspiring to complete B.Sc., degree in Mathematics. This course introduces the object oriented programming structure in C++ and develops the skills in writing programs.

On successful completion of the course the student will be able to

- write programs in C++ related to the problems they encounter in day-to-day life and validate in the computer lab.

**Unit I:** Principles of OOP-Objects- Classes- Inheritance- Reusability- Polymorphism and Overloading- Tokens- Expressions- Conditional statements- Looping statements- Console I/O.

**Unit II:** Functions in C++ - Function prototyping- Call by reference- Return by reference- Default arguments- Constant arguments- Function overloading- Inline and Friend function.

**Unit III:** Classes and objects-Specifying a class-Defining member functions- Nesting of member functions- Private member functions- Private member functions- Array with a class- Static member functions- Array of objects- Constructor and Destructors.

**Unit IV:** Operator overloading-Overloading function- Overloading unary operators using member and friend functions- Overloading binary operators using member and friend functions.

**Unit V:** Type conversion- Inheritance: levels of inheritance- Multiple inheritance- Multilevel inheritance- Hierarchical inheritance, Hybrid inheritance- Virtual base classes-Introduction to files.

**Text Book:**

Balagurusamy. E., Object Oriented Programming with C++, Tata McGraw-Hill, 2008.

**Unit I:** Sections 1.3-1.8; 2.1-2.8; 3.1-3.24

**Unit II:** Sections 4.1-4.11

**Unit III:** Sections 5.3-5.18; 6.2-6.11

**Unit IV:** Sections 7.1-7.8

**Unit V:** Sections 8.1-8.9; 11.1-11.6

**Reference Books:**

1. H. Schildt, C++ complete reference, MC Graw Hill, 1995.
2. R. Rajaram, Object Oriented Programming and C++, New age international publishers, New Delhi, 1998.
3. A.Chandra Babu & T. Joshuva Devadass, Programming with C++, Narosha Publishing House Ltd., 2008.
4. P. Pandiyaraja, Object Oriented Programming with C++, S.Viswanathan Pvt.,Ltd., 2008.

**MAT 1102 OBJECT ORIENTED PROGRAMMING IN C++ LAB 2hr / 1cr**

**Objective:**

The objective of the course is to learn the fundamental programming concepts and methodologies which are essential to build a C++ programs.

It enables them to write programs using these concepts and to practice them in the C++ programming language via laboratory experiences.

- |  |      |
|--|------|
| 1. Programs using scanf and printf statements.                         | (1h) |
| 2. Programs using conditional statements.                              | (2h) |
| 3. Programs using looping statements.                                  | (2h) |
| 4. Programs using functions (inline function, default arguments etc..) | (1h) |
| 5. Programs using the concept of function overloading.                 | (1h) |
| 6. Programs related to classes and objects.                            | (2h) |
| 7. Programs using static member function and arrays of objects.        | (2h) |
| 8. Programs using the concept of friend and virtual functions.         | (2h) |
| 9. Programs on Constructors and Destructors.                           | (2h) |
| 10. Programs on Operator overloading.                                  | (2h) |
| 11. Programs related to Inheritance.                                   | (2h) |
| 12. Basic programs on files.   | (1h) |

MAT 2511 / MAS 2511

ALGEBRA - II

5hrs / 5cr

**Objective:**

The objective of this course is to create awareness on the existing structures such as rings, fields, lattices and their relevance in the contemporary world. This course deals with basic ideas in Ring theory, Fields and Lattices.

After the end of the course the students will able to

- explain the fundamental concepts of advanced algebra such as groups and rings and their role in modern mathematics and applied contexts
- demonstrate accurate and efficient use of advanced algebraic techniques
- demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra

**Unit I:** Introduction to Rings – Types of rings – Sub rings – Examples.

**Unit II:** Ideals – Integral domain – Quotient rings – Maximal ideal – Prime ideal – Homomorphism of rings.

**Unit III:** Introduction to Fields – Field of quotients – Ordered integral domain – Unique Factorization Domain – Euclidean Domain – Principal ideal domain.

**Unit IV:** Polynomial rings - Eisenstein Criterion.

**Unit V:** Lattices – Modular Lattice -Distributive lattice– Boolean algebra - Boolean ring – Boolean functions – Canonical form.

**Text Book:**

Arumugam. S and Thangapandian Isaac. A, Modern Algebra, SCITECH Publications Private Limited, 2006.

**Unit I:** Chapter 4 (sec 4.1- 4.6)

**Unit II:** Chapter 4 (sec 4.7- 4.10)

**Unit III:** Chapter 4 (sec 4.11- 4.15)

**Unit IV:** Chapter 4 (sec 4.16- 4.18)

**Unit V:** Chapter 9 (sec 9.0- 9.5)

**Reference Books:**

1. Sharma. J.N and Vashishtha. A.R, Linear Algebra, Krishna Prakasha Mandir, 1981.
2. Vijay K Khanna, Bhambri.S.K, A Course in abstract algebra, Vikas publishing house pvt. Ltd, 2013.

MAT 2513 / MAS 2513

ANALYSIS - II

5hrs / 5cr

**Objective:**

The course deals with metric spaces which is a classical extension of the real line and its properties in terms of the distance. The course introduces to the students, metric spaces and its properties. The properties like connectedness, completeness and compactness which are inherent in nature in the real line are extended to the metric spaces. Also properties like continuity and uniform continuity are exploited.

After the end of the course the students will able to

- explain the fundamental concepts of advanced analysis such as metric spaces their role in modern Mathematics and applied contexts
- demonstrate capacity for Mathematical reasoning through analyzing, proving and explaining concepts from analysis

**Unit I:** Introduction to limits - Limit and continuity - Continuous Functions- Discontinuity - Types of discontinuity - Intermediate value theorem and its consequences.

**Unit II:** Metric spaces- Open sets- Limit point- Closed sets- Closure of a set- Properties of closure of a set- Interior of a set- Properties of interior of a set- Dense sets- Nowhere dense sets - Limits in metric spaces- Reformulation of definition of continuous functions- Baire's theorem- Uniform continuity.

**Unit III:** Connected metric spaces- Separated sets- Connected and Disconnected sets- Connectedness of product of connected metric spaces- Continuity and Connectedness.

**Unit IV:** Completeness - Totally Boundedness.

**Unit V:** Compact metric spaces- Continuous functions on compact metric spaces- Continuity of the inverse function - Bolzano-Weierstrass theorem.

**Text Books:**

1. Shanthi Narayan and Raisinghania.M.D, Elements of Real Analysis, Sultan Chand & Company Limited, 2010.  
**Unit I:** Chapter 8 (Sec 8.4-8.6, 8.11-8.14, 8.16, 8.17)
2. Arumugam Issac, Modern Analysis, New Gamma Publishing House, 2006.  
**Unit II:** Chapter 2  
**Unit III:** Chapter 5  
**Unit IV:** Chapter 3  
**Unit V:** Chapter 6

**Reference Books:**

1. Richard R. Goldberg, Methods of Real Analysis, New Delhi: Oxford & IBH Publishing Company Private Limited 2002.
2. Sharma. J.N and Vasistha .A.R, Real Analysis, Krishna Prakashan Media (P) Limited, 1997.
3. Bartle .R.G.and Sherbert .D.R., Introduction to Real Analysis, Singapore: John Wiley and sons (Asia) Private Limited 2002.

4. Ross .K.A, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian Reprint, 2004.
5. Howie .J.M, Real Analysis, Springer, 2007.
6. Shirali, S. and H.L.Vasudeva, Metric Spaces, Springer, 2001.
7. Malik, S.C. and Savita Arora, Mathematical Analysis, New Age International Publishers, 2001

MAT 2515 / MAS 2515

DIFFERENTIAL EQUATIONS

5hrs / 5cr

**Objective:**

The objective of this course is to enable the students to solve various types of differential equations and to apply them in various fields. The topics covered includes formation of differential equations, solving various types of ordinary and partial differential equations, Laplace transforms and Laplace transforms as tool for solving differential equations.

After the end of the course the students will able to

- solve and apply linear differential equations of second order
- solve linear differential equations using the Laplace transform.

**Unit I:** Ordinary differential equation – Non-Homogeneous equations of the first degree in x and y – Bernoulli's equation -First order and first degree exact equation – Integrating factors – Equations of the first order but of higher degree – Equations solvable for p, y and x and Clairaut's form.

**Unit II:** Linear differential equations with constant coefficients – Particular integrals – Second order homogeneous equations with variable coefficients – Equations reducible to the linear homogeneous equations – Variation of parameters – Simultaneous differential equations of the form  $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$  -n<sup>th</sup> order exact differential equations – Orthogonal trajectory.

**Unit III:** Partial differential equations of the first order – Derivation of partial differential equations – Classification of integrals – Lagrange's method of solving linear Partial differential equations – Standard forms – Equations reducible to the standard forms.

**Unit IV:** Laplace transforms – Developing the theory to use it as a tool - Laplace transform of periodic functions – Some general theorems – Evaluation of integrals – Inverse Laplace transform.

**Unit V:** Solving ordinary differential equation with constant coefficients, variable coefficients and simultaneous linear equation using Laplace transform.

**Text Books:**

1. Narayanan. S and Manickavachagom Pillay.T.K, Calculus Vol.III, S.Viswanathan Private Limited, 2012.  
**Unit I** : Chapter 1 (sec 1.1 - 6.1)  
**Unit II** : Chapter 1 (sec 8.1), Chapter 2 (sec 1- 4 and 8-10), Chapter 3 (sec 2 – 4)  
**Unit III**: Chapter 4 (sec 1- 7)  
**Unit IV**: Chapter 5 (sec 1- 7)  
**Unit V**: Chapter 5(sec 8-10)
2. Raisinghania M. D , Ordinary and Partial Differential Equations , S. Chand and Company Ltd, New Delhi, 1997.  
**Unit II**: Part II- ODE, Chapter 3(sec 3.1- 3.4).

**Reference Books:**

1. Narayanan S and Manickavachagom Pillay.T.K, Differential Equations, S.Viswanathan Private Limited, 1996.
2. Arumugam.S and Thangapandian Isaac .A, Differential Equations, New Gamma Publishing House, 2002.

**MAT 2411 / MAS 2411****STATISTICS – I****4hrs / 4cr****Objective:**

The objective of the course is to enable the students to understand the theoretical background of statistics as a student of Mathematics. The course essentially deals with the probability distribution theory which is the basis of statistics. The topics covered includes Correlation and Regression and curve fitting.

On successful completion of the course the student will be able to:

- identify discrete and continuous random variables.
- apply distribution into various problems.
- calculate the relation between the different parameters in real life.
- fit the appropriate curve.

**Unit I:** Sample space – Random Variable - Discrete and continuous Distribution function- Probability density function - joint probability function.

**Unit II:** Mathematical expectation and generating functions – Moment generating function- Chebyche's inequality- Law of large numbers.

**Unit III:** Theoretical Discrete and continuous distributions- Binomial, Poisson, Normal, Gamma, Exponential, Rectangular, Uniform distributions- Standard properties.

**Unit IV:** Correlation and Regression.

**Unit V:** Method of least squares – Curve fitting- linear, polynomial, exponential and logarithmic.



**Text Books:**

1. Arumugam. S and Thangapandian Isaac.A, Statistics, New Gamma Publications Private Limited, 2003.
  - Unit I:** Chapter 12 (sec 12.1-12.3)
  - Unit II:** Chapter 12 (sec 12.4 -12.6)
  - Unit III:** Chapter 13
  - Unit IV:** Chapter 6(sec 6.1- 6.4)
  - Unit V:** Chapter 5
2. Gupta. S.C and Kapoor.V.K, Mathematical Statistics, Sultan Chand and Sons 2001.
  - Unit 1:** Chapter 5 (sec 5.5.1-5.5.4)
  - Unit II:** Chapter 6 (sec 6.12, 6.13, 6.13.1)
  - Unit III:** Chapter 8 (sec 8.1, 8.3, 8.6)

**Reference Book:**

1. Manmohan Gupta, Statistics, Sultan Chand and Sons, 2001.

**MAT 2512 / MAS 2512****ALGEBRA - III****5hrs / 5cr****Objective:**

The objective of this course is to enable the students to understand the basic ideas of vector spaces as algebraic structure, linear transformations and their relations to matrices are also dealt with. The topics covered in this course are vector spaces, inner product space, linear transformations and matrix of linear transformation.

After the end of the course the students will be able to

- explain the fundamental concepts of advanced algebra such as vector space and their role in modern mathematics and applied contexts
- demonstrate accurate and efficient use of advanced algebraic techniques
- demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra

**Unit I:** Vector space – Subspace – Quotient space.

**Unit II:** Spanning set – Linear independent set- Basis – Dimension.

**Unit III:** Linear transformations - Rank and Nullity of a linear transformation – Matrices - Linear transformations – Vector space of linear transformations.

**Unit IV:** Inner product space –Properties – norm and distance- Schwartz inequality, triangle inequality.

**Unit V:** Orthogonal elements – Orthonormal set – Gram-Schmidt orthogonalization process – orthogonal complement.

**Text Books:**

1. Vijay K Khanna, Bhambri.S.K, A Course in Abstract algebra, Vikas publishing house pvt Ltd,2013.

**Unit I:** Chapter 10 (page 392-403)

**Unit II:** Chapter 10 (page 411-437)

**Unit III:** Chapter 10 (page 404-410 & 453-479)

2. Arumugam.S. and Thangapandian Isaac. A, Modern Algebra, SCITECH Publications Private Limited, 2006.

**Unit IV:** Chapter 6 (sec 6.0-6.1)

**Unit V:** Chapter 6 (sec 6.2-6.3)

**Reference Book:**

Sharma. J.N and Vashishtha.A.R, Linear Algebra, Krishna Prakasha Mandir, 2002.

**MAT 2514 / MAS 2514****ANALYSIS - III****5hrs / 5cr****Objective:**

The first two semesters of the degree programme introduced calculus which includes differentiation and integration where integration was treated as the reverse process of differentiation. However, the Riemannian definition of integration gave a twist to the way it is looked at. Students are introduced to integration as a limit of summation by Riemann integration. The Riemann integrability of a function is looked at in detail. The necessary and sufficient condition for Riemann integrability is the central theme of this course. Sequence of functions and their limits are introduced (pointwise limit and uniform limit). The ramifications of uniform convergence and their ramifications on integrability, differentiability and continuity are dealt in depth.

After the end of the course the students will able to

- explain the fundamental concepts of advanced analysis such as Riemann integral their role in modern mathematics and applied contexts
- demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from analysis

**Unit I:** Riemann Integration - Riemann Integrable Functions - Properties of the Riemann integral- Characterization theorem on Reimann integrable functions.

**Unit II:** Derivatives - chain rule - Darboux's theorem - Rolle's Theorem - Law of the mean – The Fundamental theorem of calculus -Substitution theorem and application - improper integrals.

**Unit III:** Taylor's theorem with Lagrange and Cauchy form of remainders- Taylor series- Maclaurin series - convex functions.

**Unit IV:** Point wise and uniform convergence of sequence of functions - uniform convergence and continuity - uniform convergence and differentiation - uniform convergence and integration -Cauchy criterion for uniform convergence.

**Unit V:** Series of functions - convergence and uniform convergence of series of functions – Weierstrass M-Test - Dini’s theorem for series - differentiation and integration of series of functions- power series - radius of convergence.

**Text Books:**

Richard R.Goldberg, Methods of Real Analysis, New Delhi: Oxford & IBH Publishing Company Private Limited, 2002.

**Unit I:** Chapter 7 (Sec 7.1-7.4)

**Unit II:** Chapter7 (Sec 7.5-7.8)

**Unit III:** Chapter 8 (Sec 8.5)

**Unit IV:** Chapter 9 (Sec 9.1-9.3)

**Unit V:** Chapter 9 (Sec 9.4, 9.5)

**Reference Books:**

1. Sharma. J.N and Vasistha. A.R, Real Analysis, Krishna Prakashan Media (P) Ltd, 1997.
2. Bartle.R.G and Sherbert. D.R, Introduction to Real Analysis, Singapore: John Wiley and Sons (Asia) Private. Limited, 2002.
3. Ross. K.A, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian Reprint, 2004.
4. Howie J.M, Real Analysis, Springer, 2007.
5. Deshpande J.V, Mathematical Analysis and Applications, Narosa Publishing House, 1999.
6. Torence Tao, Analysis I, TRIM 37, Hindustan Book Agency, 2000.

**MAT 2516 / MAS 2516 VECTOR CALCULUS & TRIGONOMETRY 5hrs / 5cr**

**Objective:**

This is a foundational course for any student aspiring to complete B. Sc degree in mathematics. The applicability of the subject is enormous in nature. The first unit is primarily devoted for the basics on vectors. Trigonometry is an inevitable part of any branch of science, Demovire’s theorem and its applications are exploited.

On successful completion of the course the student will be able to

- compute derivatives and integrals of vector functions
- calculate line integrals along piecewise smooth paths; interpret such quantities as work done by a force
- use Green’s theorem to evaluate line integrals along simple closed curves
- compute the curl and the divergence of vector fields
- compute surface integrals
- apply Stoke’s theorem to compute line integrals along the boundary of a surface
- use Stoke’s theorem to give a physical interpretation of the curl of a vector field
- use the unit circle to define the six trigonometric functions

**Unit I:** Introduction to vectors- dot product and cross product of vectors- product of three and four vectors- geometrical interpretation of dot and cross product and their related aspects- volume of parallelepiped- tetrahedron-vector equation(lines, circles etc..) algebraic equations and geometrical interpretations- problems related to aforesaid aspects on vectors.

**Unit II:** Limit of a vector function- continuity- Differentiation of vectors- Taylor's theorem for vector functions- Partial derivatives- differentiability of vector functions- related problems- Definition of gradient, divergent and curl with physical interpretation- Curvilinear coordinates- cylindrical and spherical coordinates.

**Unit III:** Vector integration- Indefinite integrals- Definite integral- Line, surface and volume integrals- Green's theorem in plane – Green's theorem in space- Stoke's and Gauss theorems- problems related to the verification of these theorems- Vector integrations.

**Unit IV:** Demovire's theorem- Geometrical interpretation- Simplification of trigonometric function- Expansion of trigonometric functions.

**Unit V:** Hyperbolic functions- Logarithmic functions- Trigonometric summation of series.

#### **Text Books:**

1. Narayanan and Manichavasagom pillai, Vector algebra and analysis, M. S. Viswanathan pvt ltd, 1986.

**Unit I:** Chapter I (sec 1-5,7,10), Chapter II(sec1-8,11-14),  
Chapter III (sec2,3,4.5- 4.8, 5, 6)

**Unit II:** Chapter IV (sec1-12)

**Unit III:** Chapter VI (sec1-7, 9, 10)

2. Narayanan and Manichavasagom Pillai, Trigonometry, M. S. Viswanathan pvt ltd, 1986.

**Unit IV:** Chapter II (sec 3,5), Chapter III(sec1-5excluding 5.1)

**Unit V:** Chapter IV (sec 1-2excluding 2.3), Chapter V(sec 5),  
Chapter VI(sec 1-3 excluding 3.1,3.2)

#### **Reference Books:**

1. Raisinghania M. D, Vector Calculus, S. Chand company ltd, 1998.
2. Dipak chatterjee, Vector Analysis, Prentice Hall of India, New Delhi, 2003.
3. Arumugam and Thangapandi Issac, Trigonometry, New gamma publication, 2003.
4. Chandra Babu. A and Seshan C.R , New Engineering mathematics, volume – II, Narosa Publishing house, Chennai, 2006.

MAT 2412 / MAS 2412

STATISTICS - II

4hrs / 4cr

**Objective:**

This is the second segment of a sequential course as a tool for solving problems in real life. The aim of this course is to enable the students to understand statistics. The course deals with analysis of variance- analysis of time series and statistical quality control.

On successful completion of the course the student will be able to

- apply suitable test for samples.
- calculate various index numbers.

**Unit I:** Sampling and Large sample tests.

**Unit II:** Small sampling tests using t- F- and Chi-square distributions.

**Unit III:** Index numbers – fixed and chain base indices – cost of living index – consumer price index – ideal index number.

**Unit IV:** Analysis of time series – components of time series – measurement of trend – seasonal variations.

**Unit V:** Analysis of variance – one way- two way classification -Latin square design.

**Text Book:**

Arumugam. S. and Thangapandian Isaac. A., Statistics, New Gamma Publications Private Limited, 2003.

**Unit I:** Chapter 14

**Unit II:** Chapter 15 and 16

**Unit III:** Chapter 9

**Unit IV:** Chapter 10

**Unit V:** Chapter 17

**Reference Books:**

1. Gupta. S.C and Kapoor V.K, Mathematical Statistics, Sultan Chand & Sons, 2001.
2. Gupta S.P, Statistical Methods, Sultan Chand and Sons, 2001.
3. Manmohan Gupta, Statistics, Sultan Chand & Sons, 2001.

MAT 3611 / MAS 3611

MECHANICS

6hrs / 6cr

**Objective:**

The course mainly deals with two major areas of applied mathematics namely Statics and Dynamics. Statics is the branch of mechanics that is concerned with the analysis of loads (force and torque, or "moment") acting on physical systems that do not experience an acceleration ( $a=0$ ), but rather, are in static equilibrium with their environment. Whereas the dynamics is a branch of applied mathematics (specifically classical mechanics) concerned with the study of forces and torques and their effect on motion. Brief introduction to central forces to the learners becomes essential as we live in the era of satellites, missiles and space explorations.

On successful completion of the course the student will be able to

- develop mathematical models for statical and dynamical systems
- appreciate the tools that were developed and apply in the relevant context
- convert mathematical conclusions in to physical realities
- inculcate the scientific temper among the learner
- appreciate the contemporary scientific developments.

**Unit I:** Introduction – Forces acting at a point – Lami’s theorem – Components of force – Parallel forces and moments – Moment of a force.

**Unit II:** Couples– Equilibrium of three forces acting on a rigid body.

**Unit III:** Coplanar forces – Friction.

**Unit IV:** Collision of elastic bodies – Principles of conservation of momentum– Direct impact– Oblique impact.

**Unit V:** Motion under the action of central forces– Law of inverse squares–Moment of inertia.

**Text Books:**

1. Venkatraman. M.K, Statics, Agasthiar publications, 2002.  
**Unit I:** Chapter: 1 to 3.  
**Unit II:** Chapter: 4,5(§1 - 6)  
**Unit III:** Chapter: 6(§1-13),7 (§1 -12).
2. Venkatraman. M.K, Dynamics, Agasthiar publications, 2002.  
**Unit IV:** Chapter 8: § 8.1 - 8.8.  
**Unit V:** Chapter11: §11.1 to 11.9, § 11.14, Chapter12: § 12.1 - 12.4.

**Reference Books:**

1. Loney. S.L, Dynamics, Mac Millan India Edition, 1998.
2. Rajeshwari. I, Mechanics, Sarah’s publications, 2016.
3. Vasistha and Agarwal, Dynamics of a particle, Krishna prakash mandir, Meeret, 2001.

**MAT 3613 / MAS 3613**

**GRAPH THEORY**

**6 hrs / 6cr**

**Objective:**

A graph is a symbolic representation of a network and of its connectivity. It implies an abstraction of the reality so it can be simplified as a set of linked nodes. Graph theory is a branch of mathematics concerned about how networks can be encoded and their properties measured. It has been enriched in the last decades by growing influences from studies of social and complex networks. The origins of graph theory can be traced to Leonhard Euler who devised in 1735 a problem that came to be known as the "Seven Bridges of Konigsberg".

On successful completion of the course the student will be able to

- write precise and accurate mathematical definitions of objects in graph theory
- use mathematical definitions to identify and construct examples and to distinguish examples from non-examples
- validate and critically assess a mathematical proof
- use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory
- construct mathematical proofs
- write about graph theory in a coherent and technically accurate manner
- hone the ability to communicate mathematics.

**Unit I:** Graphs– Sub graphs– Isomorphism and degrees – Degree sequence – Walks and connected graphs – Cycles in graphs – Cut vertices and cut edges – Connectedness – Ramsay number – Matrices associated with the graph – Operations on graphs.

**Unit II:** Eulerian graphs – Hamiltonian graphs –Properties.

**Unit III:** Bipartite graph – Trees.

**Unit IV:** Colouring – Vertex colouring – Edge colouring – Five colour theorem and Four colour conjecture – Chromatic number and chromatic polynomials.

**Unit V:** Independence number – Covering number – Planar graph–Dual graph of planar graph –Directed Graph.

**Text Books:**

1. Choudum .S.A., A First Course In Graph Theory, McMillan India Ltd, 1987.  
**Unit I:** Chapter 1(sec1.1-1.7), Chapter 4(sec 4.1)  
**Unit II:** Chapter 2(sec2.1-2.4)  
**Unit III:** Chapter 3(sec3.1-3.4)  
**Unit IV:** Chapter 6(sec6.1-6.3)  
**Unit V:** Chapter 5(sec5.1-5.4), Chapter 7(sec7.1-7.5)
2. Arumugam.S and Ramachandran.S, Invitation to Graph Theory, New Gamma Publishing House, 1996  
**Unit I:** Chapter 2(sec 2.5, 2.9), Chapter 3(sec 3.1-3.2)  
**Unit V:** Chapter 2(sec 2.6)

**Reference Books:**

1. John Clarke & Derek Allan Holton, A first Look at Graph Theory, World Scientific Publishing Co. Ltd., 1995.
2. Murugan. M, Graph Theory and Algorithms, Muthali publishing house, 2003.

MAT 3615 / MAS 3615

OPERATIONS RESEARCH – I

6hrs / 6cr

**Objective:**

This course aims to develop students to use quantitative methods and techniques for effective decision making, mathematical model formulation and applications that are used in solving real life problems.

On successful completion of the course the student will be able to

- convert real life problems into mathematical models
- to use Mathematical tools to solve problems in the analytical form
- interpret in the common man's language and to hone the ability to do reality checks on calculations.

**Unit I:** Introduction– Formulation of L.P.P. – Graphical solution of L.P.P. and its special cases – Canonical form, Standard form and Basic solution – Basic feasible solution – Reduction of feasible solution to a basic feasible solution.

**Unit II:** The Simplex method – Introduction – Simplex method – Big M method – Two phase Method.

**Unit III:** Duality in Linear Programming – Concept of duality – Formulation of dual linear problem – Formulation of primal-dual pairs – Dual simplex method – Revised simplex method.

**Unit IV:** The Transportation Problem - Introduction- Mathematical formulation- Loops in a transportation table- Finding IBFS- moving towards optimality – Degeneracy – Unbalanced transportation problems -The Assignment problem – Introduction – Hungarian method - Variations of the Assignment problem – Multiple optimal solutions – Maximization case - Travelling salesman problem –Unbalanced assignment problem- Restrictions.

**Unit V:** Introduction to theory of Games – Saddle Point – Graphical solution for  $2 \times m, n \times 2$  Dominance property – Solution of game by linear programming method.

**Text Book:**

Kantiswarup, Gupta P. K. & Manmohan, Operations Research, Sultan Chand & Sons, 2010.

**Unit I:** Chapter 1, 2 & 3

**Unit II:** Chapter 4

**Unit III:** Chapter 5, 9.1, 9.2

**Unit IV:** Chapter 10, 11

**Unit V:** Chapter 17

**Reference Books:**

1. Sharma.J.K. Operations Research, Theory and applications, Macmillan, New Delhi, 2003.
2. Goel. B.S. and Mittal, S.K. Operations Research, Pragati Prakashan, Meerut, 2000.
3. Hadley.G, Linear Programming, Narosa Book Distributors Private Ltd.,1963.
4. Taha.H.A. Operations Research – An Introduction (8th Edition) Prentice Hall of India, New Delhi, 2007.
5. Bronson.R, Operations Research 2nd Edition, Schaum's Outline Series, 1997.



MAT 3511 / MAS 3511

COMBINATORICS

5 hrs / 5cr

**Objective:**

Combinatorics is a branch of mathematics concerning the study of finite or countable discrete structures. Aspects of combinatorics include counting the structures of a given kind and size (enumerative combinatorics), deciding when certain criteria can be met, and constructing and analyzing objects meeting the criteria. Many combinatorial questions have historically been considered in isolation, giving an adhoc solution to a problem arising in some mathematical context. In the later twentieth century, however, powerful and general theoretical methods were developed, making combinatorics into an independent branch of mathematics in its own right. Combinatorics is used frequently in computer science to obtain formulas and estimates in the analysis of algorithms.

On successful completion of the course the student will be able to

- apply algorithms taught in the course
- understand the fundamental combinatorial structures that naturally appear in various other fields of mathematics and computer science
- use these structures to represent mathematical and applied questions
- use the combinatorial tools that are used to analyze such structures
- know how to prove the existence or non-existence of the object, compute the number of such objects, and understand their underlying structure
- use generating functions to solve a variety of combinatorial problems.

**Unit I:** Two basic principles – Simple arrangement and selections with or without repetition – Distributions – Binomial coefficients.

**Unit II:** Generating functions - Calculating coefficients of generating functions – Exponential generating function – Summation method – Partitions.

**Unit III:** Recurrence relations – Divide and conquer relations – Dearrangement – Solution of linear recurrence relation.

**Unit IV:** Fibonacci number - Stirling number of first and second kind – Catalan number– Ménage number.

**Unit V:** Inclusion and Exclusion principle – Pigeon hole principle – Ramsey theorem.

**Text Books:**

1. Tucker A.W., Applied Combinatorics, Wiley, 2011.

**Unit I:** Chapter 5

**Unit II:** Chapter 6

**Unit III:** Chapter 7(sec 7.1 - 7.3).

**Unit V:** Chapter 8(sec 8.1, 8.2 and Appendix A4).

2. Schaum's outline series, Combinatorics, Tata McGraw-Hill Publishing Company Ltd 2005.

**Unit IV:** Chapter 1(sec 1.112, 1.114, 1.132, 1.134, 1.146, 1.147, 1.148, 1.149, 1.150)  
 Chapter 2 (sec 2.73)  
 Chapter 3 (sec 3.64)

#### Reference Books:

1. Cohen D., Combinatorics, Wiley, 1978.
2. Hall M., Combinatorial Mathematics, McGraw Hill, 1968.
3. Liu C.L., Introduction to Combinatorial Mathematics, McGraw-Hill, Newyork, 1994.
4. Ryser H.J., Combinatorial Mathematics, Carus Mathematical monograph, 1965.
5. Krishnamurthy, Combinatorics, PHI, 1998.
6. Balakrishnan V.K., Combinatorics, Schaum's outline series, Tata McGraw Hill, 2005

**MAT 3200 / MAS 3200**

**ENVIRONMENTAL STUDIES**

**4 hrs / 2cr**

#### Objective:

An environmental study is a multidisciplinary academic field which systematically studies human interaction with the environment in the interests of solving complex problems. Environmental study brings together the principles of sciences, commerce/ economics and social sciences so as to solve contemporary environmental problems. It is a broad field of study that includes the natural environment, built environment, and the sets of relationships between them. The field encompasses study in basic principles of ecology and environmental science, as well as associated subjects such as ethics, geography, policy, politics, law, economics, philosophy, environmental sociology and environmental justice, planning, pollution control and natural resource management.

On successful completion of the course the student will be able to

- locate and comprehend relationships between the natural, social and cultural environment
- create cognitive capacity and resourcefulness to make the students curious about social phenomena, starting with the family and moving on to wider spaces
- nurture the curiosity and creativity of the students particularly in relation to the natural environment (including artifacts and people)
- engage the students in exploratory and hands-on activities to acquire basic cognitive and psychomotor skills through observation, classification, inference, etc.
- create awareness towards environmental issues and their social responsibility as a major stakeholder in the system
- appreciate the eco diversity of the sub continent and its resources
- know the need for sustainable development and optimal utilization of natural resources
- introduce to mathematical tools that may be used solve environmental issues.

**Unit I:** Understanding eco-system –Food chain –Ecological pyramids – Introduction to different eco-system – Bio-geographical classification of India – Hot spots of bio-diversity – Conservation of bio-diversity.

**Unit II:** Introduction to Environmental Pollution – Causes and effects of air, water, noise, soil, thermal and nuclear pollution – Measures of control and management – Oil sleek and its effects on the marine eco system – Global warming and climate change – Acid rain– Ozone layer depletion – Nuclear accident and holocaust.

**Unit III:** Energy sources – Renewable- Non renewable energy sources – Nuclear energy – Bio fuels – Non conventional energy sources – Pollution free energy.

**Unit IV:** Social Issues – Urbanization and pollution – Hazard identification – Air quality standards – Major pollutants and their effects in an urban environment – Permissible limits and methods of control – Environmental ethics – Environmental protection act – Environmental auditing (Air, water, wildlife protection, forest conservation acts) – Public awareness on solid waste management – House hold environment and health.

**Unit V:** Mathematical modeling for environmental issues –Weather/ disaster predictions – mathematical models using differential equations, linear programming and chaos theory.

**Text Book:**

Erach Bharucha, Textbook of Environmental Studies, Universities Press, 2005.

**Unit I:** Section 3.1.1, 3.4, 3.6, 3.7, 4.2, 4.6, 4.9

**Unit II:** Section 5.1, 5.2, 6.6

**Unit III:** Section 2.2, 2.3

**Unit IV:** Section 6.2, 6.5, 6.9 – 6.13, 5.4

**Unit V:** <http://math.unipa.it/~grim/Jferruccicarter.PDF>

**Reference Books:**

1. Rana, Essentials of ecology and Environmental science, S.V.S. PHI, 2003.
2. Subramanian,N.S. & Sambamoorthy-A.V.S.S Ecology, Narosa publishing house, 2000.
3. Dr.Raman Sivakumar, Introduction to environmental science and energy, 2005.
4. Dr.Raman Sivakumar, Introduction to Environmental Science and Engineering, 2005.
5. Dr.Ravikrishnan.A, Environmental Science and Engineering, Sri Krishna Hitech Publishing Company Pvt. Ltd, 2010.
6. Arumugam.N, Kumaresan.V, Environmental studies, Saras Publication, 2010.

MAT 3612 / MAS 3612

NUMBER THEORY

6 hrs / 6cr

**Objective:**

The study of number theory inevitably includes knowledge of the problems and techniques of elementary number theory, however the tools which have evolved to address such problems and their generalizations are both analytic and algebraic, and often intertwined in surprising ways. This course covers topics from classical number theory including discussions of mathematical induction, prime numbers, division algorithms, congruences, and quadratic reciprocity.

On successful completion of the course the student will be able to

- state fundamental results in number theory and prove rigorously mathematical
- statements concerning prime numbers and modular arithmetic
- determine greatest common divisors by prime factorizations or euclid's algorithm
- solve linear diophantine equations and linear congruences
- describe properties of common arithmetical functions, including the euler phi function
- apply methods and techniques of number theory to a range of applications
- hone the ability to do reality checks on calculations.

**Unit I:** Divisibility– Euclidean algorithm – Primes – Fundamental theorem of arithmetic.

**Unit II:** Congruences – Fermat, Euler and Wilson theorem – Lagrange theorem – Chinese remainder theorem – Solution of congruences.

**Unit III:** Quadratic residues – Euler's criterion – Gauss lemma – Quadratic reciprocity law.

**Unit IV:** Arithmetic functions – Number of divisors– Sum of divisors – Euler's phi function –Möbius function – Möbius inversion formula – Greatest integer function – Related problems.

**Unit V:** Numbers of special form – Perfect Numbers – Mersenne primes and amicable numbers – Fermat numbers – Pepin's test – Diophantine Equation – Pythagorean triplets.

**Text Book:**

Burton. D. M, Elementary Number theory, Universal book stall, 2012.

**Unit I:** Chapter 2 (sec2.1-2.4), Chapter 3(sec3.1)

**Unit II:** Chapter 2(sec 2.5), Chapter 4(sec4.2-4.4), Chapter 5(sec 5.2-5.3)

**Unit III:** Chapter 9 (sec 9.1-9.3)

**Unit IV:** Chapter 6 (sec6.1-6.3), Chapter 7(sec 7.2-7.4)

**Unit V:** Chapter 11(sec11.2-11.4), Chapter 12(sec12.1)

**Reference Books:**

1. Andrews. G. E, Number theory, Hindustan Publishing Corporation, 1994.
2. Apostol. T. M, Introduction to analytic number theory, Narosa publishing house, 1998.
3. Niven. I and Zuckerman.H.S, An introduction to the theory of numbers, Wiley eastern, 2015.
4. Narayanan. S and Manicavachagom Pillay. T.K, Algebra, Vol. I, S. Viswanathan printers and publishers, 2012.

## MAT 3614 / MAS 3614      COMPLEX ANALYSIS

6 hrs / 6cr

**Objective:**

Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers. It is useful in many branches of mathematics, including algebraic geometry, number theory, analytic combinatorics, applied mathematics; as well as in physics, including hydrodynamics and thermodynamics and also in engineering fields such as nuclear, aerospace, mechanical and electrical engineering.

On successful completion of the course the student will be able to

- understand how complex numbers provide a satisfying extension of the real numbers
- appreciate how throwing problems into a more general context may enlighten one about a specific context (e.g. solving real integrals by doing complex integration; Taylor series of a complex variable illuminating the relationship between real functions that seem unrelated -- e.g. exponentials and trig functions)
- learn techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication)
- continue to develop proof techniques
- appreciate how mathematics is used in design (e.g. conformal mapping)
- unlearn (if ever learned) the notion that mathematics is all about getting "the right answer"
- hone the ability to do reality checks on calculations
- hone the ability to communicate mathematics

**Unit I:** Geometry of complex numbers – Elementary transformations – Bilinear transformations – Cross Ratio – Fixed points of bilinear transformation.

**Unit II:** Analytic function – Differentiability – The Cauchy Riemann equation – Conformal mappings.

**Unit III:** Definite Integral – Cauchy's Theorem – Cauchy's Integral formula – Cauchy's inequality – Morera's theorem – Liouville's theorem and fundamental theorem of Algebra – Maximum modulus theorem.

**Unit IV:** Taylor's and Laurent's theorem – Zeros of an analytic function.

**Unit V:** Singularities – Cauchy Residue theorem – Arguments principle – Rouché's theorem – Contour Integration.

**Text Book:**

Arumugam.S, Thangapandi Issac.A, Somasundaram. A, Complex Analysis, SCITECH publications private limited, 2007.

**Unit I:** Chapter 1(sec 1.5 - 1.7 ) and Chapter 3( sec 3.1 - 3.4).

**Unit II:** Chapter 2

**Unit III:** Chapter 6

**Unit IV:** Chapter 7( sec 7.1 - 7.3).

**Unit V:** Chapter 7 sec 7.4 Chapter 8: (sec 8.1, 8.2, 8.3(type 1 & type 2)).

**Reference Books:**

1. Shanti Narayanan, Complex Analysis, S. Chand & Co, 1999.
2. Duraipandian.P, Lakshmi Duraipandian and Muhilan.D, Complex Analysis, Emerald Publishers, 1994.
3. Ponnuswamy.S, Foundations of Complex Analysis, Narosa Publishing House, 2004.
4. Karunakaran.V , Complex Analysis, Narosa Publishing House, 2006.

**MAT 3616 / MAS 3616****OPERATIONS RESEARCH - II****6hrs / 6cr****Objective:**

Student will be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type. To build and solve Transportation Models and Assignment Models. To design new simple models, like CPM to improve decision-making and develop critical thinking and objective analysis of decision problems.

On successful completion of the course the student will be able to

- convert real life problems into mathematical models by making use of inequalities
- appreciate post optimal analysis/sensitivity of the optimal solution for small changes in the initial parameters
- design new simple models, like: pert, cpm to improve decision –making and develop critical thinking and objective analysis of decision problems
- learn and understand the types of inventories and objectives of inventory control. this would help them to understand the major reasons for holding inventories and also to differentiate between independent and dependent demand
- recognize the basic types of queuing model, derive and calculate steady state system performance characteristics for these types.

**Unit I:** Introduction to sensitivity Analysis – Changes in the cost vector, requirement vector – Coefficient matrix – Addition and deletion of variables - related problems.

**Unit II:** Introduction to Integer programming – Gomary’s all - IPP Method – construction of Gomary’s cut – fractional cut method-all Integer and mixed Integer related problems.

**Unit III:** Network Scheduling by PERT/CPM- Introduction – Network and Basic components – Rules of network construction – Time calculations in networks – Critical Path Method (CPM)- PERT:PERT calculations - Negative float and Negative slack – advantages of network (PERT/CPM).

**Unit IV:** Inventory Control- Introduction – Reasons for carrying inventory – Types of inventory – The inventory decisions – Economic Order Quantity- Four EOQ models – EOQ problem with price breaks- Multi item deterministic problem.

**Unit V:** Queueing Theory- Introduction – Queueing system – Characteristics of Queueing Systems - Classification of Queueing models – Solution of Queueing models-  $\{(M/M/1):(\infty/FIFO)\}$ ,  $\{(M/M/1): (N/FIFO)\}$ ,  $\{(M/M/C): (\infty/FIFO)\}$ ,  $\{(M/M/C): (C/FIFO)\}$ .

**Text book:**

Kantiswarup, Gupta P.K. & Manmohan, Operations Research, Sultan Chand & Sons, 2004.

**Unit I:** Chapter 6 (sec 6.1 – 6.5 (except addition & deletion of a constraint)).

**Unit II:** Chapter 7(sec 7.1 – 7.5).

**Unit III:** Chapter 21

**Unit IV:** Chapter 19 (sec 19.1-19.9).

**Unit V:** Chapter 20 (sec 20.1 – 20.8 (Model I, III, V, VII)).

**Reference Books:**

1. Hadley. G, Linear Programming, Narosa Book Distributors Private Ltd., 1963.
2. Taha, H.A. Operations Research – An Introduction (8th Edition) Prentice Hall of India, New Delhi, 2007.
3. Bronson R, Operations Research 2nd Edition, Schaum's Outline Series, 1997.
4. Sharma, J.K. Operations Research, Theory and applications, Macmillan, New Delhi, 2003.
5. Sundaresan.V, Ganesan. K, Resource management Techniques, AR publications, 2009.

**MAT 3512 / MAS 3512****FUZZY MATHEMATICS****5hrs / 5cr****Objective:**

Fuzzy mathematics forms a branch of mathematics related to fuzzy set theory and fuzzy logic. It started in 1965 after the publication of Lotfi Asker Zadeh's seminal work Fuzzy sets. The quest for imitating human brain (artificial intelligence) since the invention of computers has propelled this area of Mathematics to a large extend as the human brain does not see things in black and white but rather in rainbow colors.

On successful completion of the course the student will be able to

- distinguish between the crisp set and fuzzy set concepts through the learned differences between the crisp set characteristic function and the fuzzy set membership function
- draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively
- define fuzzy sets using linguistic words and represent these sets by membership functions
- know how to perform mapping of fuzzy sets by a function and also use the  $\alpha$ -level sets in such instances
- know fuzzy-set-related notions; such as  $\alpha$ -level sets, convexity, normality, support, etc.
- know the concept of a fuzzy number and how it is defined
- understand the extension principle, its compatibility with the  $\alpha$ -level sets and the usefulness of the principle in performing fuzzy number arithmetic operations (additions, multiplications, etc.)
- know the fuzzy relations and the properties of these relations
- analyze the distinction between binary logic and fuzzy logic at the conceptual.

**Unit I:** Crisp sets and fuzzy sets– Basic concepts of fuzzy set – Classical and fuzzy logic.

**Unit II:**  $\alpha$ -cuts – Properties of  $\alpha$ -cuts – Representations of fuzzy sets – Extension principle of fuzzy sets.

**Unit III:** Operations on fuzzy sets – Fuzzy complements – Fuzzy union – Fuzzy intersection.

**Unit IV:** Fuzzy numbers – Arithmetic operation on intervals – Arithmetic operation on fuzzy numbers – fuzzy equations.

**Unit V:** Crisp and fuzzy relations – Binary fuzzy relations – Binary relation on a single set – Equivalence and similarity relation – Fuzzy relation equation.

**Text Books:**

1. Klir.G.J and Folger T.A, Fuzzy sets Uncertainty and information, Prentice Hall of India, 1995.  
**Unit I:** Section 1.1 – 1.6.  
**Unit III:** Section 2.1 – 2.5.  
**Unit V:** Section 3.1– 3.5 & 3.8.
2. Klir G.J and Bo Yuan, Fuzzy Sets, Fuzzy Logic, Theory and Applications, Prentice Hall of India, 1997.  
**Unit II:** Sections 2.1 – 2.3.  
**Unit IV:** Section 4.1(Introduction), 4.3 – 4.4(Problems only)& 4.6.

**Reference Book:**

H.J.Zimmermann, Fuzzy Set Theory and Its Applications, Kluwer Academic Publishers, 2001.

**MAT 1431 / MAS 1431**

**MATHS FOR PHYSICS- I**

**5hrs / 4cr**

**Objective:**

This course develops among the students, the mathematical skills required to study physics. The course deals with vectors, solutions of linear equations, Eigen value, Eigen vectors, complex numbers, series expansion and complex integration.

On successful completion of the course, the students will be able to

- compute the dot product of vectors, lengths of vectors, and angles between vectors
- compute the cross product of vectors and interpret it geometrically
- determine the equations of lines and circles using vectors
- calculate line integrals along piecewise smooth paths
- use green's theorem to evaluate line integrals along simple closed curves
- compute the curl and the divergence of vector fields
- compute surface integrals
- apply stoke's theorem to compute line integrals along the boundary of a surface
- use stoke's theorem to give a physical interpretation of the curl of a vector field
- learn techniques of complex analysis that make practical problems easy.



**Unit I:** Vector definition- dot product-cross product-unit normal vector-Vector differentiation results- vector differential operator definition- gradient- directional derivatives- divergent and curl- solenoidal and irrotational-scalar potential function- Formula involving operator  $\nabla$ - operation involving  $\nabla$  twice related problems.

**Unit II:** Line integral- surface integral- volume integral – verification of Divergence theorem due to Gauss- Green’s theorem and Curl theorem due to Stokes – General & orthogonal curvilinear coordinates- Polar coordinates- Right circular cylindrical coordinates- Spherical coordinates.

**Unit III:** Solution of a system of Linear equations: Homogeneous and non homogeneous problems using rank method-Eigen value problem- Coordinate transformations- Rotation in two dimensions- Rotation in three dimensions.

**Unit IV:** Introduction to complex numbers - Complex differentiation- Cauchy Riemann equations -Analytic functions -Harmonic equation - related problems.

**Unit V:** Complex integration – Cauchy’s theorem and Integral formula - Residues -  $m^{\text{th}}$  order pole- simple pole- Cauchy’s residue theorem- Evaluation of definite integrals.

#### **Text Books:**

1. Manickavachagom Pillay T.K, Narayanan .S, Vector Algebra and Vector Analysis, S. Viswanathan pvt. Ltd, 1996.  
**Unit I:** Chapter IV (sec 1, 2(Results), 6, 7, 8, 9.1, 10, 11, 12).  
**Unit II:** Chapter VI (sec 2 - 7 and 9) (sec 4 -7 and 9).
2. Arumugam. S and Thangapandi Issac. A., Modern Algebra, Scitech publications private Ltd, 2003.  
**Unit III:** Chapter VII (sec 7.6, 7.8 ).
3. S. Arumugam & A. Thangapandi Issac, Complex Analysis, New Gamma publishing House, 2001.  
**Unit IV:** Chapter II (sec 2.5, 2.6, 2.7, 2.8).  
**Unit V:** Chapter VI (sec 6.1, 6.2, 8.1, 8.2).

#### **Reference Book:**

- Khanna. M. L, Matrices, Jai Prakash Nath& Co. Meerut, 2001.

**MAT1433 (ECE/ECO)      MATHEMATICS FOR ECONOMICS      5hrs / 4cr**

**Objective:**

The course deals with quadratic equation, matrices, differentiation, integration, and differential equations.

This course introduces to the learner the quantitative techniques which can be applied in dealing with the study of economics.

**Unit I:** Importance of quantitative analysis – functions; linear, quadratic, nature of roots – relations between roots and coefficients – Theory of indices – index rules.

**Unit II:** Matrices – types of matrices - determinants – inverse of matrix – solving system of equations using Cramer's rule.

**Unit III:** Differentiation: successive differentiation – maxima & minima – partial differentiation – total differentiation.

**Unit IV:** Integration: standard forms – rules and definite integrals – area between two curves.

**Unit V:** Differential equations – solving first order and second order differential equations.

**Text Books:**

1. Mehta. B.C. & Madnani. G.M.K, Mathematics for Economists, Sultan Chand & Sons, Ninth edition, 2008.

**Unit I:** Sections 1.16-1.17.

**Unit II:** Sections 5.1-5.12; 5.13(II), 5.15.

**Unit III:** Sections 6.1-6.5; 6.8-6.9; 8.1-8.4; 8.7-8.8.

**Unit IV:** Chapter 12 & sections 13.1-13.3.

**Unit V:** Sections 14.1-14.7; 14.10-14.12.

2. Aggarwal R.S, Quantitative Aptitude, S. Chand & company Ltd., Revised Edition 2008.

**Unit I:** Chapter 9

**Reference Books:**

1. M.JeyaramArumugam, Mathematics – an introduction, 1985
2. M.L. Khanna, Matrices, Jai Prakash Nath & Co. Meerut, 2001.
3. Madha and Madnani, Mathematical applications in Economics, Himalaya, 2000.

MAT 1432 / MAS 1432

MATHS FOR PHYSICS- II

5hrs / 4cr

**Objective:**

This course develops among the students, the mathematical skills required to study physics.

On the successful completion of the course students will be able to

- distinguish between linear, nonlinear, partial and ordinary differential equations. recognize and solve a variable separable differential equation, homogeneous differential equation, exact differential equation
- construct a second solution of a differential equation from a known solution and to classify the partial differential equations
- understand the relationship between fourier series and linear time-invariant system.

**Unit I:** Differential equations- Order and degree – Variable separable- First order linear homogeneous equations – Non homogeneous differential equations - linear differential equation – Bernoulli's equation and exact differential equations.

**Unit II:** Second order differential equations – Second order differential equation with constant coefficients-Second order differential equations with variable coefficients and polynomial coefficients.

**Unit III:** Partial differential equations – Lagrange's method – Standard types - Equations solvable for p and q-Equations solvable for x, y and z, - Equation of the form  $f_1(x, p) = f_2(y, q)$  – Clairant's form – Equations reducible to standard forms – Charpit's method.

**Unit IV:** Fourier series – Step functions – odd and even functions- Fourier integral and its complex form - Half – range series: cosine and sine series - Properties of Fourier series- Parseval's relation.

**Unit V:** Introduction to Hermite and Legendre polynomials – Basic equations – Solution to Hermite differential equation and Legendre differential equation – Generating function – Rodrigues formula – Ortho normality relations – Recurrence relation and problems.

**Text Books:**

1. Manickavachagom Pillay.T.K, Narayanan.S, Differential equations and its applications, S.Viswanathan pvt. Ltd, 2013.  
**Unit I:** Chapter I and Chapter II (Up to 6.3)  
**Unit II:** Chapter V (Up to Exercise XVI)  
**Unit III:** Chapter XII (Up to Exercise XXXIX).
2. Durai pandian. P, & Udhayabaskaran. S, Allied Mathematics volume II, S. Chand & company Pvt. Ltd, 2016.  
**Unit IV:** Chapter IV
3. Saran, Sharma and Trivedi , Special functions, Pragati Prakashan Publications,2003.  
**Unit V:** Chapter 7(sect 7.1, 7.2) and Chapter 6(sec 6.1, 6.2 (recurrence relation only)).

**MAT1334 (ECE/ECO) FUNDAMENTALS OF COMPUTER APPLICATIONS****3hrs / 3cr****Objective:**

To create awareness on the efficiency and accuracy in using computer techniques in dealing with problems in social sciences with special emphasis on study of economic, To introduce the basic tools in computer software.

On successful completion of the course the student will be able to

- know creating and editing documents using Word, data analysis and numeric manipulation using Excel and create and deliver presentations using Power Point.

**Unit I:** Physical components of computer – input – output devices – hardware and software – operating system.

**Unit II:** Word – creating a document – editing – move and copy text – help system – formatting text and paragraph – finding and replacing text – spelling checking – tabs – enhancing document – column and tables – graphs – mail merge.

**Unit III:** Data Base Management – spread sheet – MS Excel – basic commands – word processing – inserting and deleting rows and columns – formatting and printing work sheet – creating a chart – date and time – naming ranges and using statistical data.

**Unit IV:** Power-point – creating a presentation – power-point view, running a slide show – printing a presentation.

**Unit V:** Office automation – multimedia application – internet browsing

**Text Book:**

Taxali. R.K., PC Software for windows – Made simple, Tata Mc Graw- Hill, 1998.

**Unit-I:** Fundamentals of Computer Studies, Expert Solution Consults, 2010.

**Microsoft office word 2007, Torben Lage Frandsen, e - publication**

**Unit II:** Chapters 8-18

**Microsoft office Excel 2007, Torben Lage Frandsen, e - publication**

**Unit III:** Chapters 19-27

**Microsoft office powerpoint 2007, Torben Lage Frandsen, e - publication**

**Unit IV:** Annexure B

**Unit V:** Fundamentals of Computer Studies, Expert Solution Consults, 2010.

**Reference Books:**

Alan R. Neibaner, Microsoft word for windows, Made easy, The basics and beyond, Tata Mc Graw Hill, New Delhi, 1999.

**MAT 1104 FUNDAMENTALS OF COMPUTER APPLICATIONS-LAB 2hrs/1cr****Objective:**

The main objective of the course is to enable the student to acquire the knowledge of Microsoft Office and internet browsing.

On the successful completion of the course students will be able to

- know the basic knowledge of the computer.
1. Create a bio-data using Ms-|word at least 2 pages.
  2. Create a mail merge letter for your 5 friends
  3. Insert the table with 5 columns and 8 rows and enter your mark details in the needed format.
  4. Using Track Changes, Edit your document for Insert, Delete and Modify.
  5. Open your saved document and check the spelling and grammar.
  6. Create a Sheet with 15 sales person details and monthly Sales by person wise and total.
  7. Insert the different type charts for your monthly wise sales amount.
  8. Create pivot table and pivot chart from Area wise, Month wise, Person wise, Sales Amount.
  9. Insert data from Text File and delete row/column and insert new row/column.
  10. Create 5 Slide power point about healthy fruits.
  11. Create a power point slide show with auto animation effects.
  12. Create a power point auto slide show with duration and sound effects
  13. Insert your favorite pictures with word art heading.

**MAT 2431****MATHS FOR CHEMISTRY - I****5hrs /4cr****Objective:**

Mathematics will allow the students to develop a sophisticated understanding of Mathematical structures and principles while gaining a wide range of skills that are attractive to employers.

This course deals with matrices, eigen values, eigen vectors, sets, functions, groups, rings, fields, sampling, and numerical methods.

**Unit I:** Matrices – elementary transformations – diagonalization – inverse – rank.

**Unit II:** Solving homogeneous and non-homogeneous equations – Cayley-Hamilton theorem - Eigen values and Eigen vectors.

**Unit III:** Sets – relations – functions – types of functions – groups – examples and simple problems, rings & fields with examples.

**Unit IV:** Sampling theory – Large and small sample tests for mean – normal, t-test, chi-square test.

**Unit V:** Numerical methods – solution of algebraic equations – Interpolation -Newton's and Lagrange's methods – Numerical differentiation & integration.

**Text Books:**

1. Arumugam. S & Thangapandian Issac. A., Modern Algebra, SCITECH Publications, 1998

**Unit I:** Chapter 7(sec 7.1, 7.2, 7.4, 7.5 )

**Unit II:** Chapter 7(sec 7.6-7.8 )

**Unit III:** Chapter 1(sec 1.1-1.8), Chapter 2(sec 2.1, 2.2, 2.4), Chapter 3(sec 3.1), Chapter 4(sec 4.1)

2. Arumugam S. & Thangapandian Issac. A, Statistics, New gamma publishing house, 2011.

**Unit IV:** Chapter 14( sec 14.1-14.5 II A, B), Chapter 15( sec 15.1) , Chapter 16(sec 16.1)

3. S. S.Sastry, Introductory methods of Numerical Analysis, 3rd edition, Prentice Hall of India Pvt.ltd., 2003.

**Unit V:** Chapter 2(sec.2.1-2.5), Chapter 3(sec 3.1, 3.3.1, 3.3.2, 3.6, 3.9.1), Chapter 5(sec 5.2, 5.4.1-5.4.3)

**Reference Books:**

1. Khanna M.L., Matrices, Jai Prakash Nath & Co. Meerut, 2001.

2. Gupta S.C.&. Kapoor V.K., Elements of Mathematical Statistics S.Chand, 1995.

**MAT 2433 / MAS 2433 BUSINESS STATISTICS (COM / CME) 5hrs / 4cr**

**Objective:**

This course deals with measures of central tendency, correlation, regression, probability theory, and sampling theory.

To enable the students to use the tools in statistics to solve the problems in business studies and commerce.

**Unit I:** Measures of central tendency – measures of dispersion.

**Unit II:** Correlation – Correlation coefficients – Rank correlation – Regression – Regression coefficients.

**Unit III:** Probability function – Addition and multiplication theorems on probability – Conditional probability – Baye's formula and theorem.

**Unit IV:** Types of sampling- parameters & statistic – statistical hypothesis – null and alternative hypothesis – types of errors- large samples based on normal area table – test of significance of small samples – t-test and F-test and Chi-square test for population variance and goodness of fit.

**Unit V:** Analysis of variance – One way and two way classification – Latin square design.

**Text Book:**

Arumugam.S & Thangapandian Issac. A, Statistics, New Gamma publishing House, 2013.

**Unit I** : Chapters 2(except deciles & percentiles) & 3

**Unit II:** Chapter 6

**Unit III:** Chapter 11

**Unit IV:** Chapters 14(sec14.1- 14.5(I& II)), 15 & 16(sec 16.1&16.2)

**Unit V:** Chapter 17

**Reference Books:**

1. Gupta .S.C and Kapoor.V.K, Mathematical Statistics, Sultan Chand and Sons, 2001.
2. Manmohan Gupta, Statistics, Sultan Chand and Sons, 2001.

MAT 2432

MATHS FOR CHEMISTRY - II

5h / 4cr

**Objective:**

Mathematics will allow the students to develop a sophisticated understanding of mathematical structures and principles while gaining a wide range of skills that are attractive to employers.

To reinforce and enhance the mathematical tools introduced earlier. Differential equation as a mathematical model for solving problems in chemistry is the central theme of the course. This course deals with differentiation, integration, differential equations and Laplace transform.

**Unit I:** Differentiation – successive differentiation – meaning of derivative- maxima and minima.

**Unit II:** Partial differentiation – errors and approximation- maxima and minima.

**Unit III:** Integration – Methods of integration – Some standard formulae-Integration by parts – definite integral – reduction formula.

**Unit IV:** Formation of differential equations –growth, decay and chemical reactions- Solving first and second order differential equations.

**Unit V:** Laplace transforms – Inverse transforms-solving linear differential equations.

**Text Books:**

1. Narayanan. S.& Manickavachagom Pillay T.K., Calculus Vol.I, S. Viswanathan private limited, 2013.  
**Unit I:** Chapter II (sec 2.1- 2.7, 3.1-3.3, 3.4, 3.6, 3.8), Chapter III ( sec 1.1- 1.6, 2.1), Chapter IV (sec 2.1, 2.2, 3, 4 ), Chapter V (sec 1.1- 1.5 )  
**Unit II:** Chapter VIII (sec 1.1-1.3, 1.5-1.7, 2.1, 2.3, 4, 5)
2. Narayanan. S. & Manickavachagom Pillay. T.K., Calculus Vol. II, S. Viswanathan private limited, 2013.  
**Unit III:** Chapter I( sec 1.1-6.4, 7.3, 7.4, 11, 12, 13.1-13.5(formula only), 15.1 )

3. Narayanan.S. & Manickavachagom Pillay. T.K., Differential Equations and its applications, S. Viswanathan private limited, 2008.

**Unit IV:** Chapter I ( sec 1, 3), Chapter II( sec 1, 2, 4, 6.1-6.4), Chapter III ( sec 1) Chapter V( sec 1-4).

**Unit V:** Chapter XI( sec 1, 2, 4-9 )

#### Reference Books:

1. Hirst. D. N., Mathematics for Chemistry, Macmillan Press Ltd, 1993.
2. Sankaranarayanan & Mangaladoss. J.A., Differential Equations and its Applications, Suja Publishing House, Palayamkottai (1980)

**MAT 2434 / MAS 2434      BUSINESS MATHEMATICS (COM/CME)      5hrs / 4cr**

#### Objective:

This course to introduce various concepts of mathematics required for commerce and it deals with differentiation, integration, matrices, transportation and assignment problem.

On the successful completion of the course students will be able to

- the student will understand how to process
- interpret information to arrive at logical conclusions to common business math applications
- to understand the important role math plays in all facets of the business world.

**Unit I:** Differential calculus: idea of limit- continuity- average concept and marginal concept- differential coefficient- standard forms rules for differentiation- higher order derivatives – increasing and decreasing functions- criteria for maxima and minima applications.

**Unit II:** Integral calculus: standard forms rules for integration- definite integral- integration by substitution – integration by parts- applications.

**Unit III:** Matrices – types of matrix – consistency of a matrix – rank of matrix-solving system of Homogeneous and non- homogeneous equation.

**Unit IV:** Transportation problems: methods of finding IBFS-u-v method-unbalanced problems - Assignment problems.

**Unit V:** Game theory– pure and mixed strategies –solution of 2x2 games- dominance rule-graphical solution of 2xn and mx2 games.

#### Text Books:

1. Sundaresan.V and Jeyaseelan.S.D, An introduction to Business Mathematics, S. Chand & co 2003.

**Unit I:** Chapter (sec 3.1 - 3.10, 3.11(from pg118), 4.3)

**Unit II:** Chapter (sec 6.1 - 6.10, 6.11, 6.11.b, 6.11.c, 6.11.e)

**Unit III:** Chapter (sec 8.1 - 8.6, 8.8, 8.9)



2. Sundaresan. V, Ganapathy sub. K.S & Ganesan.K, Resource Management Techniques, A.R Publications , 2011.

**Unit IV:** Chapter 7.1 - 7.4, 8.1 - 8.5, 8.7, 8.9.

**Unit V:** Chapter 16.1-16.4, 16.6, 16.7.

### Reference Books:

1. Jeyaram & Arumugam, Mathematics an Introduction, New Gamma publishing House, 1986.
2. Khanna .M.L, Matrices, Jai Prakash Nath & Co. Meerut, 2001.
3. Narayanan .S & Manickavachagom Pillay .T.K, Calculus, volume I & II, S.Viswanathan private limited, 2002.
4. Arumugam .S & Thangapandian Issac. A , Differential equations with Applications, New Gamma publishing house, 2008.

**MAS 1433**

**DISCRETE MATHEMATICS (BCA)**

**5hrs / 4cr**

### Objective:

The objective of this course is to inculcate the essential mathematical concepts for computer applications and improving their logical thinking as well as to equip the students to understand the concepts on algebraic structures, graph theory with examples.

On the successful completion of the course students will be able to

- realize that there are multiple solutions to a given problem and these solutions will have a real impact on people's lives
- communicate their solutions to others, including why and how a solution solves the problem and what assumptions were made
- successfully apply the knowledge they have gained through project experience
- encompass an appreciation for the structure of computer systems and the processes involved in their construction and analysis
- understand individual and collective responsibility and individual limitations as well as the limitations of technical tools
- understand the range of opportunities and limitations of computing
- know how to apply tools and ideas from mathematics and theoretical computer science to structure and solve complex problems

**Unit I:** Set- Subset- Cardinality of a set- Cartesian product- Relations- Functions-Matrix- Inverse of a matrix- Solving system of equations using Cramer's rule.

**Unit II:** Logic- Connectives- Well formed formula- Implications- Tautology- Valid conclusions.

**Unit III:** Algebraic Structure - Semi group – Monoid – Group - Abelian group - Cyclic group - Sub group - Ring - Sub ring – Vector space - Linearly independent sets - Linearly dependent sets – Basis - Linear Transformations.

**Unit IV:** Combinatorics - Addition and multiplication Principle – Permutations – Combinations - Recurrence relations.

**Unit V:** Graph - Sub graphs – Walk – Trail – Path – Connected – Cycle - Euler graph - Fleury's Algorithm - Hamiltonian graph - Closure of a graph - Cut vertex - Cut edge – Tree - Kruskal's and Prim's algorithms.

**Text books:**

1. Dr. Venkataraman .M.K, Dr. Sridharan.M., Chandrasekaran.M, Discrete Mathematics, National Publishing Company, 2003  
**Unit I:** Chapter 1(sec 1-4, 6, 9 ) Chapter 2( sec 1-5 ) Chapter 3(sec 1, 2, 5 ).  
**Unit II:** Chapter 9 (sec 1-3,5-8 ).
2. Arumugam. S & Thangapandian Issac. A, Modern Algebra, Scitech Publications, 2001.  
**Unit III:** Chapter 3( sec 3.1 , 3.5 ,3.6 ) Chapter 4( sec 4.1 , 4.6 )  
 Chapter 5: sec 5.0, 5.1 ,5.3-5.6
3. Alan Tucker, Applied Combinatorics, 5<sup>th</sup> edition, John Wiley & sons. Inc. 2007.  
**Unit IV:** Chapter 5(sec 5. 1 , 5.2 ) Chapter 7( sec 7.1 ).
4. John Clark and Derek Allan Holton, A First Look at Graph Theory, Allied Publishers ltd, 1995.  
**Unit V:** Chapter 1(sec 1.1, 1.3-1.6 ) Chapter 2( sec 2.2, 2.3, 2.6) Chapter 3( sec 3.1, 3)

**Reference Books:**

1. Shankerrao.G, Mathematical Foundations of computer science, I.K International publishing house pvt ltd ,2006.
2. Tremblay J.P & Manohar R, Discrete Mathematical Structures with applications computer science, Tata McGraw Hill, 1987.
3. Narsingh Deo, Graph Theory with applications to engineering and computer science, Prentice Hall India, New Delhi, 1989.

**MAS 1435**

**MATHS FOR CHEMISTRY - I**

**5hrs / 4cr**

**Objective:**

To introduce the basic concepts of various areas in Mathematics required to study chemistry. This course deals with matrices, eigen values, eigen vectors, sets, functions, groups, rings, fields, sampling, and numerical methods.

On successful completion of the course the student will be able to

- solve systems of linear equations
- to reduce the augmented matrix to row echelon form
- apply the basic techniques of matrix algebra
- find the eigen values and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix
- use mathematical definitions to identify and construct examples and to distinguish examples from non-examples
- ability to apply sampling methods to more general problems in statistics
- ability to analyse and interpret results of statistical sampling

- solve an algebraic or transcendental equation, differential equation using an appropriate numerical method
- approximate a function using an appropriate numerical method

**Unit I:** Matrices – Elementary transformations – Diagonalization – Inverse – Rank.

**Unit II:** Solving homogeneous and non-homogeneous equations – Cayley-Hamilton theorem - Eigen values and Eigen vectors.

**Unit III:** Sets – Relations – Functions – Types of functions – Groups – Examples and simple problems- Rings & fields with examples.

**Unit IV:** Sampling theory – Large and small sample tests for mean – normal, t-test, chi-square test.

**Unit V:** Numerical methods – Solution of algebraic equations – Interpolation -Newton's and Lagrange's methods – Numerical differentiation & integration.

**Text Books:**

1. Arumugam.S & Thangapandian Issac. A, Modern Algebra, SCITECH Publications, 1998 .  
**Unit I:** Chapter 7(sec 7.1, 7.2, 7.4, 7.5 )  
**Unit II:** Chapter 7(sec 7.6-7.8 )  
**Unit III:** Chapter 1(sec 1.1-1.8), Chapter 2(sec 2.1, 2.2, 2.4), Chapter 3( sec 3.1), Chapter 4( sec 4.1)
2. Arumugam. S & Thangapandian Issac. A, Statistics, New gamma publishing house, July 2011.  
**Unit IV:** Chapter 14( sec 14.1-14.5 II A, B), Chapter 15( sec 15.1), Chapter 16(sec 16.1)
3. Sastry. S.S, Introductory methods of Numerical Analysis, 3<sup>rd</sup> edition, Prentice Hall of India Pvt.ltd, 2003.  
**Unit V:** Chapter 2( sec.2.1-2.5), Chapter 3( sec 3.1, 3.3.1, 3.3.2, 3.6, 3.9.1), Chapter 5( sec 5.2, 5.4.1-5.4.3 )

**Reference Books:**

1. Khanna .M.L, Matrices, Jai Prakash Nath& Co. Meerut, 2001.
2. Gupta .S.C & Kapoor.V.K, Elements of Mathematical Statistics , S.Chand,1995.

MAS 1439

BUSINESS STATISTICS (CPA)

5 hrs / 4cr

**Objective:**

The objective of this course is to impart basic knowledge about application of statistics to various business situations.

On the successful completion of the course students will be able to

- the students will gain basic knowledge of the application of mathematics and statistics to business disciplines
- get the ability to analyse and interpret data to provide meaningful information to assist in making management decisions.

**Unit I :** Introduction –Methods of Collecting Primary and Secondary Data- Sampling Methods- Classification and Tabulation--Formation of Discrete and Continuous Frequency Distribution – Graphical representation of Frequency Distribution- Diagrammatic Presentation of Data.

**Unit II :** Measures of Central Tendency – Arithmetic Mean – Simple and Weighted Arithmetic Mean – Combined Arithmetic Mean – Geometric Mean – Harmonic Mean – Median– Quartiles, Deciles and Percentiles – Mode – Measures of Dispersion – Range – Quartile Deviation - Standard Deviation – Combined Standard Deviation- Coefficient of Variation.

**Unit III:** Correlation - Meaning – Significance – Types – Graphic method– Mathematical method- Karl Persons Co-efficient of Correlation - Rank Correlation- Concurrent Deviation- Lag and Lead in correlation- Regression- Meaning – Uses – Simple Regression Lines.

**Unit IV:** Index Numbers - Definition – Uses – Construction of Index Number – Methods– Laspeyre, Paasche, Bowley and Fisher’s Ideal Index Number – Tests of Index number – Cost of living Index Number.

**Unit V :** Analysis of Time Series - Meaning – Utilities – Components – Measurements of Trend – Method of Moving Averages – Method of Least Square – Measurement of Seasonal Variation- Probability – Addition, Multiplication Theorem – Conditional probability - Bayes’ Theorem- Mathematical Expectations (Simple Problems Only).

**Text Book:**

R.S.N . Pillai and Bagavathi , Statistics theory and practice,S. Chand & sons, New Delhi, 2017.

**Unit I:** Chapters 1, 4,5, 7 ,8

**Unit II:** Chapters 9, 10

**Unit III:** Chapters 12, 13.

**Unit VI:** Chapter 14

**Unit V:** Chapters 15, 18.

**Reference Books:**

1. Sanchetti & Kapoor, Statistics, Sulthan Chand, New Delhi, 2013.
2. Gupta .S.P, Statistical Methods , Sultan Chand & Sons, New Delhi, 2012.

MAS 1434

DISCRETE MATHEMATICS (COS)

5hrs / 4 cr

**Objective:**

The objective of this course is to train the students with fundamental concepts of mathematics and to equip the students with logical thinking and analytical skills. This course deals with sets, logic, Combinatorics and automata.

On successful completion of the course, the students will be able to

- write an argument using logical notation and determine if the argument is or is not valid
- understand the basic principles of sets and operations in sets
- demonstrate an understanding of relations and functions
- to utilize mathematics and computer application to solve practical problems in mathematics.

**Unit I:** Logic: Connectives-Normal forms-Inference theory of calculus- Inference theory of predicate calculus.

**Unit II:** Set theory: Sets-Operations of sets- Relations- Functions- Boolean algebra- Lattices.

**Unit III:** Combinatorics: Permutations- Combinations- Recurrence Relations- Generating Functions- Principle of inclusion and exclusion- Problems.

**Unit IV:** Algebraic Structure: Groups - Semi Groups- Monoids – Subgroups- Normal subgroups- Lagrange's Theorem- Introduction to rings. (Definition and simple problems only).

**Unit V:** Automata: Alphabets- Strings- Languages- Grammar- Type 0, Type1, Type2 and Type3 Grammars- Finite automata- Regular expressions- Non- deterministic finite automata.

**Text Books:**

1. Tremblay. J.P & Manohar.R, Discrete Mathematical Structures with applications of Computer Science, Tata McGraw- Hill 1987.  
**Unit I :**Chapter 1(sec 1-2 - 1-2.4 ,1-2.6, 1-2.8 , 1-2.9 , 1-2.11 ,1-3.1- 1-3.4 , 1-4.2 & 1-6.4)
2. Tucker .A, Applied Combinatorics, John Wiley and sons, 2005.  
**Unit III:** Chapter 5(sec 5.1- 5.4); Chapter 6(sec 6.1, 6.2) Chapter 7 (sec 7.1).
3. S.Arumugam and A. Thangapandian Isaac, Modern Algebra, SCITECH publications, 2006.  
**Unit II:** Chapter 9 (sec 9.1,9.2 ,9.3 and 9.5 )  
**Unit IV:** Chapter 3( sec 3.1 , 3.2 , 3.5 , 3. 8 , 3. 9 )
4. Dr. Venkataraman.M.K, Dr. Sridharan.N,Chandrasekaran.N, Discrete Mathematics , Then National Publication Company.  
**Unit II:** Chapter 1 (All sections except sec 9 only problems) & Chapter 2 (sec 1, 2, 5)  
**Unit IV:** Chapter 7 (sec 3 )  
**Unit V:** Chapter 12(sec 3 -7 and 17)

**References Books:**

1. Schaums outline Series, Set Theory and Logic, Tata McGraw Hill, 1999.
2. Schaums outline Series, Boolean Algebra and switching circuits, Tata McGraw Hill, 1999.
3. Schaums outline Series, Discrete Mathematics, Tata McGraw Hill, 1999.
4. Schaums outline Series, Combinatorics, Tata McGraw Hill, 1999
5. J.E. Hopcroft, J.D.Ullman, Introduction to automata theory, Language and computations, Narosa publishing House, 1999.

**MAS 1436****MATHS FOR CHEMISTRY - II****5hrs / 4cr****Objective:**

To reinforce and enhance the mathematical tools introduced earlier. Differential equation as a mathematical model for solving problems in chemistry is the central theme of the course. This course deals with differentiation, integration, differential equations and Laplace transform.

On successful completion of the course, the student will be able to:

- understand the rules of differentiation
- able to compute the derivatives of given functions
- able to explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point
- understand the notion of an implicitly defined function
- understand the derivative as it relates to rates of change
- solve problems involving relationships between changing quantities
- find the indefinite integral of elementary algebraic functions and trigonometric functions.
- use the substitution rule to evaluate both definite and indefinite integrals
- understand some basic definitions and terminology associated with differential equations and their solutions
- use analytical methods of solution by direct integration; separation of variables; and the integrating factor method
- understand exponential growth and decay
- understand the laplace transform and its existence.

**Unit I:** Differentiation – Successive differentiation – Meaning of derivative- Maxima and minima.

**Unit II:** Partial differentiation – Errors and approximation- Maxima and minima.

**Unit III:** Integration – Methods of integration – Some standard formulae-Integration by parts – Definite integral – Reduction formula.

**Unit IV:** Formation of differential equations –Growth, decay and chemical reactions- Solving first and second order differential equations.

**Unit V:** Laplace transforms – Inverse transforms-Solving linear differential equations.

**Text Books:**

1. Narayanan. S. & Manickavachagom Pillay. T.K., Calculus Vol. I , S. Viswanathan private limited, 2013.

**Unit I:** Chapter II (sec 2.1- 2.7, 3.1-3.3, 3.4, 3.6, 3.8), Chapter III (sec 1.1- 1.6, 2.1), Chapter IV (sec 2.1, 2, 2, 3, 4), Chapter V (sec 1.1- 1.5)

**Unit II:** Chapter VIII (sec 1.1-1.3, 1.5-1.7, 2.1, 2.3, 4, 5)

2. Narayanan. S. & Manickavachagom Pillay.T.K, Calculus Vol. II, S. Viswanathan private limited, 2013.

**Unit III:** Chapter I (sec 1.1-6.4, 7.3, 7.4, 11, 12, 13.1-13.5(formula only), 15.1)

3. Narayanan. S & Manickavachagom Pillay.T.K , Differential Equations and its applications, S. Viswanathan private limited, 2008.

**Unit IV:** Chapter I (sec 1, 3), Chapter II (sec 1, 2, 4, 6.1-6.4), Chapter III (sec 1), Chapter V (sec 1-4)

**Unit V:** Chapter XI (sec 1, 2, 4-9)

**Reference Books:**

1. Hirst. D. N, Mathematics for Chemistry, Macmillan Press Ltd, 1993.
2. Sankaranarayanan & Mangaladoss. J.A, Differential Equations and its Applications, Suja Publishing House, Palayamkottai, 1980.

**MAS 1438****STATISTICS (BIT)****5 hrs / 4cr****Objective:**

The aim of this course is to enable the students to understand statistics. The course essentially deals with the probability distribution theory which is the basis of statistics. The topics covered include correlation and Regression and analysis of variance.

On successful completion of the course, the students will be able to

- demonstrate the ability to apply fundamental concepts in exploratory data analysis
- demonstrate an understanding of the basic concepts of probability
- understand the foundations for classical inference involving confidence intervals and hypothesis testing.

**Unit I:** Measures of central tendency - Measures of dispersion

**Unit II:** Correlation – Correlation coefficient – Rank correlation – Regression – Regression coefficient

**Unit III:** Probability function – Addition and multiplication theorems on probability – Conditional probability- Baye’s formula and theorem.

**Unit IV:** Types of sampling – Parameters and statistics –Statistical hypothesis – Null and alternative hypothesis – Types of errors –Large samples based on normal area table –Test of significance of small samples- t-test and F-test and chi square test for population variance and goodness of fit.

**Unit V:** Analysis of variance – One way and two way of classification –Latin square design.

**Text Book:**

Arumugam.S & Thangapandian Issac .A , Statistics, New gamma publication House , 2013.

**Unit I:** Chapter 2(sec 2.0 - sec 2.4), Chapter 3 (sec 3.1)

**Unit II:** Chapter 6(sec 6.1 - 6.4)

**Unit III:** Chapter 11

**Unit IV:** Chapter 14(sec 14 .3 & 14.4), Chapter 15(sec 15.1 & 15. 2),  
Chapter 16 (sec 16.2)

**Unit V:** Chapter 17(sec 17.2 to 17.3)

**Reference Book:**

Gupta .S.C. & Kapoor .V.K, Elements of Mathematical statistics, S.chand co, 1995.

**MAS 1440**

**BUSINESS STATISTICS (BBA)**

**5hrs / 4cr**

**Objectives:**

This course is designed to acquire the skills needed for decision making under uncertainties using statistical tools.

On completion of the course, the students will able to

- gain the knowledge on presentation and tabulation of data, the methods of collecting data and summarizing the data using central tendency
- acquire the knowledge on various measures of dispersion and the method of measuring it
- measure the trend or variation existing in a time series data
- acquire the knowledge of measuring the fluctuation or changes in price and quantity of goods and products using various index numbers.

**Unit I:** Business statistics: Introduction-definition - nature and scope-objectives-importance - functions of statistics-limitations-uses of statistics in various fields.

**Unit II:** Statistical survey-execution of survey-collection of data-sampling design-classification of data-tabulation-diagrammatic presentation-graphical presentation, measures of central tendency-arithmetic mean- combined mean-weighted means - median- quartile-percentile-mode- - geometric mean-harmonic mean.

**Unit III:** Measures of dispersion-range-quartile deviation-mean deviations-standard deviation-variance-coefficient of variation-combined standard deviation.

**Unit IV:** Skewness-correlation analysis-types of correlation-karl pearsons's coefficient of correlation-spearman's rank correlation-concurrent deviation-coefficient of determination.



**Unit V:** Regression analysis-business applications of regression analysis-index number - uses-methods of calculation of index number – analysis of time series.

**Text Books:**

1. Dr. Selvaraj .V.M, Business Statistics, Bhavani publications, 2011 (for theory).  
**Unit I:** Chapter 1(sec1 – 8)  
**Unit II:** Chapter 1(sec 1-9 - 1-32), Chapter 2  
**Unit IV:** Chapter 5(sec 5-1, 5-2), Chapter 6(sec 6-1 - 6-5, 6.7), Chapter 7(sec 7-1, 7-2)
2. Arumugam, Isaac, Statistics, New gamma Publishers, 2008 (for problems)  
**Unit II :** Chapter 2  
**Unit III:** Chapter 3  
**Unit IV:** Chapter 6.1 – 6.3  
**Unit V:** Chapter 9.1, 9.2, Chapter 10

**Reference Books:**

1. Pillai.R.S.N. & Bhavathi.V, Business Statistics, S. Chand Publishers, 2015.
2. Gupta S.C, Kapoor.V.K, - Fundamentals of Mathematical Statistics, 10<sup>th</sup>-Edition, 2000.

**MAS 1446**

**BUSINESS MATHEMATICS (CPA)**

**5 hrs / 4 cr**

**Objective:**

The objective of this course is to impart basic knowledge and application of business mathematics to commercial situations.

Students will be able to identify and use applicable math study skills in suitable problems.

**Unit I:** Ratios and Proportions- Simple and Compound Interest Including Application of Annuity – Variation, Indices –Laws of indices-Fractional index-Operations with power functions- Surds-Operations on surds-Rationalising factor-Number Systems and Conversions.

**Unit II:** Set–Types of sets- Venn Diagrams- Operation on sets-Number of elements in a finite set-Related problems- Permutation – Fundamental rule of counting- Permutation of n different things- Circular permutations- Permutation of things not all different- Restricted permutations – Combinations- Restricted combinations- Combination of things not all different .

**Unit III:** Linear Simultaneous Equations- Quadratic Equations- Solution to quadratic equations-Nature of the roots- Inequalities.

**Unit IV:** Sequence and Series- Summation of series- Arithmetic progression-Sum of series in A.P- Geometric Progressions – Sum of series in G.P- Arithmetic mean-Geometric mean.

**Unit V:** Calculus- Function- Types of functions – Limit of a function- Continuity of a function- Differentiation-Derivative function of one variable, Power function, Constant with any function, sum, product, quotient of two function- Function of a function- Logarithmic functions- Maxima and Minima – Partial differentiation.

**Text Books:**

1. Dr. Aggarwal.R.S, Objective Arithmetic, S.Chand publishing,New Delhi,2013.  
**Unit I:** Chapter 12, 21& 22
2. Switching and finite automata theory, Z.Kohavi,Tata MCGraw hill publishing company,1978.  
**Unit I:** Chapter
3. Sancheti.D.C., Kapoor.V.K, Business Mathematics Sultan Chand& Sons, New Delhi,2005.  
**Unit I:** Chapter 6  
**Unit II:** Chapter 2, Chapter 9  
**Unit III:** Chapter 8 (sec 8.3, 8.7- 8.11)  
**Unit IV:** Chapter 11&12  
**Unit V:** Chapter 17 (sec17.0-17.8, 17.10, 17.19 &17.20)

**Reference Books:**

1. Ranganath.C.K, Sampagiram.C.S. and Rajaram.Y, Business Mathematics, Himalaya Publishing House, Mumbai, 2011.
2. Gupta.S.C , Business Mathematics , Sultan Chand & sons, New Delhi, 2010.

**MAS 2431****OPERATIONS RESEARCH (BIT)****5hrs / 4cr****Objective:**

To introduce to the students some of the quantitative techniques which are essential for Information technology.

On successful completion of the course, the students will be able to

- develop mathematical models for real life problems
- get solutions using techniques in operation research.

**Unit I:** Introduction to operations research - Linear programming problem (L.P.P) – Mathematical formulation – Graphical solution– Solution to L.P.P by simplex method.

**Unit II:** Transportation problem – Mathematical formulation – Finding initial basic feasible solution – Northwest corner rule, least cost method and Vogel’s approximation method – Moving towards optimality – Unbalanced transportation problem.

**Unit III:** Assignment problem: Introduction – Mathematical formulation – Hungarian Assignment algorithm – variations of the Assignment problem.

**Unit IV:** Game theory – Introduction – Two person zero sum games – Maxmin principle - minimax principle – Saddle points – Games without saddle points – Solution of 2x2 games – Graphical method – Dominance property.

**Unit V:** PERT/CPM – Introduction – Networking – Critical path analysis – Probability considerations in PERT.

**Text Book:**

KantiSwarup, Gupta and Man Mohan, Operations Research, Sultan Chand and Sons 2004.

**Unit I:** Chapter 1 (sec 1. 1, 1.6 & 1.7) Chapter 2 (sec 2.1, 2.2)

Chapter 3 (sec 3.1, 3.2) Chapter 4 (sec 4.3)

**Unit II:** Chapter 10 (sec 10.1, 10.9, 10. 10, 10. 14)

**Unit III:** Chapter 11 (sec 11.1 - 11. 4)

**Unit IV:** Chapter 17 (sec 17 .1 - 17.7)

**Unit V :** Chapter 21(sec 21. 1 - 21. 6)

**Reference Books:**

1. Taha,H.A, Operations Research - An Introduction, Prentice Hall,8th Edition, 2007.
2. Kapoor V.K, Operations Research, Sultan chand and sons, 1997.
- 3 .Gupta P.K, and Man Mohan, Problems in Operations Research, Sultan chand and Sons, 2007.
4. Paneerselvam, Operations Research, Prentice Hall, 200

**MAS 2437****BUSINESS STATISTICS (CIT)****5hrs / 4cr****Objective:**

The purpose of this course is to develop the numerical and analytical ability with statistical tools. This course equips the students with various statistical tools which can be used in business environment.

On the successful completion of the course students will be able to

- Students in introductory-level Statistics courses will know fundamental statistical concepts and some of their basic applications in science and society.
- Students shall know how to organize, manage, and present data. Students shall be able to effectively communicate results of statistical analysis.

**Unit I:** Meaning- Scope- Importance and Limitations of Statistics- Statistically Investigation: Planning of Statistical Investigation- Census and collection of primary and secondary data- Statistical errors and approximation- Classification and Tabulation of data- Frequency distribution.

**Unit II:** Statistical Average: Arithmetic- geometric and Harmonic means- Mode- Median- Quartiles and Percentiles- Simple and weighted averages- Uses and limitations of different averages.

**Unit III:** Dispersion: Range- Quartile deviation- mean deviation and their coefficients- standard deviation- Coefficient of variation.

**Unit IV:** Correlation: Types of correlations- Karl person's coefficient of correlation- Spearman rank correlation- Regression- meaning- applications- equations.

**Unit V:** Index Numbers: Utility of index numbers- Problems in the construction of index numbers- Simple and weighted index number- Fisher's ideal index number -Time reversal test - Factor reversal test - Commodity reversal test.

**Text Books:**

1. Dr. Selvaraj.V.M, Business Statistics, Bavani Puplications, 2011.  
**Unit I:** Chapter 1
2. S. Arumugam, & A. Thangapandian Isaac, Statistics, New Gamma Publication House, 2004.  
**Unit II:** Chapter 2(sec 2.1, 2.2 (except Deciles), 2.3, 2.4, 2.5)  
**Unit III:** Chapter 3(sec 3.1)  
**Unit IV:** Chapter 6(sec 6.1, 6.2, 6.3, 6.4)  
**Unit V:** Chapter 9(sec I-A,I-B,II-A,II-B )

**Reference Books:**

1. Gupta .S.P, Fundamentals of Statistics, Sultan Chand Publishers, New Delhi, 2007.
2. Elhance .D.N, Fundamentals of Statistics, New Century Book House, 2011.
3. Gupta .S.C, V. K. Kapoor, Mathematical Statistics, Sultan Chand & Sons 2001.
4. Gupta.S. P, Statistical Methods, Sultan Chand & Sons, 2001.
5. Dr. Vittal .P. R, Mathematical Statistics, MARGHAM Publications, 2002.

**MAS 2439****QUANTITATIVE TECHNIQUES (BBA)****5hrs / 4cr****Objective:**

This course aims to equip the students with the basic mathematical and quantitative techniques that would enhance their Decision making skills both as a manager and as an entrepreneur.

On successful completion of the course the student will be able to

- understand statistical inference in relation to international business decision making
- understand the mathematical tools that are needed to solve optimization problems
- students have gain the knowledge on transportation and assignment problem.

**Unit I:** Basic concepts in matrix algebra – Determinant- Solving linear equations using Crammer’s rule, matrix inversion method – Introduction to theory of probability.

**Unit II:** Concept of Linear Programming Problem : Formulation - Terminologies – Assumptions – Application and Limitations; LPP solution methods – Graphical method – Simplex method.

**Unit III:** Transportation Problem: Mathematical formulation – Initial basic feasible solution methods: North West corner rule – Least cost method – Vogel’s approximation method – Optimality checking – Stepping stone method.

**Unit IV:** Assignment problem: Introduction – Mathematical Formulation – Hungarian assignment algorithm – Variations of the assignment problem.

**Unit V:** Game Theory: Introduction - Basic terminologies – Two person zero sum game – Games with saddle point – Games without saddle point mixed strategies – Dominance property of reducing the size of the game – solution methods.

**Text Books:**

1. Khanna M.L, Matrices, Jai Prakash Nath & Co. Meerut, 2001.  
**Unit I:** Chapter
2. Arumugam. S, & Thangapandian Issac .A, Statistics, New Gamma Publication House, 2004.  
**Unit I:** Chapter 11
3. Kantiswarup and Manmohan, Operations Research, Sultan Chand and sons, New Delhi, 2004.  
**Unit II:** Chapter 2 & Chapter 3 (sec 3.1, 3.3)  
**Unit III:** Chapter 6 (sec 6.1, 6.2, 6.5, 6.6)  
**Unit IV:** Chapter 7  
**Unit V:** Chapter 9 (sec 9.1-9.7)

**Reference Books:**

1. Sundaresan.V, Ganapathy Subramanian. K.S, Ganesan.K, Resource Management Techniques, A.R.Publications, 2002
2. Natarajan , Balasubramani, Tamilarasi, Operations Research , Pearson Education, 2007.
3. Ramnath , Rohitashwa, Quantitative Techniques for Managers, Himalaya Publications, 2010.
4. Paneerselvam, Operations Research, Prentice Hall, 2007.
5. Kothari, Introduction to Operation Research, Vikas publishing House, New Delhi, 2010.
6. Gupta. P.K, Man Mohan, Problems in Operation Research, Sultan Chand and sons, New Delhi, 2010.

**MAS 2475****BUSINESS STATISTICS (CMC)****5hrs / 4cr****Objective:**

The purpose of this course is to develop the numerical and analytical ability with statistical tools.

This course equips the students with various statistical tools which can be used in business environment.

**Unit I:** Meaning- Scope- Importance and Limitations of Statistics- Statistically Investigation: Planning of Statistical Investigation- Census and collection of primary and secondary data- Statistical errors and approximation- Classification and Tabulation of data- Frequency distribution.

**Unit II:** Statistical Average: Arithmetic- geometric and harmonic means- Mode- Median- Quartiles and Percentiles- Simple and weighted averages- Uses of different averages.

**Unit III:** Dispersion: Range- Quartile deviation- mean deviation and their coefficients- Standard deviation- Coefficient of variation.

**Unit IV:** Correlation: Karl person's coefficient of correlation- Spearman's rank correlation- Concurrent deviation method- Regression equations.

**Unit V:** Index Numbers: Utility of index numbers- Problems in the construction of index numbers- simple and weighted index number- Base shifting Fisher's ideal index number and tests of reversibility.

**Text Books:**

1. Gupta. S.C, Kapoor.V. K, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2001.  
**Unit I** : Chapter 1( sec 1.1 - 1.4)
2. Arumugam.S & Thangapandian Issac. A, Statistics, New Gamma Publication House, 2013.  
**Unit II:** Chapter 2 (sec 2.0 -2.4 (except deciles))  
**Unit III:** Chapter 3  
**Unit IV:** Chapter 6 (sec6.1 -6.4)  
**Unit V:** Chapter 9 ( sec 9.1)
3. Dr. Selva Raj.V.M, Business Statistics, Bavani Publications, 2011.  
**Unit I:** Chapter 1

**Reference Books:**

1. Gupta. S.P, Fundamentals of Statistics, Sultan Chand Publishers, New Delhi, 2007.
2. Elhance. D.N, Fundamentals of Statistics, New Century Book House, 2011.
3. Gupta.S.P, Statistical Methods, Sultan Chand & Sons, 2001
4. Dr. Vittal. P. R, Mathematical Statistics, MARGHAM Publications, 2002.

**MAS 2477      NUMERICAL AND STATISTICAL METHODS (COS)      5 hrs / 4cr**

**Objective:**

The aim of this course is to enable the students to acquire basic tools in numerical and statistical methods for solving real life problems in business, industry, agriculture and medicine.

On the successful completion of the course students will be able to

- Understand Numerical and Statistical methods preliminaries.
- Apply Statistical and Numerical methods in various computer science related projects, seminars and research.

**Unit I:** Solving algebraic and transcendental equations – Bisection method – Regula Falsi method- Iteration method – Newton Raphson method-Solving system of linear equations - Gauss elimination – Gauss Jordan method.

**Unit II :** Interpolation – Equally spaced intervals- Newton’s forward and Backward – Gauss forward and Backward – Stirlings formula- Unequally spaced intervals – Lagrange method – Hermite method.

**Unit III :** Numerical differentiation- Newton’s forward and backward formula - Stirlings formula- Numerical integration – Trapezoidal – Simpson’s  $1/3^{\text{rd}}$  and  $3/8^{\text{th}}$  rule – Solving differential equation - Euler’s method – Runge Kutta  $2^{\text{nd}}$  and  $4^{\text{th}}$  order formula.

**Unit IV:** Measures of central tendency – mean – median – mode – Geometric mean – Harmonic mean – Measure of Dispersion – Range – Standard deviation – Quartile Deviation .

**Unit V :** Probability - Conditional probability - Probability distributions – Binomial – Poisson – Normal distributions - Correlation – Correlation coefficients – Rank Correlation.

**Text Books:**

1. Sastry S.S , Introductory method of Numerical Analysis, Prentice Hill of India, 2000  
**Unit I:** Chapter 2(sec 2.1- 2.5) Chapter 5(sec 5.3.2)  
**Unit II:** Chapter 3 (sec 3.6, 3.7.1, 3.7.2, 3.9.1, 3.9.2)  
**Unit III:** Chapter 4(sec4.2, 4.4 (4.4.1, 4.4.2) ) , Chapter 6 ( sec 6.4,6.5)
2. Arumugam. S and Thangapandian Issac. A, Statistics, New Gamma publishing House, 2004.  
**Unit IV :** Chapter 2( sec 2.1,2.2,(only Median )2.3,2.4) , Chapter 3 ( sec 3.1)  
**Unit V:** Chapter 11 (sec 11.1, 11.2), Chapter 13 (sec 13.1, 13.2, 13.3) Chapter 6 (Sec 6.1, 6.2)

**Reference Books:**

1. Jain.M.K, Jain.R.K &,Iyengar.S.R.K , Numerical methods for scientific & engineering, New Age international, 1995.
2. Venkataraman. M.K, Numerical methods for science and engineering, National Publishing company, 1999.

**MAS 2438****BUSINESS MATHEMATICS (CIT)****5hrs / 4cr****Objective:**

This course is designed to explore the techniques in mathematics and statistics which can be used in environment and managerial skills.

On the successful completion of the course students will be able to

- apply mathematical concepts and principles to perform computations.
- apply mathematics to solve problems.
- communicate mathematical knowledge and understanding.
- apply technology tools to solve problems.
- perform abstract mathematical reasoning.
- learn independently.

**Unit I:** Set theory: basic operations - Universe of sets - Functions - Venn diagrams.

**Unit II:** Matrices and Determinants-Definition of a matrix -Types of matrices- Algebra of matrices - Properties of determinants - Calculation of values of determinants upto Third order-Adjoint of a matrix- elementary row or column operations-Finding inverse of a matrix through Adjoint and elementary row and column operations- Solution of a system of linear equations (having unique solution and involving not more than three variables) using matrices- Input Output Analysis.

**Unit III:** Analysis of Time series- Causes of variation, components of a time series- Decomposition - additive & multiplicative models- determination of trend - Moving averages-least squares (Linear, Parabolic & Exponential trend)- Seasonal Indices - simple averages - ratio to trend- link relative methods.

**Unit IV:** Theory of Probability – concepts - addition & multiplication laws of probability-conditional probability- Baye's Theorem.

**Unit V:** Theoretical distribution – Binomial-Poisson and Normal Distributions.

**Text Books:**

1. Sancheti .D.C, and Kapoor .V.K, ,Business Mathematics ,Sultan Chand & Sons,1993.

**Unit I:** Chapter 2( sec 2.1-2.12,2.19- 2.24)

**Unit II:**Chapter 20 (sec 20.1-20.12,20.14-20.15,20.17-20.22)

2. Sundaresan.V, Jeyaseelan.S.D , An Introduction to Business Mathematics,2012, S.Chand, 2012.

**Unit II :** Chapter 8 (sec 8.7)

3. Arumugam. S., & A. Thangapandian Isaac, Statistics, New Gamma Publication House, 2004.

**Unit III :** Chapter 10 (sec 10.1,10.2,10.3)

**Unit IV :** Chapter 11 (sec 11.1,11.2)

**Unit V :** Chapter 13 (sec 13.1,13.2,13.3)

**Reference Books:**

1. Gupta. S.C, Kapoor. V. K, Mathematical Statistics, Sultan Chand & Sons, 2001.
2. Gupta .S P, Statistical methods, Sultan Chand & Sons, 2001.

**MAS 2440**

**OPERATIONS RESEARCH (BCA)**

**5hrs / 4cr**

**Objective:**

To introduce to certain quantitative techniques in operations research will enhance the analytical ability of the students.

After completing the course, the students will be able to

- convert real life problems into mathematical models, to use Mathematical tools to solve problems in the analytical form and will be able to interpret in the common man's language and to hone the ability to do reality checks on calculations.
- design new simple models, like: PERT, CPM to improve decision –making and develop critical thinking and objective analysis of decision problems.

**Unit I:** Linear programming problem (L.P.P) – Mathematical formulation – Graphical solution – General L.P.P – Standard form – Canonical form – Solution to L.P.P by simplex method.

**Unit II:** Transportation problem – Mathematical formulation – Finding initial basic feasible solution – Northwest corner rule, least cost method and Vogel's approximation method – Moving towards optimality – Unbalanced transportation problem.

**Unit III:** Assignment problem – Mathematical formulation – Hungarian algorithm – Unbalanced assignment problem – Special cases – Travelling salesman problem.



**Unit IV:** Game theory – Introduction – Two person zero sum games – Maxmin, minimax principle – Saddle points – Games without saddle points – Solution of 2x2 games – Graphical method – Dominance property.

**Unit V:** Networking – Network and Basic components – Rule of network construction – Time calculations – Float or slack values – Critical path – CPM & PERT.

**Text Book:**

Kantiswarup, Gupta and ManMohan, Operations Research, Sultan Chand and Sons, 2004.

**Unit I:** Chapter 2( sec 2.2), Chapter 3(sec 3.1,3.2,3.4,3.5 ), Chapter 4( sec 4.3)

**Unit II:** Chapter 10( sec 10.1, 10.2, 10.9, 10.10, 10.14)

**Unit III:** Chapter 11( sec 11.1, 11.2, 11.3, 11.4, 11.6 )

**Unit IV:** Chapter 17: 17.1 -17.7

**Unit V:** Chapter 21: 21.1 -21.7.

**Reference Books :**

1. Kapoor.V.K , Operations Research, Sultan chand and sons , 1997.
2. Gupta. P.K and ManMohan, Problems in Operation Research, Sultan Chand and Sons, 2010.
3. Arumugam. S & Thangapandian Isaac.A, Operations Research, New Gamma Publishing house, 2003.
4. Sundaresan.V, Ganapathy Subramanian. K.S, Ganesan. K, Resource Management Techniques, A.R.Publications, 2002.

**MAS 2454**

**BIostatistics (BCH)**

**5hrs / 4cr**

**Objective:**

The main objective of the course is to inculcate the students with statistical skills needed to deal with contemporary nature of biological and clinical experiments. It also acquaints students with basic concepts of data collection and sampling methods.

On successful completion of the course the student will be able to

- identify the probability distribution
- apply the methods of distribution in various experimental problems

**Unit I:** Definition of statistics- Characteristics of statistics- Statistical Methods- Uses of statistics in Biology- Data types- Collection of data- Classification- Tabulation- Diagrammatic representation.

**Unit II:** Statistical tools-measures of central tendency-mean, median and mode, Harmonic mean, Geometric mean-measures of dispersion-mean deviation-standard deviation-coefficient of variation.

**Unit III:** Correlation: Types of correlation- Karl Pearson's co-efficient of correlation-Rank correlation- Regression lines.

**Unit IV:** Probability: Introduction-Basic definitions –Simple problems- Theoretical distribution- Binomial-Poisson-Normal distributions and applications.

**Unit V:** Sampling-Hypothesis- t-test- F-test-chi square test for goodness of fit-ANOVA- Definition- Classification-one criteria and two criteria - Simple problems- Overview of research methodology.

**Text book:**

Palanichamy.S & Manoharan, Statistical Methods for Biologists, Palani Paramount publications, 1990.

**Unit I:** Chapters 1, Chapter 2 (sec 2.1, 2.3, 2.4)

**Unit II:** Chapters 3, Chapter 4 (sec 4.1 – 4.4)

**Unit III:** Chapters 6 (sec 6.1, 6.2, 7.1, 7.2)

**Unit IV:** Chapters 8, 9

**Unit V:** Chapters 10, 11, 12.

**Reference Books:**

1. Arumugam Isaac .S, Statistics, New gamma Publishers, 2008.
2. Dr. Pranab kumar banarjee, Introduction to Biostatistics, S.Chand & company Ltd, 2011
3. Elhance, D.N and Agarwal, Fundamentals of Statistics, Kitab Mahal Ahamedabad, 2003.

**MAS 2466**

**BUSINESS MATHEMATICS (CMC)**

**5hrs / 4cr**

**Objective:**

This course is designed to explore the techniques in mathematics and statistics which can be used in environment and managerial skills.

On successful completion of the course the student will be able to

- understand the basic principles of sets
- demonstrate an understanding of the basic concepts of probability.

**Unit I:** Set theory: basic operations - universe of sets - functions - Venn diagrams.

**Unit II:** Matrices and Determinants- Definition of a matrix- Types of matrices-Algebra of matrices-Properties of determinants- Calculation of values of determinants up to Third order-adjoint of a matrix- elementary row or column operations-Finding inverse of a matrix through adjoint and elementary row and column operations- Solution of a system of linear equations (having unique solution and involving not more than three variables) using matrices- Input Output Analysis.

**Unit III:** Analysis of Time series- Causes of variation, components of a time series- Decomposition - additive & multiplicative models, determination of trend - Moving averages-least squares (Linear, Parabolic & Exponential trend)- Seasonal Indices - simple averages - ratio to trend- link relative methods.

**Unit IV:** Theory of Probability: concepts- addition & multiplication laws of probability- Conditional probability- Baye's theorem.

**Unit V:** Theoretical distribution - Binomial, Poisson distribution - Test of significance - Chi-square test, T-tests.

**Text Books :**

1. Sanchetti Kapoor, Business Mathematics, Sultan Chand & Sons, New Delhi, 2009.  
**Unit I:** Chapter 2 (sec 2.0 -2.20)  
**Unit II:** Chapter 20 (sec 20.0 - 20.24)
2. V. Sundaresan , S . D . Jeyaseelan, An Introduction to Busines mathematics, S. Chand, 2013.  
**Unit II:** Chapter 8 ( sec 8.7)
3. S. Arumugam, & A. Thangapandian Isaac, Statistics, New Gamma Publication House, 2013.  
**Unit III:** Chapter 10  
**Unit IV:** Chapter 11  
**Unit V:** Chapter 13 ( sec 13.1 & 13.2), Chapter 15 ( sec 15.1 )and Chapter 16( sec 16.1 & 16.2)

**Reference Books:**

1. Gupta. S.C, Kapoor. V. K, Mathematical Statistics, Sultan Chand & Sons, 2001.
2. Gupta. S.P , Statistical methods, Sultan Chand & Sons, 2001.

**MAS 2472**

**BIostatISTICS (MIC)**

**5hrs / 4cr**

**Objective:**

To introduce to the students the basic techniques in statistics, will enhance their ability to validate their experimental results.

The course deals with the fundamentals of biostatistics, sampling methods, data types and presentation, measures of central tendencies and dispersion, distribution patterns and various tests of inferential statistics.

**Unit I:** Definition of statistics- Characteristics of statistics- Uses of statistics in Biology- Data types- Collection of data- Classification- Tabulation- Diagrammatic representation.

**Unit II:** Measures of central tendencies: Mean and its types- Arithmetic mean, Geometric mean, Harmonic mean. Median, Mode, Measures of Dispersion: Range, Quartile deviation, Mean deviation, Standard deviation, Co-efficient of standard deviation, Standard error, Variance.

**Unit III:** Correlation Analysis: Types of correlation- Karl Pearson's co-efficient of correlation-Rank correlation- Regression lines.

**Unit IV:** Sampling: Types of sampling- Parameters and statistic- Null and alternate hypothesis- Test of significance of small samples-T-test, F-test and chi-square test for goodness of fit.

**Unit V:** Analysis of variance- One-way and two way classification- Latin square design.

**Text Books:**

1. Palanichamy.S & Manoharan, Statistical Methods for Biologists, Palani Paramount Publications, 1990.

**Unit I:** Chapter 1(sec1.1-1.7), Chapter 2(sec2.1-2.4)

**Unit II:** Chapter 3, Chapter 4(sec 4.1- 4.4)

**Unit III:** Chapter 7(sec7.1-7.2(coefficient of correlation and rank correlation))

**Unit VI:** Chapter 10(sec 10.1-10.3 and 10.6) ,Chapter 11

**Unit V:** Chapter 12

2. Arumugam. S & Thangapandian Issac. A, Statistics, New Gamma publishing House, 2008.

**Unit V:** Chapter 17 (sec17.3)

**Reference Books:**

1. Gupta, Statistical Methods, S.Chand&co, 2001.
2. Subatra.R. & Ms. Shrividya .R, Probability and statistics, Tech-Max publications, 2006.
3. Pranab kumar banarjee, Introduction to Biostatistics, S.Chand & company ltd.2011
4. Elhance, D.N and Agarwal, Fundamentals of Statistics, Kitab Mahal Ahamedabad, 2003.

**MAT 1221 / MAS 1221      ARITHMETIC AND MATHEMATICAL LOGIC****3 hrs / 2cr****Objective:**

The course is intended for the students who are not majoring in mathematics as a non-major elective. The basic algebraic concepts including the principle of mathematical induction are introduced. The basic structure in mathematics called set is introduced by means of real life examples. The idea of truth table and its consequence in resolving situations in which the truth value is either true or false is studied at length.

After the successful completion of the course, students will be able to

- identify and use applicable math study skills in suitable problems.
- it develops logical skills and arithmetic ability.

**Unit I:** Odd man out series - Percentage - Profit and Loss – Discount - Data interpretation.

**Unit II:** Mean – Median – Mode.

**Unit III:** Operations on set – Algebra of sets – Finite and Infinite set – Principles of Mathematical Induction.

**Unit IV:** Truth tables – Disjunction – Conjunction – Implication.

**Unit V:** Laws of Logic – Tautology – Contradiction – Conjunctive and Disjunctive Normal forms.

**Text Books:**

1. Aggarwal. R. S , Quantitative Aptitude , S . Chand and Company Ltd, 2014.  
**Unit I:** Sec I : 35 ,10 ,11, 32 and Sec II : 36 ,37
2. Arumugam. S & Thangapandian Issac. A, Statistics, New gamma publication House, 2013  
**Unit II:** Sec 2.1 – 2.3 simple problems
3. Venkatraman .M.K, Discrete Mathematics, The normal publishing company, 2000.  
**Unit III:** Chapter 1 (sec 1.1 – 1.6) and chapter 4 (sec 4.2)  
**Unit IV:** Chapter 9 (sec 9.1 -9.3)  
**Unit V:** Chapter 9 (9.6 – 9.8 and 9.12)

**Reference Books:**

1. Stoll. R.S, Set Theory and Logic , Eureka publishing House , 1997.
2. Tremblay .J.P, Manohar. R, Discrete Mathematical Structure with applications to Computer science, Tata Mc-Graw -Hill, 2011.
3. Seymour Lipschutz , Schaum's theory and problems of set theory , Mc-Graw-Hill, 1964.

**MAT 1222 / MAS 1222 RECREATIONAL MATHEMATICS****3hrs / 2cr****Objective:**

The course is intended for the students who are not majoring in mathematics as a non-major elective. Mathematics is called the Queen of sciences. It is sometimes perceived as incomprehensible. Mathematics can be fun is the theme of this course.

This course enables the students to

- appreciate the recreational value in mathematics through interesting games
- fallacies and paradoxes.

**Unit I:** Magic squares – Definition – History – Creation of magic square- Odd order ( $2m+1$ )- Single even order( $2(2m+1)$ )– Double even order ( $4m$ ) .

**Unit II:** Fallacies- Paradoxes.

**Unit III:** Multiplication rules – Divisibility rules.

**Unit IV:** Combinatorics – Rule of sum – Rule of product – Combination – Permutations – Basic level problems.

**Unit V:** Recurrence relations – Tower of Hanoi problem – Fibonacci numbers – Related results.

**Text Books:**

1. Rouse ball, H.S.M. Coxter, Mathematical Recreations and essays 13<sup>th</sup> edition, Dover Publications, 2003.  
**Unit I:** Chapter 7 (page no 193-199)
2. Maxwell. E.A, Fallacies in mathematics, Cambridge University press , 1969.  
**Unit II:** Chapter 1 & 6
3. Jagadguru swami Sri Bharathi Krisna tirthaji maharaja, Vedic mathematics, Banarsidass publishers, Delhi 2006.  
**Unit III:** Chapter 2 & 3
4. Balakrishnan. V.K, Schaum's outline of combinatorics, Tata Mc Graw-Hill publishing company Limited, Delhi 1995.  
**Unit IV:** Chapter 1 (Basic level problems)  
**Unit V:** Chapter 3 (Basic level problems)

**Reference Books:**

1. Tucker A.W, Applied Combinatorics, John & Sons Wiley, 2000.
2. Cohen D, Combinatorics, Wiley, 1978.

**MAT 1231 / MAS 1231****MATHEMATICS FOR LIFE****3hrs / 2cr****Objective:**

The course is introduced to all the first year students as a life skill course. This course attempts to show what mathematics is, how it has developed from man's efforts to understand and model nature, how the mathematical approach to real problem can be accomplished, to what extent mathematics has modeled on civilization and culture. The topics covered in this course are history of calendar, puzzles, and moon, sun and Mathematical models in nature.

The course aims at enabling the students to acquire mathematical knowledge for technical proficiency.

**Unit I:** History and types of calendar- Various number bases subsist in the history-Number puzzles and Logical puzzles.

**Unit II:** Speed arithmetic-Complementation rule - Product near the base  $10^k$ - Division-Square root.

**Unit III:** Konigsberg bridge problem- Jordan curve-Planarity-Map coloring.

**Unit IV:** Synodic month- Sidereal month - Relation between synodic and sidereal month- Elongation of Moon- Phase formula.

**Unit V:** Lunar eclipse- Types and condition for its occurrence-Partial and total Solar eclipse- Condition for the occurrence of solar eclipse.

**Text books:**

1. Kumaravel and Mrs. Kumaravel, Astronomy, Shri Vishnu arts, Sivakasi,2004.  
**Unit I:** Chapter 7(Sec 3).  
**Unit IV:** Chapter 12.  
**Unit V:** Chapter13.
2. Glover. J. T, Vedic Mathematics, MothilalBanarsidass publishers, 1995.  
**Unit II:** Chapters: 2,3,4,5.
3. Arumugam.S. and Ramachandran.S ,Invitation to Graph Theory, SciTech Publications (India) Pvt. Ltd., 2004.  
**Unit III:** Pages: 1-10, 73-82, 85-98.

**Reference Books:**

1. Galbraith.P, Blurn.W, Booker.G, and Ian D. Hurtle, Mathematical models, Harwood publisher, Chichester, 1993.
2. Arthur berry, Astronomy, Dover publication, 1991.
3. George J. Summer, The great book of puzzles and teasers, Jaico publishing house.
4. John Clarke & Derek Allan Holton, A first look at Graph Theory, World Scientific Publishing Co. Ltd., 1995.

**MAT 1232 / MAS 1232****MATHEMATICAL REASONING****3hrs / 2cr****Objective:**

The course is introduced to all the first year students as a life skill course. This course aims at developing logical thinking and mathematical reasoning. The science of coding and decoding is a hallmark in this era of communication and networking. A logical deduction is an important tool for any sequential programming which is an essence of the present electronic era.

The course enables the students to

- understand this process and ultimately enables them to crack the unknown
- enable the students to gain the knowledge about any problem that involves logical deduction by several methods like cause and effect reasoning

**Unit I:** Blood relation- Deciphering jumbled up descriptions, Relation puzzle and coded relations.

**Unit II:** Coding and Decoding- Letter decoding, direct letter coding, Number/symbol coding- Matrix coding- Substitution- Deciphering message word codes- Deciphering number and symbol codes for messages- Jumbled coding.

**Unit III:** Puzzle test: Classification type- Seating/placing arrangements-Comparison type- Sequential order of things- Selection based on given conditions-Family based puzzles.

**Unit IV:** Logical deduction- Arguments- Assumptions- Courses of Actions- Conclusions.

**Unit V:** Deriving conclusions from passages- Theme deduction - Cause and effect reasoning.

**Text Book:**

Aggarwal. R.S, A Modern Approach to verbal & non-verbal reasoning, S.chand& company Ltd., 2006.

**Unit I:** section 1: 5

**Unit II:** section 1: 4

**Unit III:** section 1: 6

**Unit IV:** section 2: 1, 2,3,4,5

**Unit V:** section 2: 6, 7,8

**Reference Books:**

1. Aggarwal. R.S, A Modern Approach to verbal reasoning, S.chand& company Ltd., 2006.
2. Aggarwal. R.S, A Modern Approach to non-verbal reasoning, S.chand& company Ltd., 2006.
3. Aggarwal. R.S, A Modern Approach to logical reasoning, S.chand& company Ltd., 2006.

**MAT 3231 / MAS 3231 MATHEMATICS FOR COMPETITIVE EXAMINATIONS****3 hrs/2cr****Objective:**

This course is designed for non major students who intent to apply for various competitive examinations. Though, no new concepts in mathematics are introduced whatever the students have learnt till their secondary level are recalled. Adequate training is given so that they will overcome the fear of numbers with the required level of speed and accuracy. This will provide strategies and methods to solve problems in Mathematics section of any competitive examinations.

On successful completion of the course the student will be able to

- appreciate the techniques and tools in mathematics to solve problems in life
- read between the lines and understand the logic behind it
- increase the speed and accuracy in performing problems in competitive examinations
- improve the efficiency in dealing with numbers
- appreciate the techniques and tools in mathematics to solve problems in life.

**Unit I:** Numbers - problems on numbers - H.C.F and L.C.M – Divisibility –Simplification.

**Unit II:** Arithmetic mean - Geometric mean – Harmonic mean.

**Unit III:** Mathematical logic – conjunction –disjunction – negation – implications – Equivalence of statements – disjunctive and conjunctive normal forms.

**Unit IV:** Venn diagram – Inclusion and exclusion principle.

**Unit V:** Measures of standard geometric objects.



**Text Books:**

1. Aggarwal R.S , Quantitative Aptitude, S. Chand & company Ltd., Revised edition, 2008.  
**Unit I:** Chapters 1,2&4  
**Unit II:** Chapter 6  
**Unit V:** Chapters 24 &25
2. Discrete Mathematics, Schaum’s outline series, McGraw Hill, 1992.  
**Unit III:** Chapter 12
3. Set theory and Related Topics, Schaum’s outline series, McGraw Hill, Second Edition 1998.  
**Unit IV:** Chapter 1

**Reference Books:**

1. Arumugam. S, & Thangapandian Issac .A, Statistics, New gamma publication House, 2013.
2. Tremblay J.P, Manohar R, Discrete Mathematical Structure with applications to computer science, Tata McGraw - Hill, 2011.

**MAT 3232 / MAS 3232      DEVELOPING QUANTITATIVE APTITUDE    3 hrs / 2cr**

**Objective:**

This course will enable the students to develop their quantitative skills that strengthen their edge over others in competitive examinations.

On successful completion of the course the student will be able to

- appreciate the techniques and tools in mathematics to solve problems in life
- increase the speed and accuracy in performing problems in competitive examinations and to improve the efficiency in dealing with numbers

**Unit I:** Simplification - Simultaneous simple equations – Problems on numbers- Problems on ages –Decimal fractions – Average - Partnership.

**Unit II:** Ratio and proportion- Variation- Profit and loss.

**Unit III:** Time and work- Pipes and cistern-Time and distance.

**Unit IV:** Simple interest- Compound interest- Alligation and mixture.

**Unit V:** Indices - Surds - Logarithms.

**Text Book:**

1. Aggarwal R.S. Quantitative Aptitude, S.chand & company Ltd., 2006  
**Unit I:** Chapters 4, 7, 8, 3,6,13  
**Unit II:** Chapters 11, 12, 14  
**Unit III:** Chapters 15, 16, 17  
**Unit IV:** Chapters 21, 22, 20  
**Unit V:** Chapters 9, 23

**Reference Books:**

1. Sundaresan.V & Jeyaseelan.S.D, An Introduction to Business Mathematics, S.Chand & company Ltd., 2003.
2. Elango, Business Mathematics, S.Chand & company Ltd., 2001.

**THE AMERICAN COLLEGE, MADURAI**  
**DEPARTMENT OF CHEMISTRY (UG-Aided)**

**Program for Choice Based Credit System – (2018 – 2019 onwards)**

SEM	Part	Course No.	Course Title	Hours	Credits	Marks
1	I	TAM/FRE/HIN		3	2	30
1	II	ENG		3	2	30
1	IIIC	CHE 1521	Physical Chemistry – I	5	5	75
1	IIIC	CHE 1513	Inorganic Chemistry – I	5	5	75
1	IIIC	CHE 1331	Inorganic Quantitative Analysis	3	3	45
1	IIIS	PHY	Physics	5	4	60
1	IV		NME I	3	2	30
1	IV		LS I	3	2	30
1	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
2	I	TAM/FRE/HIN		3	2	30
2	II	ENG		3	2	30
2	IIIC	CHE 1522	Organic Chemistry – I	5	5	75
2	IIIC	CHE 1514	Inorganic Chemistry – II	5	5	75
2	IIIC	CHE 1332	Organic Analysis and Preparation	3	3	45
2	IIIS	PHY	Physics	5	4	60
2	IV		NME II	3	2	30
2	IV		LS II	3	2	30
2	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
3	I	TAM/FRE/HIN		3	2	30
3	II	ENG		3	2	30
3	IIIC	CHE 2521	Organic Chemistry – II	5	5	75
3	IIIC	CHE 2513	Inorganic Chemistry – III	5	5	75
3	IIIC	CHE 2515	Physical Chemistry – II	5	5	75
3	IIIC	CHE 2431	Inorganic Qualitative Analysis	4	4	60
3	IIIS	MAT/BOT	Mathematics / Botany	5	4	60
3	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>29</b>	<b>435</b>
4	I	TAM/FRE/HIN		3	2	30
4	II	ENG		3	2	30
4	IIIC	CHE 2522	Organic Chemistry – III	5	5	75
4	IIIC	CHE 2524	Inorganic Chemistry – IV	5	5	75
4	IIIC	CHE 2516	Physical Chemistry – III	5	5	75
4	IIIC	CHE 2432	Organic Estimation and Gravimetric Analysis	4	4	60
4	IIIS	MAT/BOT	Mathematics / Botany	5	4	60
4	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>29</b>	<b>435</b>

## CHE/CHS 2

SEM	Part	Course No.	Course Title	Hours	Credits	Marks
5	IIC	CHE 3611	Organic Chemistry – IV	6	6	90
5	IIC	CHE 3613	Inorganic Chemistry – V	6	6	90
5	IIC	CHE 3615	Physical Chemistry – IV	6	6	90
5	IIC	CHE 3531	Physical Lab	5	5	75
5	IV	CHE 3200	Environmental Chemistry	4	2	30
5	IV		LS III	3	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
6	IIC	CHE 3612	Organic Chemistry – V	6	6	90
6	IIC	CHE 3614	Applied Chemistry	6	6	90
6	IIC	CHE 3616	Physical Chemistry – V	6	6	90
<b>6</b>	<b>IIC</b>	<b>CHE 3534</b>	<b>PROJECT</b>	<b>5</b>	<b>5</b>	<b>75</b>
6	IV	VAL	Value Education	4	2	30
6	IV		LS IV	3	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
			<b>Grand Total</b>	<b>180</b>	<b>158</b>	<b>2430</b>

## MAJOR SUPPORTIVE COURSES

Sem	Part	Course No.	Course Title	Hours	Credit	Marks
1	IIS	CHE 1381	Chemistry for Botanist - I	3	3	45
<b>1</b>	<b>IIS</b>	<b>CHE 1183</b>	<b>Chemistry lab for Botanist-I</b>	<b>2</b>	<b>1</b>	<b>15</b>
2	IIS	CHE 1382	Chemistry for Botanist-II	3	3	45
<b>2</b>	<b>IIS</b>	<b>CHE 1184</b>	<b>Chemistry lab for Botanist-II</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>3</b>	<b>IIS</b>	<b>CHE 2381</b>	<b>Chemistry for Physicist-I</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>3</b>	<b>IIS</b>	<b>CHE 2181</b>	<b>Chemistry lab for Physicist-I</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>3</b>	<b>IIS</b>	<b>CHE 2383</b>	<b>Chemistry for Zoologist-I</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>3</b>	<b>IIS</b>	<b>CHE 2183</b>	<b>Chemistry lab for Zoologist-I</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>4</b>	<b>IIS</b>	<b>CHE 2382</b>	<b>Chemistry for Physicist-II</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>4</b>	<b>IIS</b>	<b>CHE 2182</b>	<b>Chemistry lab for Physicist-II</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>4</b>	<b>IIS</b>	<b>CHE 2384</b>	<b>Chemistry for Zoologist-II</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>4</b>	<b>IIS</b>	<b>CHE 2184</b>	<b>Chemistry lab for Zoologist-II</b>	<b>2</b>	<b>1</b>	<b>15</b>

**NON MAJOR ELECTIVE**

No.	Sem	Part	Course No	Course Title	Hours	Credits	Marks
NME I	1	IV	CHE 1261	Chemistry in Everyday Life	3	2	30
NME II	2	IV	CHE 1262	Food Chemistry	3	2	30

**LIFE SKILL COURSES**

No.	Sem	Part	Course No	Course Title	Hours	Credits	Marks
LS I	1	IV	CHE 1271	Cosmetics and Consumer Products	3	2	30
LS II	2	IV	CHE 1272	Chemistry in Crime Investigation	3	2	30
LS III	5	IV	CHE 3215	Medicinal Chemistry	3	2	30
LS IV	6	IV	CHE 3216	Dairy and Dairy products	3	2	30

## CHE/CHS 4

### SEMESTER I

### MAJOR SUPPORTIVE

CHE 1183

CHEMISTRY LAB FOR BOTANISTS–I

[2 hr / 1 cr]

#### Specific objectives:

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to quantitatively estimate metal ions like iron, manganese, calcium, zinc. This course is also supported by STAR college programme.

1. Estimation of Sodium Carbonate
2. Estimation of acetic acid in vinegar
3. Estimation of Manganese dioxide in pyrolusite
4. Estimation of Fe(II)-Permanganometry
5. Estimation of Fe(II)-Dichrometry/External indicator
6. Estimation of Zn (II)-Complexometry
7. Spectrometric determination of the glucose level in jam
8. Preparation of silver nanoparticles by green synthesis method
9. Preparation of copper nanoparticles by green synthesis method
10. Disintegration and dissolution of drug molecules (tablets)
11. Analysis of pH , TDS, DO and Salinity of various water samples.
12. Determination of pH from various commercially available beverages

### SEMESTER II

### MAJOR SUPPORTIVE

CHE 1184

CHEMISTRY LAB FOR BOTANISTS–II

[2 hr/ 1 cr]

#### Specific objectives:

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to qualitatively analyze the simple salts containing the following cations and anions. This course is also supported by STAR college programme.

1. Analysis of Salt-I
2. Analysis of Salt-II
3. Analysis of Salt-III
4. Analysis of Salt-IV  
(Cations: Pb(II), Cu(II), Cd(II), Bi(III), Fe(II), Mn(II), Ni(II), Co(II), Zn(II), Mg(II) & NH<sup>4+</sup> Interfering Anions: Oxalate, tartrate, borate, fluoride, and phosphate)
5. Analysis of Ozone & CO<sub>2</sub> in air sample
6. Estimation of available nitrogen in soil samples
7. Estimation of available phosphorus in soil samples
8. Estimation of Borax in soil samples
9. Extraction, isolation and characterization of natural products
10. Measurement of density of various commercial milk samples.
11. Determination of fat content in milk and milk products.
12. Separation of cream from whole milk using cream separator

#### Extension activity:

Industrial visits to milk industry/ polymer industry/ beverage industry/ sugarcane industry

**SEMESTER III****MAJOR SUPPORTIVE****CHE 2181****CHEMISTRY LAB FOR PHYSICISTS-I****[2 hr / 1cr ]****Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to quantitatively estimate metal ions like iron, manganese, calcium, zinc etc. This course is also supported by STAR college programme.

1. Estimation of Sodium Carbonate
2. Estimation of acetic acid in vinegar
3. Estimation of Manganese dioxide in pyrolusite
4. Estimation of Fe(II)-Permanganometry
5. Estimation of Fe(II)-Dichrometry/External indicator
6. Estimation of Zn (II)-Complexometry
7. Spectrometric determination of the glucose level in jam
8. Preparation of silver nanoparticles by green synthesis method
9. Preparation of copper nanoparticles by green synthesis method
10. Disintegration and dissolution of drug molecules (tablets)
11. Analysis of pH , TDS, DO and Salinity of various water samples.
12. Determination of pH from various commercially available beverages

**SEMESTER III****MAJOR SUPPORTIVE****CHE 2183****CHEMISTRY LAB FOR ZOOLOGIST-I****[2 hr / 1 cr ]****Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to quantitatively estimate metal ions like iron, manganese, calcium, zinc. This course is also supported by STAR college programme.

1. Estimation of Sodium Carbonate
2. Estimation of acetic acid in vinegar
3. Estimation of Manganese dioxide in pyrolusite
4. Estimation of Fe(II)-Permanganometry
5. Estimation of Fe(II)-Dichrometry/External indicator
6. Estimation of Zn (II)-Complexometry
7. Spectrometric determination of the glucose level in jam
8. Preparation of silver nanoparticles by green synthesis method
9. Preparation of copper nanoparticles by green synthesis method
10. Disintegration and dissolution of drug molecules (tablets)
11. Analysis of pH , TDS, DO and Salinity of various water samples.
12. Determination of pH from various commercially available beverages

## SEMESTER IV

## MAJOR SUPPORTIVE

## CHE 2182 CHEMISTRY LAB FOR PHYSICISTS–II [2 hr/ 1 cr ]

**Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to qualitatively analyze the simple salts containing the following cations and anions. This course is also supported by STAR college programme.

1. Analysis of Salt-I
2. Analysis of Salt-II
3. Analysis of Salt-III
4. Analysis of Salt-IV  
(Cations:  $Pb(II)$ ,  $Cu(II)$ ,  $Cd(II)$ ,  $Bi(III)$ ,  $Fe(II)$ ,  $Mn(II)$ ,  $Ni(II)$ ,  $Co(II)$ ,  $Zn(II)$ ,  $Mg(II)$  &  $NH^{4+}$  Interfering Anions: Oxalate, tartrate, borate, fluoride, and phosphate)
5. Analysis of Ozone &  $CO_2$  in air sample
6. Estimation of available nitrogen in soil samples
7. Estimation of available phosphorus in soil samples
8. Estimation of Borax in soil samples
9. Extraction, isolation and characterization of natural products
10. Measurement of density of various commercial milk samples.
11. Determination of fat content in milk and milk products.
12. Separation of cream from whole milk using cream separator

**Extension activity:**

Industrial visits to milk industry/ polymer industry/ beverage industry/ sugarcane industry

## SEMESTER IV

## MAJOR SUPPORTIVE

## CHE 2184 CHEMISTRY LAB FOR ZOOLOGIST–II [2 hr/ 1 cr ]

**Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises Also this course is intended for students to qualitatively analyze the simple salts containing the following cations and anions. This course is also supported by STAR college programme.

1. Analysis of Salt-I
2. Analysis of Salt-II
3. Analysis of Salt-III
4. Analysis of Salt-IV  
(Cations:  $Pb(II)$ ,  $Cu(II)$ ,  $Cd(II)$ ,  $Bi(III)$ ,  $Fe(II)$ ,  $Mn(II)$ ,  $Ni(II)$ ,  $Co(II)$ ,  $Zn(II)$ ,  $Mg(II)$  &  $NH^{4+}$  Interfering Anions: Oxalate, tartrate, borate, fluoride, and phosphate)
5. Analysis of Ozone &  $CO_2$  in air sample
6. Estimation of available nitrogen in soil samples
7. Estimation of available phosphorus in soil samples
8. Estimation of Borax in soil samples

9. Extraction, isolation and characterization of natural products
10. Measurement of density of various commercial milk samples.
11. Determination of fat content in milk and milk products.
12. Separation of cream from whole milk using cream separator

**Extension activity:**

Industrial visits to milk industry/ polymer industry/ beverage industry/ sugarcane industry

**SEMESTER VI****MAJOR CORE****CHE 3534****PROJECT****[5hr/ 5 cr]**

**Objectives:** This course is designed to reinforce the concepts with analytical techniques. It will provide a platform for students to have a hands-on experience with instruments and present a report on a research topic.

**Learning outcome**

The students should be able to

- analyze a research topic
- acquire analytical skills
- write a report of their findings
- present a report

**Group project**

Students will be divided into group of five. As a group, students will do the project work on a title approved by the respective project supervisor. Students will maintain daily records and present oral reports while doing the project. All the above process will be duly assessed by the project supervisor. They will submit the dissertation at the end of the semester.

**Evaluation**

Project presentation	25 marks
Project progress	50 marks
Dissertation	25 marks



**THE AMERICAN COLLEGE, MADURAI**  
**DEPARTMENT OF CHEMISTRY (UG-SF)**

**Program for Choice Based Credit System – 2018 – 2019**

	Part	Course No.	Course Title	Hrs	Credits	Marks
1	I	TAS/FRS/HIS		3	2	30
1	II	ENS		3	2	30
1	IIIC	CHS 1511	Physical Chemistry – I	5	5	75
1	IIIC	CHS 1513	Inorganic Chemistry – I	5	5	75
1	IIIC	CHS 1331	Inorganic Quantitative Analysis	3	3	45
1	IIIS	PHS	Physics	5	4	60
1	IV	XXX	NME I	3	2	30
1	IV	XXX	LS I	3	2	30
1	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>25</b>	<b>405</b>
2	I	TAS/FRS/HIS		3	2	30
2	II	ENS		3	2	30
2	IIIC	CHS 1512	Organic Chemistry –II	5	5	75
2	IIIC	CHS 1514	Inorganic Chemistry – II	5	5	75
2	IIIC	CHS 1332	Organic Analysis and Preparation	3	3	45
2	IIIS	PHS	Physics	5	4	60
2	IV	XXX	NME II	3	2	30
2	IV	XXX	LS II	3	2	30
2	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>25</b>	<b>405</b>
3	I	TAS/FRS/HIS		3	2	30
3	II	ENS		3	2	30
3	IIIC	CHS 2511	Organic Chemistry – II	5	5	75
3	IIIC	CHS 2513	Inorganic Chemistry – III	5	5	75
3	IIIC	CHS 2515	Physical Chemistry – II	5	5	75
3	IIIC	CHS 2431	Inorganic Qualitative Analysis	4	4	60
3	IIIS	MAS/ BCH	Maths/Biochemistry	5	4	60
3	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>435</b>
4	I	TAS/FRS/HIS		3	2	30
4	II	ENS 2202	Career Skills	3	2	30
4	IIIC	CHS 2512	Organic Chemistry – III	5	5	75
4	IIIC	CHS 2524	Inorganic Chemistry – IV	5	5	75
4	IIIC	CHS 2516	Physical Chemistry – III	5	5	75
4	IIIC	CHS 2432	Organic Estimation & Gravimetric Analysis	4	4	60
4	IIIS	MAS/ BCH	Maths/Biochemistry	5	4	60
4	V		NSS/NCN/NCC/PED/SLP			
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>435</b>

	Part	Course No.	Course Title	Hrs	Credits	Marks
5	IIIC	CHS 3611	Organic Chemistry – IV	6	6	90
5	IIIC	CHS 3613	Inorganic Chemistry – V	6	6	90
5	IIIC	CHS 3615	Physical Chemistry – IV	6	6	90
5	IIIC	CHS 3531	Physical Chemistry Lab	5	5	75
5	IV	CHS 3200	Environmental Chemistry	4	2	30
5	IV	XXX	LS III	3	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
6	IIIC	CHS 3612	Organic Chemistry – V	6	6	90
6	IIIC	CHS 3614	Applied Chemistry	6	6	90
6	IIIC	CHS 3616	Physical Chemistry – V	6	6	90
<b>6</b>	<b>IIIC</b>	<b>CHS 3534</b>	<b>PROJECT</b>	<b>5</b>	<b>5</b>	<b>75</b>
6	IV	VAL	Value Education	4	2	30
6	IV	XXX	LS IV	3	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
			<b>Grand Total</b>	<b>180</b>	<b>158</b>	<b>2430</b>

#### MAJOR SUPPORTIVES COURSES

Sem	Part	Course No.	Course Title	Hours	Credit	Marks
1	IIIS	CHS 1371	Chemistry for Bio-chemistry-I	3	3	45
<b>1</b>	<b>IIIS</b>	<b>CHS 1173</b>	<b>Chemistry lab for Bio-chemistry-I</b>	<b>2</b>	<b>1</b>	<b>15</b>
1	IIIS	CHS 1372	Chemistry for Bio-chemistry-II	3	3	45
<b>2</b>	<b>IIIS</b>	<b>CHS 1174</b>	<b>Chemistry lab for Bio-chemistry-II</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>3</b>	<b>IIIS</b>	<b>CHS 2311</b>	<b>Chemistry for Physicist-I</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>3</b>	<b>IIIS</b>	<b>CHS 2111</b>	<b>Chemistry lab for Physicist-I</b>	<b>2</b>	<b>1</b>	<b>15</b>
<b>4</b>	<b>IIIS</b>	<b>CHS 2312</b>	<b>Chemistry for Physicist-II</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>4</b>	<b>IIIS</b>	<b>CHS 2112</b>	<b>Chemistry lab for Physicist-II</b>	<b>2</b>	<b>1</b>	<b>15</b>

#### NON MAJOR ELECTIVES

No.	Sem	Part	Course No.	Course Title	Hours	Credit	Marks
NME1	1	IV	CHS 1251	Dairy Chemistry	3	2	30
NME2	2	IV	CHS 1252	Chemistry in Today's World	3	2	30

#### LIFE SKILL COURSES

No.	Sem	Part	Course No.	Course Title	Hours	Credit	Marks
LS1	1	IV	CHS 1271	Cosmetics and Consumer Products	3	2	30
LS2	2	IV	CHS 1272	Chemistry in Crime Investigation	3	2	30
LS3	5	IV	CHS 3215	Medicinal Chemistry	3	2	30
LS4	6	IV	CHS 3218	Food processing and preservation	3	2	30

## CHE/CHS 10

### SEMESTER I

### MAJOR SUPPORTIVE

#### CHS 1173 CHEMISTRY LAB FOR BIO-CHEMISTRY-I

[2 hr/ 1cr]

#### Specific objectives:

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to quantitatively estimate metal ions like iron, manganese, calcium, zinc etc. This course is also supported by STAR college programme.

1. Estimation of Sodium Carbonate
2. Estimation of acetic acid in vinegar
3. Estimation of Manganese dioxide in pyrolusite
4. Estimation of Fe(II)-Permanganometry
5. Estimation of Fe(II)-Dichrometry/External indicator
6. Estimation of Zn (II)-Complexometry
7. Spectrometric determination of the glucose level in jam
8. Preparation of silver nanoparticles by green synthesis method
9. Preparation of copper nanoparticles by green synthesis method
10. Disintegration and dissolution of drug molecules (tablets)
11. Analysis of pH, TDS, DO and Salinity of various water samples.
12. Determination of pH from various commercially available beverages

### SEMESTER II

### MAJOR SUPPORTIVE

#### CHS 1174 CHEMISTRY LAB FOR BIO-CHEMISTRY-II

[2 hr/ 1cr]

#### Specific objectives:

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to qualitatively analyze the simple salts containing the following cations and anions. This course is also supported by STAR college programme.

1. Analysis of Salt-I
2. Analysis of Salt-II
3. Analysis of Salt-III
4. Analysis of Salt-IV  
(Cations: Pb(II), Cu(II), Cd(II), Bi(III), Fe(II), Mn(II), Ni(II), Co(II), Zn(II), Mg(II) & NH<sup>4+</sup> Interfering Anions: Oxalate, tartrate, borate, fluoride, and phosphate)
5. Analysis of Ozone & CO<sub>2</sub> in air sample
6. Estimation of available nitrogen in soil samples
7. Estimation of available phosphorus in soil samples
8. Estimation of Borax in soil samples
9. Extraction, isolation and characterization of natural products
10. Measurement of density of various commercial milk samples.
11. Determination of fat content in milk and milk products.
12. Separation of cream from whole milk using cream separator

#### Extension activity:

Industrial visits to milk industry/ polymer industry/ beverage industry/ sugarcane industry

**SEMESTER III****MAJOR SUPPORTIVE****CHS 2111****CHEMISTRY LAB FOR PHYSICISTS–I****[2 hr / 1cr]****Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to quantitatively estimate metal ions like iron, manganese, calcium, zinc etc. This course is also supported by STAR college programme.

1. Estimation of Sodium Carbonate
2. Estimation of acetic acid in vinegar
3. Estimation of Manganese dioxide in pyrolusite
4. Estimation of Fe(II)-Permanganometry
5. Estimation of Fe(II)-Dichrometry/External indicator
6. Estimation of Zn (II)-Complexometry
7. Spectrometric determination of the glucose level in jam
8. Preparation of silver nanoparticles by green synthesis method
9. Preparation of copper nanoparticles by green synthesis method
10. Disintegration and dissolution of drug molecules (tablets)
11. Analysis of pH , TDS, DO and Salinity of various water samples.
12. Determination of pH from various commercially available beverages

**SEMESTER IV****MAJOR SUPPORTIVE****CHS 2112****CHEMISTRY LAB FOR PHYSICISTS–II****[2 hr/ 1 cr]****Specific objectives:**

Main objective of this program is to encourage more hands-on training to undergraduate students by adding more individualized practical exercises. Also this course is intended for students to qualitatively analyze the simple salts containing the following cations and anions. This course is also supported by STAR college programme.

1. Analysis of Salt-I
2. Analysis of Salt-II
3. Analysis of Salt-III
4. Analysis of Salt-IV  
(Cations: *Pb(II), Cu(II), Cd(II), Bi(III), Fe(II), Mn(II), Ni(II), Co(II), Zn(II), Mg(II) & NH<sup>4+</sup>* Interfering Anions: *Oxalate, tartrate, borate, fluoride, and phosphate*)
5. Analysis of Ozone & CO<sub>2</sub> in air sample
6. Estimation of available nitrogen in soil samples
7. Estimation of available phosphorus in soil samples
8. Estimation of Borax in soil samples
9. Extraction, isolation and characterization of natural products
10. Measurement of density of various commercial milk samples.
11. Determination of fat content in milk and milk products.
12. Separation of cream from whole milk using cream separator

**Extension activity:**

Industrial visits to milk industry/ polymer industry/ beverage industry/ sugarcane industry

**SEMESTER VI**

**MAJOR CORE**

**CHS 3534**

**PROJECT**

**[5hr/ 5 cr]**

**Objectives:** This course is designed to reinforce the concepts with analytical techniques. It will provide a platform for students to have a hands-on experience with instruments and present a report on a research topic.

**Learning outcome**

The students should be able to

- analyze a research topic
- acquire analytical skills
- write a report of their findings
- present a report.

**Group project**

Students will be divided into group of five. As a group, students will do the project work on a title approved by the respective project supervisor. Students will maintain daily records and present oral reports while doing the project. All the above process will be duly assessed by the project supervisor. They will submit the dissertation at the end of the semester.

**Evaluation**

Project presentation	25 marks
Project progress	50 marks
Dissertation	25 marks

## Department of Religion, Philosophy and Sociology

## Choice Based Credit System

Program for B.A. Degree in RPS

SEM	Part	Course No.	Course Title	Hr / Wk	Cr
I	I	XXX 0000	TAM / FRE / HIN	3	2
I	II	ENG 1201	Conversational Skills	3	2
I	III	RPS 1431	Academic Study of Religion	4	4
<b>I</b>	<b>III</b>	<b>RPS 1443</b>	<b>Introduction to Philosophy</b>	<b>4</b>	<b>4</b>
<b>I</b>	<b>III</b>	<b>RPS 1521</b>	<b>General Introduction to Sociology</b>	<b>5</b>	<b>5</b>
I	III S	RPS 1435	Social Anthropology: Origin of Man and Society	5	4
I	IV NME	RPS 1233	Understanding the Universe and Infinity	3	2
I	IV LS	RPS 1232	Social Skills	3	2
Total				<b>30</b>	<b>25</b>
II	I	XXX 0000	TAM / FRE / HIN	3	2
II	II	ENG 1202	Reading and Writing Skills	3	2
<b>II</b>	<b>III</b>	<b>RPS 1532</b>	<b>World Religions - I</b>	<b>5</b>	<b>5</b>
<b>II</b>	<b>III</b>	<b>RPS 1442</b>	<b>Ethics</b>	<b>4</b>	<b>4</b>
<b>II</b>	<b>III</b>	<b>RPS 1424</b>	<b>Social Institutions</b>	<b>4</b>	<b>4</b>
II	III S	RPS 1436	Introduction to Psychology	5	4
II	IV NME	RPS 1234	Elements of Philosophy of Science	3	2
<b>II</b>	<b>IV LS</b>	<b>RPS 1242</b>	<b>Yoga for Healthy Living</b>	<b>3</b>	<b>2</b>
II	Part V	XXXX 0000	NSS / NCC / SLP / P.Ed	2	1
Total				30+2	25+1
III	I	XXX 0000	TAM / FRE / HIN	3	2
III	II	ENG 2201	Study Skills	3	2
<b>III</b>	<b>III</b>	<b>RPS 2531</b>	<b>World Religions - II</b>	<b>5</b>	<b>5</b>
<b>III</b>	<b>III</b>	<b>RPS 2542</b>	<b>Classical Indian Philosophy - I</b>	<b>5</b>	<b>5</b>
III	III	RPS 2433	Logic	4	4
<b>III</b>	<b>III</b>	<b>RPS 2525</b>	<b>Study of Indian Society</b>	<b>5</b>	<b>5</b>
III	III S	<b>RPS 2435</b>	Philosophy of Religion	5	4
Total				<b>30</b>	<b>27</b>
IV	I	XXX 0000	TAM / FRE / HIN	3	2
IV	II	ENG 2202	Career Skills	3	2
<b>IV</b>	<b>III</b>	<b>RPS 2442</b>	<b>Ancient and Medieval European Philosophy</b>	<b>4</b>	<b>4</b>
<b>IV</b>	<b>III</b>	<b>RPS 2543</b>	<b>Classical Indian Philosophy - II</b>	<b>5</b>	<b>5</b>
IV	III	RPS 2534	Social Structure in India	5	5
IV	III	RPS 2536	Project in Sociology	5	5
IV	III S	<b>RPS 2430</b>	Social and Political Philosophy	5	4
IV	Part V	XXXX 0000	NSS / NCC / SLP	2	1
Total				<b>30+2</b>	<b>27+1</b>

**RPS 2**

<b>SEM</b>	<b>Part</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Hr / Wk</b>	<b>Cr</b>
<b>V</b>	<b>III</b>	<b>RPS 3641</b>	<b>Introduction to Hinduism</b>	<b>6</b>	<b>6</b>
<b>V</b>	<b>III</b>	<b>RPS 3543</b>	<b>Modern Western Philosophy</b>	<b>5</b>	<b>5</b>
<b>V</b>	<b>III</b>	<b>RPS 3625</b>	<b>Sociological Theories - I</b>	<b>6</b>	<b>6</b>
<b>V</b>	<b>III</b>	RPS 3637	Modern Indian Philosophy	6	6
<b>V</b>	<b>IV LS</b>	RPS 3231	Introduction to Critical Thinking	3	2
<b>V</b>	<b>IV</b>	VAL 3232	Social Issues and Value stand	4	2
			Total	<b>30</b>	<b>27</b>
<b>VI</b>	<b>III</b>	RPS 3632	Introduction to Christianity	6	6
<b>VI</b>	<b>III</b>	<b>RPS 3544</b>	<b>Contemporary Western Philosophy</b>	<b>5</b>	<b>5</b>
<b>VI</b>	<b>III</b>	<b>RPS 3626</b>	<b>Sociological Theories - II</b>	<b>6</b>	<b>6</b>
<b>VI</b>	<b>III</b>	<b>RPS 3638</b>	<b>Introduction to Islam</b>	<b>6</b>	<b>6</b>
<b>VI</b>	<b>IV LS</b>	<b>RPS 3232</b>	<b>Skills for Career Development</b>	<b>3</b>	<b>2</b>
<b>VI</b>	<b>IV</b>	RPS 3200	Environment and Ethical Issues	4	2
			Total	<b>30</b>	<b>27</b>
<b>Grand total for Semester I - VI</b>				<b>180+4</b>	<b>158+2</b>

- LS** : Life Skills courses  
**NME** : Non-Major Elective courses  
**S** : Supportive courses  
**VAL** : Value Education  
**EVS** : Environmental Studies

**INTRODUCTION TO PHILOSOPHY****RPS 1443****4 Cr / 4 Hr**

**Objective:** *This course is an introduction to the central problems of Philosophy. This course helps students to reflect on the nature of Reality, Knowledge, Morality and Beauty.*

**I – The Nature of Philosophy**

Nature, Scope and methods of Philosophy – The origin of philosophical thinking – Questions of meaning and truth – Philosophy and Science – Requirements for philosophizing

**II – Problems of Philosophy**

The problems of appearance and Reality – Problems of mind & body – The problems of Universals and Particulars – Problem of truth and falsehood – Problems of Knowledge and Error

**III – Methods and approaches in Philosophy**

Logical method – Empirical method – Transcendental method – Critical method – Traditional – Analytic – Pragmatic – Existential – Phenomenological approaches

**IV – Value of Philosophy**

Uses of Philosophy – To form world views, to stand on issues and to understand self, world and society

**V – An approach to Indian Philosophy**

Dharsana – Goals of Indian Philosophy - Origin of Indian Philosophy: Vedas, Upanishads – Concepts of Atman, Brahman – Orthodox and Heterodox schools in Indian Philosophy – Sad dharsana.

*Books for reference:*

1. Bertrand Russell – “The Problems of Philosophy”
2. A.C. Ewing – “The Fundamental Questions of Philosophy”
3. George Thomas Patric – “Introduction to Philosophy”
4. Chandradhar Sharma: A critical survey of Indian Philosophy



## GENERAL INTRODUCTION TO SOCIOLOGY

RPS 1521

5 hr / 5 cr

**Objective:** *This is a introductory course which enables the students to understand the subject matter of sociology. This course gives an overview of theoretical perspectives and introduces the basic concepts in Sociology.*

### Unit I – Sociology as a Discipline

Origin of Sociology – Historical context of Emergence of Sociology as discipline – Nature and Scope – Major perspectives: Positivist, Functionalist, Conflict and Symbolic interactionism

### Unit II – Sociology and other Social Sciences

Sociology and its relationship with Anthropology, History, Psychology, Philosophy and Political Science.

### Unit III – Understanding Individual and Society

Concept of Self- Nature Vs Nurture-- Socialization process – stages, types and agencies – Looking Glass Self theory Culture - characteristics and components – Norms and values – Folkways and Mores – Basic introduction.

### Unit IV – Basic Concepts related to Social Structure

Structure – Social structure – Function- Community – Association – Institution – Characteristics – Role & Status – Social groups – Nature & types – Social Stratification – Caste and Class – Social inequality

### Unit V – Social Process

Cooperation - Competition - Conflict - Accommodation – Assimilation - Definition, Types, Similarities and differences among Social processes – Social process & Social change

### *Books for reference:*

1. M. Haralambos & R.M. Heald, 'Sociology – Themes and Perspectives', Oxford University Press, New Delhi, 2006.
2. Peter L. Berger, Invitation to Sociology, Penguin Books, England, 1963
3. R.K. Sharma, Fundamentals of Sociology, Atlantic Publishers, New Delhi, 2013

**WORLD RELIGIONS – I**

RPS 1532

5 hr / 5 cr

**Objective:** This course is a survey of the major religious traditions which have either emerged in India or find a place exclusively in India. Special attention is given to the sects of these religions traditions along with the belief and practices.

**I – Zoroastrianism**

Founder – Conception of God with equal and opposite qualities – Zoroastrian sacred book, ritual and worship – Zoroastrianism in India

**II – Hinduism**

Vedic Hinduism – Vedas, Upanishads and Hindu scriptures – Beliefs in Atman, Brahman – Sects within Hinduism – Saivism, Vaishnavism,

**III – Jainism & Buddhism**

Thirthankaras, concept of Jiva, Ahimsa – Sects within Jainism – Jainism as a heterodox religion - Jaina worship and rituals, Life of Buddha- Four noble truths, eight fold path, sects within Buddhism – Buddhism as a heterodox religion – Buddhist worship and rituals

**IV – Popular Religions of South India****V – Sikhism**

Origin of Sikhism, Ten Gurus, Adi granth, Sects in Sikhism, beliefs and practices in Sikhism

*Books for Reference:*

1. Anindita N. Balslev, "On World Religions", , SAGE Publications, 2014
2. Kitagawa, J.M. Lasalle, "Modern Trends in World Religions", Illinois, Open Court Publishing Co., 1967
3. D.S. Sharma, "Hinduism through the Ages"
4. Humphrey C., "Buddhism: An Introduction and Guide", Penguin Books , 1990

## ETHICS

RPS 1442

4 Cr / 4 Hr

**Objective:** *This course is a study of the nature and scope of different ethical theories and their defining modes of goodness, rightness or moral values. Special attention is given to the exploration of enduring moral concerns, such as moral relativism, the place of reason in ethics, egoism, altruism and the nature of moral responsibility.*

### I – Introduction

Nature and scope of Ethics, Concept of Value, Right and Good, Duty, Virtue, Free will, Determinism, Rights and obligations and Evil – Classification of Ethical Theories - Normative and meta-ethical distinction – Teleological – De ontological distinction – Cognitivist and Non- cognitivist distinction – Ethical subjectivism – Objectivism and Relativism

### II – Teleological Ethical Theories

Importance for ends or good and moral value – Moral obligation seen as Value, Right as good – Greek Eudemonism, Egoistic hedonism of Epicurus, Hedonistic Utilitarianism of Bentham and Mill, Instrumentalism of Dewey

### III – Deontological Ethical Theories

Deontology and Importance for moral obligation, duty – Oughtness, rightness, categorical imperative, Self evident nature of right, right known through reason, Intuition, Act and Rule Deontology - Butler’s moral conscience theories – Ross’s deontological intuitionism and Kant’s formalism

### IV – Freedom and Responsibility

Determinism, Fatalism, hard and Soft determinism, Libertarianism and Action theory

### V – Ethics and Taking stands on contemporary issues

Arguments and against Homosexuality, Abortion – Euthanasia – Capital punishment and Animal rights

*Books for Reference:*

1. “Taking Sides: Clashing Views on Controversial Moral Issues”, Stephen Satris, The Dushkin Publishing Group Inc., 1994
2. “Applying Ethics”, Jeffrey Olen & Vincent Barry, Wadsworth Publishing Company, 1999
3. “Ethics and the limits of Philosophy”, Fontana Press, Collins, 1985
4. “An Introduction to Philosophical Analysis”, John Hospers, Prentice Hall Inc., 1997

## SOCIAL INSTITUTIONS

RPS 1424

4 hr / 4 cr

**Objective:** *This course enables the students to understand the concept of social institutions and provides them an overview of the functional aspects of Social institutions which will help the students to analyze the social reality*

### Unit I – Understanding Kinship

Kindred meaning – Kinship definition – Types of Kinship – Descent – Unilineal – Patrilineal, Matrilineal – Double Unilineal descent – Ambilineal descent – Residence rules - Rules of descent – clan – lineage – Differences – Types of Kin - Kinship usages

### Unit II – MARRIAGE

Definition, characteristics, types – Monogamy, Polygamy – Polygyny – Sororal Polygyny – Non-sororal Polygyny – Polyandry – Fraternal Polyandry – Non-fraternal Polyandry – Widow inheritance – Rules of Marriage – Exogamy, Endogamy, Hypergamy & Hypogamy- Functions

### Unit III – FAMILY

Meaning, characteristics - types, functions – Joint family System Changes in Joint family system – Nuclear family – Merits and demerits – Significance of family as an institution – Changing aspects of family system

### Unit IV – Polity

Meaning – Different forms of political organization – Functions -Party system – Biparty system – Multiparty system – Democracy – Types - Merits and Demerits – Factors affecting democratic participation – Importance of Democracy

### Unit V – Education& Religion

Meaning - Definition – Social functions – Education and Social change – Religion – Durkheim's definition - Belief systems, Functions of religion

#### *Books for Reference:*

1. M. Haralambos & R.M. Heald, 'Sociology – Themes and perspectives', Oxford University Press, Newdelhi,2006.
2. R.K. Sharma, Fundamentals of Sociology, Atlantic Publishers, New Delhi, 2013
3. J.L. Kachroo, General Sociology, Cosmos Bookhive Pvt Ltd, Haryana, 2008

**YOGA FOR HEALTHY LIVING**

RPS 1242

2 Cr / 3 hrs

**Objectives:** *This course aims at 1. To introduce Yoga for total personality development and impart skills in students at U.G level. 2. To promote positive health, prevention of stress related health problems and rehabilitation through Yoga. 3. To inculcate Yoga in order to have a healthy life and also to live in tune with nature (Eco – friendly)*

**I. Outlines of Yoga**

Meaning of Yoga – Importance of Yoga as a science and an art – Types of Yoga - Asthanga Yoga

**II. Principles of Yogic Practices**

Significance of Asanas, Pranayama, Dhyana, Chakras, Kriyas – its types and principles

**III. Suryanamaskara (Sun Salutation)**

Dakshasana – Namaskarasana – Parvatasana – Hastapadasana – Ekapadaprasaranana – Bhudharasana – Ashtangapranipatasana – Bhujangasana – Bhudharasana - Ekapadaprasaransana – Hastapadasana – Namaskarasana

**IV. Yogasanas for practice**

- A) Preparatory Exercises: Twisting, Hand, Leg, Eye and Head exercises
- B) Meditative Asanas: 1. Padmasana 2. Vajrasana 3. Sukhasana
- C. Standing Position: 1. Trikonasana 2. Vrksasana 3. Utkatasana
- D. Sitting Position: 1. Paschimottanasana 2. Ushtrassana 3. Ardhamatsyendrasana
- E. Prone Position: 1. Bhujangasana 2. Shalabhasana 3. Dhanurasana
- F. Supine Position: 1. Viparitarakani 2. Matsyasana 3. Halasana
- G. Balancing Asanas: 1. Chakrasana 2. Naukasana 3. Natarajasana
- H. Twisting Asanas: 1. Garudasana 2. Matsyendrasana 3. Jathara Parivartanasana
- I. Relaxative Asanas: 1. Shavasana 2. Makarasana 3. Balasana

**V. Other Yogic techniques**

Hasya (Laughing) Technique

Pranayama (Breathe) Techniques: Anuloma Viloma – Nadi suttu – Bastrika – Sitali

Dhyana (Meditation) Techniques: Breathing, Mindfulness, Walking, Empty mind

*Books for Reference:*

1. Dr.M.L. Gharote & Dr.S.K. Ganguli, “ Teaching Methods in Yoga” , Kaivalyadham, Lonavala.
2. S.C. Vasu, “Introduction to the Yoga Philosophy” Chomkhamba Sanskrit Sansthan, Varanasi.
3. S.N. Gupta, “Yoga Philosophy in relation to other Systems of Indian Thought”, Chomkhamba Sanskrit Sansthan, Varanasi.
4. Dr. M.M. Gore, “Physiology and Anatomy of Yogic Practices”, Kaivalyadham, Lonavala.
5. B.K.S Ayyangar. “Light of Yoga”, Orient Lormen Pvt. Ltd, New Delhi.

## WORLD RELIGIONS – II

RPS 2531

5 hr / 5 cr

**Objective:** *This course is a survey of the major religions traditions which have originated outside India forms the content of this course. An exposition to History, Beliefs, Practices and Sects of these religions traditions receive primary attention in this course.*

### I – Judaism

Concept of Yahweh – Ten commandments – Torah – Prophets – Worship – rituals and festivals in Judaism

### II – Christianity

Brief life history of Jesus, Bible, Sermon on the Mount, Christian conception of God, Man, World, Sin and Salvation – Basic Christian values – Sects in Christianity

### III – Islam

Meaning of Islam - Life history of prophet Mohammed – Hijra – Five pillars — Quran - Hadieth – Sects in Islam – Islamic worship and rituals

### IV – Taoism

Lao Tzu's thought – Tao - the way – Tao as understanding of the functions of the world – Yang and Yin – conception of wise person – Virtuous activity – Philosophy of Chuang Tzu – His conception of World, Nature, and Man

### V – Confucianism

Biography of Confucius – Practical way of learning – Love for humanity – Confucius Tao - the way heaven works – the principle of the Mean – Principles of Reciprocity – Confucius's conception of Sage or Superman

#### *Books for Reference:*

1. Anindita N. Balslev, "On World Religions", , SAGE Publications, 2014
2. Kitagawa, J.M. Lasalle, "Modern Trends in World Religions", Illinois, Open Court Publishing Co., 1967
3. D.S. Sharma, "Hinduism through the Ages"
4. Humphrey C., "Buddhism: An Introduction and Guide", Penguin Books , 1990

**CLASSICAL INDIAN PHILOSOPHY – I**

**RPS 2542**

**5 Cr / 5 Hrs**

**Objective:** *This course introduces the beginning of Indian Philosophy. Special attention is given to the question of reality and the different contestations of it by juxtaposing the Vedic traditions with Carvaka, Jainism and Buddhism.*

**I – Vedas and Upanishads**

Sruti and Smṛti – Divisions in Vedas – concept of Reality – Rta – Cosmic Order – Meaning of Upanishads – Principal Upanishads – The identity of Brahman and Atman – Upanisadic world views – Karma, Samsara and Moksha

**II – Carvaka**

Lokayata as the only Shastra – Perception as the only Pramana – Rejection of non-material entities, Dharma and Moksha, Carvaka, Ethics

**III – Jainism**

Tirthakaras; Jaina epistemology; Classification of knowledge into aparoksa – Paroksa and Pramana – Naya – Syadvada – Jaina

Metaphysics: Anekantavada – Categories: Jiva, Ajiva, Asti – Kaya Dravyas and Anast Kaya dravya – Bondage and Liberation; Maha – Vrata and anu vrata

**IV –Buddhism**

Four noble truths; Eight fold path; Pratyasamutpada: Nairatmyavada, Ksana – Bhanga – Vada – Sanghatavada – Hinayana and Mahayana distinction – Nirvana

**V – Schools of Buddhism**

Sarvastivada – Madhyamika (Vaibhasika) and Sautrantika (Shunyavada), Yoga chara (Vijnanavada)

**Books for Reference:**

1. Chandradhar Sharma, "A Critical Survey of Indian Philosophy", Motilal Banarsidass Publishers, 1994
2. Datta & Chatterjee, "Introduction to Indian Philosophy", University of Calcutta, 1984
3. Dr. S. Radhakrishnan, "History of Philosophy: Eastern and Western", Vol – I, George Allen & Unwin Ltd., London, 1967

## STUDY OF INDIAN SOCIETY

RPS 2525

5 hr / 5 cr

**Objective:** *This course is designed to understand the fundamental social relations in India and thereby aids them in interpreting Indian Social reality in the contemporary context.*

### Unit I – Understanding Caste

Definition –Varna & Jati- Features of caste – Purity and Pollution -Caste as social stratification – Changes in caste system – Caste& Mobility - Sanskritisation - Caste discrimination – untouchability

### Unit II –Family, Kinship &Marriage in India

Family – Disintegration of joint family structure in India – Kinship – Clan exogamy – caste endogamy – sapinda exogamy – Gotra exogamy – Marriage – Forms and rules of Hindu marriages – Christian and Muslim Marriages - Family with special reference to women in India

### Unit III – Economy of India

Pre-colonial economy – Village economy – Jajmani system - Colonial Indian economy - Independent India and Development – Democratic Socialism – Import Substituted Industrialisation – Globalisation – Structural adjustment Program - Liberalisation – Globalisation in India

### Unit IV – Education in India

Education in ancient & medieval India – Gurukula system – Colonization & modern education – Education and Globalization

### Unit V – Religion &Indian Polity

Religious traditions in India – Religious Pluralism – Indian Secularism - Democracy in India – Merits and Demerits – Factors affecting democratic participation in India – State and Civil Society

#### *Books for reference:*

1. Ram Ahuja, Indian Social System, Rawat Publications, Jaipur,1993.
2. J.K. Chopra, Indian Society, Structure and Change, Unique Publishers, Newdelhi,2014
3. J.L. Kachroo, General Sociology, Cosmos Bookhive Pvt Ltd, Haryana, 2008



## ANCIENT AND MEDIEVAL EUROPEAN PHILOSOPHY

RPS 2442

4 Cr / 4 Hrs

**Objective:** 1. This course aims at exploring the origin and development of philosophy in European context 2. The focus is on classical thinkers' view on man, god, society, knowledge and morality 3. This course aims at establishing the signification and impact of classical thought on the history of western philosophy

### I – Pre Socratic Philosophy

Characteristic feature of pre-Socratic philosophy – The early nature of philosophers – Thales, Anaximander, Anaxagoras, Xenophanes – Problems in nature of philosophy: Heraclitus – One and the many, Parmenides – Only the one – Sophists: Rhetoric and relativism – Atomists and Pythagoras philosophies

### II – Socratic and Platonic Philosophy

Socratic method – The quest for search for truth – Human excellence and knowledge – Knowledge is virtue, Plato: The context of Plato's philosophy – Knowledge and opinion – Appearance and reality – Theory of ideas – Plato's conception of man and society

### III – Aristotle's philosophy

The reality of the world – Aristotle's criticism of Plato – Logic and knowledge – Classification of science – Potentiality and actuality – God – Soul and the good life

### IV – Augustine's Philosophy

The background – Conception of soul, sin and salvation – Pursuit of wisdom and happiness – Problem of evil – Human nature – Corruption and restoration – Two cities – Reason and authority

### V – St. Thomas Aquinas and St. Anselm

Aquinas conception of knowledge – focus on the things of the world – The five ways of proving God's existence, St. Anselm's ontological proofs – Nature of proofs – The philosophical significance of medieval age.

*Books for reference:*

1. Fredrick Copelston S.J. – A History of Philosophy
2. Y. Masin – A Critical History of Western Philosophy
3. Norman Melchart – The great conversation: A historical introduction to philosophy

## CLASSICAL INDIAN PHILOSOPHY – II

RPS 2543

5 Cr / 5 Hrs

**Objective:** This course aims at providing detailed exposition of the metaphysical and epistemological positions of the six systems on Indian Philosophy. Special care is taken to explicate the contesting claims to the conception of Reality, Truth, Knowledge and Error.

### I – Samkhya - Yoga

Satkaryavada, Prakrti, Prakrti parinamavada – The evolutes of Prakrti – Purusa – Vivarta parinama – Spiritualistic pluralism and atheistic Samkhya – Concept of chitta and Chitta Vrittis – Astanya Yoga

### II – Nyaya - Vaishesika

- a) Logic and Epistemology of Nyaya, Prama, Paratah, Pramanya, Nirvikalpaka Pratyaksa, Savikalpaka Pratyaksa, Laukika – Alaukika Pratyaksa, Samanyalaksana – Jnana Laksana – Yogaja, Anyathakhtya – Svartha Anumana and Parartha Anumana
- b) Metaphysics and Ontology of Vaishesika – Concept of Padartha, Dravya, Guna, Karma, Samany, Vishesa, Samavaya Abhava – Asatkaryavada.

### III – Purva Mimamsa

Svatahpramanyavada, Prabhakara and Kumarila Schools, Prabhakara's Akhyati and the importance of Shabda – Pramana - The conception of categories – Triputi pratyahsavada and Jnatatavada - Dharma

### IV – Advaita

Brahman – Maya – Ishvara – Jiva, Atman – vivartavada – Jivanmukti and videhamukt

### V – Visistadvaita and Dvaita

Reality of achit – chit and Ishvara – Saguna Brahman - Panchapeda

#### *Books for Reference:*

1. "A Critical Survey of Indian Philosophy", Chandradhar Sharma, Motilal Banarsidass Publishers, 1994
2. "Introduction to Indian Philosophy", Datta & Chatterjee, University of Calcutta, 1984
3. "History of Philosophy: Eastern and Western", Vol – I, Dr. S. Radhakrishnan, George Allen & Unwin Ltd., London, 1967

## INTRODUCTION TO HINDUISM

RPS 3641

6 Cr / 6 Hrs

**Objective:** 1. This course aims to introduce the history, scriptures, sects and basic beliefs of Hinduism  
2. This course helps the students to study the theistic traditions in Hinduism expressed through Saivism and Vaishnavism

### I – Historical Moorings of Hinduism

Meaning of Sanatana Dharma – Vedic religion – Distinction between Brahmanism and Hinduism – Gods associated with Sacrifices – Origin of doctrine of Transmigration – The rise of Theism

### II – Scriptures of Hinduism

Srutis – Smritis – Vedas – Upanishads – Epics – Bhagavatgita – Puranas - Agamas

### III – Tenents, Beliefs and Gods of Hinduism

Concept of Brahman – Trinity – Samsara – Karma – Dharma – Gods of the Vedas, Vishnu – Ten Avatars – Siva – The mother goddess (Durga) – Skanda – Ganesa- Kama and Lakshmi – Gods in popular traditions – Moksha – Three paths to Brahman

### IV –Theistic traditions in Hinduism: Saivism

Saivism – Origin and development – Central themes – Pati (God): Transcendence, Creation and Grace – Pasu (Soul): multiplicity of souls, distinction between soul and god, 36 tattvams – Pasam: Trio, Karma samsara and concept of Maya – Liberation: stages, Dhikas and concept of guru

### V –Theistic traditions in Hinduism: Vaishnavism

Vishnu in early scriptures – The Philosophy of Ramanuja – Raman and Krishna Bhakti – The Alvars of Tamilnadu – Major beliefs and doctrines: God – Nirguna and Sarguna, Avatars – Ten and religious duties

*Books of reference:*

1. A.L. Basham, "The origin and development of classical Hinduism"
2. Deva Senapathi, "Saiva Siddhanta"
3. John Carman, "The theogloy of Ramanuja"
4. K.C. Varadachari, "Alvars of South India"

## MODERN WESTERN PHILOSOPHY

RPS 3543

5 Cr / 5 Hrs

**Objective:** 1. This course highlights the intricate relationship between the scientific and philosophical methods in modern philosophy 2. This course aims at introducing the various schools of thought and the corresponding metaphysical and epistemological world views.

### I – Rationalism

Descartes' method – Dualism – Interactionism – Clear and distinctness – Certain knowledge; Spinoza's conception of substance- Attributes and Modes – Pantheism – Leibnitz: Monodology, Pre Established Harmony – Freedom and Necessity

### II – Empiricism

Locke's rejection of innate ideas – Tabula rasa- Theory of origin and development of knowledge – Theory of representative realism - Berkeley's subjective idealism – Hume's impressionism – Hume on causation and Hume's Skepticism

### III – Transcendental Idealism and Absolute Idealism

Transcendental investigation of Kant – Phenomena and Noumena – Copernican revolution in philosophy, Synthetic a priori – Categories – Kantian reconciliation of rationalism and empiricism – Hegel's historical approach to philosophy – Dialectical method – Absolute idea – History and Freedom

### IV – Pragmatism

Difficulty in resolving metaphysical issues – Metaphysical problems as problems of meaning – Pierce's method of fixing belief – John Dewey's instrumentalism – William James's pragmatism.

### IV – Existentialism

Socio – cultural background for the rise of Existentialism, Kierkegaard on individual existence – John Paul Sartre's Atheistic position – Being in itself and Being for itself – Thrownness – Bad faith – Man's responsibility

*Books for reference:*

1. Bertrand Russell – "History of Western Philosophy"
2. T. Maish – "A Critical History of Western Philosophy"
3. Fredrick Copelston. S. J. - "A History of Philosophy"

## SOCIOLOGICAL THEORIES - I

RPS 3625

6 hr / 6 cr

**Objective:** *This course aims at introducing the pivotal ideas of major classical thinkers in sociology with an objective to provide foundation in theoretical Sociology. Special attention is given to the chosen sociological theories, which help the students to go for higher studies and research.*

### Unit I – Auguste Comte

Positivism - Social Statics & Dynamics - Comte's Law of three stages – Hierarchy of Sciences.

### Unit II – Emile Durkheim

Social fact –Suicide and religion as Social facts – types of suicide - Study of division of labour – mechanical & organic solidarity - Interpretation of religion – Totemism – sacred & Profane - Durkheim's implicit functionalism

### Unit III – Max Weber

Social action as unit of analysis - Verstehen – Meaning – Types of social action – Sociology as historic science – Ideal type – Verstehen- Bureaucracy – Protestant ethics and Spirit of capitalism

### Unit IV – Karl Marx

Historical Materialism – Dialectical Materialism – Modes of Production– Surplus value – Class consciousness - Theory of Alienation – Class Struggle & Social Change

### Unit V – Talcott Parsons

Concept of Social action – Pattern Variables - Functional Prerequisites of social system – Value orientation

### *Books for reference:*

1. M.Haralambos & R.M.Heald, 'Sociology – Themes and perspectives',Oxford University Press, Newdelhi,2006.
2. M.Francis Abraham, 'Modern Sociological Theory', Oxford University Press, Newdelhi,2013.
3. Lewis Coser, Masters of Sociological Thought, Rawat Publications, Jaipur,2008

## CONTEMPORARY WESTERN PHILOSOPHY

**RPS 3544**

**5 Cr / 5 Hrs**

**Objective:** 1. To introduce the recent philosophical movements of phenomenology, critical theory and structuralism 2. To understand the limitations of modern philosophy through an adequate critique. 3. To adopt new methods in philosophy and to give a new focus on emancipatory logic.

### **I – Phenomenology**

Husserl's phenomenological method, Intentionality and bracketing – Phenomena as a science of science – Maurice Merleau-Ponty's critique of science- Critique of language and critique of history.

### **II – Deconstructive readings of Jacques Derrida**

Center and De-center – Logocentrism and Phonocentrism – Operation of difference

### **III – Critical Theory**

Frankfurt school – Early critical theory of George Lukacs – Reification – Critique of modern ideological hegemony of Antonio Gramsci.

### **IV – Reality and Knowledge as aspects of human interests**

Marx's emancipatory logic and its limitations – need for new construction of knowledge for retaining emancipatory scheme – Public sphere critique of science – Knowledge and human interests

### **V – Structuralism**

Structuralist analysis of reality – the language turn – Discourse analysis – Episteme – archeology of knowledge – knowledge of power – Panopticon power – Anti foundation

#### *Books for reference:*

1. Kearney, Richards, "Modern Movements in European Philosophy", Manchester University Press, New York, 1993
2. Gramsci, Antonio, Prism Note Books, Lawrence and Wishart, London 1971
3. Brooke Noel Moore and Kenneth Bruder, "Philosophy The Power of Ideas" Tata McGraw\_Hill Publishing company limited, New Delhi, 6th Edition, 2005

**SOCIOLOGICAL THEORIES - II**

RPS 3626

6 hr / 6 cr

**Objective:** *This sequential course to Sociological Theories – I is the study of major theorists and theories of modern sociology. This course exposes the students to the dominant trends in modern sociology and helps them in pursuing higher studies*

**Unit I – Robert K. Merton’s Functional Analysis**

Function & Dysfunction – Manifest & latent function - Functional alternatives - Theory of deviance – Sociology of Science

**Unit II – Conflict Approach**

Major propositions of conflict theory – Types – Exogenous & Endogenous conflicts - Ralf Dahrendorf’s Dialectical Conflict perspective – Imperatively Coordinated Associations –Authority – Lewis Coser – Conflict Functionalism – Positive and negative functions of conflict

**Unit III – Social Exchange Theory**

Meaning - George C. Homans – Behavioural Perspective – Homans’s propositions – Success stimulus, value, deprivation-satiation, aggression- approval, rationality - Peter M. Blau: Structural perspective – Social exchange and power

**Unit IV – Symbolic interactionism**

C.H. Cooley – Looking glass Self – G.H. Mead – Mind, Self and Society – Herbert Blumer – Central premises of Symbolic interactionism.

**Unit V – Interactionist Perspective**

Harold Garfinkel – Ethnomethodology – Alfred Schutz – Phenomenology – Peter Berger & Thomas Luckman – Social construction of reality.

*Books for reference:*

1. M. Haralambos & R.M. Heald, 'Sociology – Themes and perspectives', Oxford University Press, Newdelhi,2006.
2. M. Francis Abraham, 'Modern Sociological Theory', Oxford University Press, Newdelhi,2013.
3. Lewis Coser, Masters of Sociological Thought, Rawat Publications, Jaipur,2008

## INTRODUCTION TO ISLAM

RPS 3638

6 hr / 6 cr

**Objective:** This course aims at imparting the students the founding, historical development and the present situation of Islamic religion with special attention to its beliefs and doctrines. This course helps to draw a comparison on the description of personalities common in Islam and Christianity on the basis of specific reference to Quranic verses that talk about these personalities.

### I. History of Islam

Arabia before Islam – Life history of prophet Mohammed – Hijira – Caliphates – Abu Baker, Umar, Uthman and Ali – Abbasid and Islamic golden age – the crusades – The Mamluks and the ottoman empire, Sunni, shia, Ahmadiya, Quranists.

### II. Beliefs and doctrines of Islam

Belief in Allah, the God, Angels, Prophets, the book, the last day, Resurrection and the predestination of Good and Evil – the foundations – Quran, Hadith, Ijma and Quiyas – The Five pillars – Faith, Prayer, Fast, Arms giving and Pilgrimage – Muslim high days

### III. Glimpses into Quran

The style of Quran, Date and authorship, The role of scripture in the Muslims life, A brief exposition to the following Suras:

Al Fatiha (1 <sup>st</sup> ) – The Opening:	The fundamental principles of Quran
Al Bagara (2 <sup>nd</sup> )- The Heifer:	Focus on the necessity of God – Consciousness, Legal ordinances, Warfare, and property rights
Al Imran (3 <sup>rd</sup> )- Family of Imran:	Focus on Nature of Jesus, The oneness of God
Al Nisa (4 <sup>th</sup> ) - Women:	Focus on obligations of Men and women, rights of women, peace and war, relations of believers with unbelievers
Yunus (10 <sup>th</sup> ) - Jonah:	The revelation of Quran to Muhammad
Ibraheem (14 <sup>th</sup> ) - Abraham:	Focus on how God is destined to lead Man from darkness to Light
Al – Kahf (18 <sup>th</sup> ) – The Cave:	A series of parables on the theme of faith in God versus excessive attachment to the life of this world
Maryam (19 <sup>th</sup> )- Mary:	The story of Zachariah, John, Mary and Jesus
An-Nur (24 <sup>th</sup> ) - The Light:	One who enlightens and lights up the universe
Al-Hujurat (49 <sup>th</sup> ) The Chambers:	Focus on Social ethics
Al-Jumuaa (62 <sup>nd</sup> ) - Friday:	Focus on congregational prayer on Friday
Al-Talaq (65 <sup>th</sup> ) - Divorce:	Focus on Divorce, Waiting period and remarriage

### IV. Islam in India

Early period (Arab – Persia) – Arab Indian interactions – Mopla Muslims in Kerala – Delhi sultanate – the Mughals – Tamil Muslims - Islam immediately before Indian independence and post independence era

### V. Sufism in Islam

Origin & Faith – Philosophy – Stages of Sufism: Saints - Ajmeer Khawaja, Nagoor Andavar - Practices



*Books for reference:*

1. HAR Gibb, "Modern Trends in Islam", Chicago University Press, 1947
2. Henry Martyn, "Introduction to Islam", Institute of Islamic Studies
3. John B. Taylor, "Thinking about Islam"
4. Sayid Athar Abbas Rizvi, "History of Sufism in India", Munishram Manoharlal Publications Ltd. 1992

**SKILLS FOR CAREER DEVELOPMENT**

**RPS 3232**

**3 hr / 2 cr**

**Objective:** *To inculcate the importance of soft skills for career development. 2. To orient students towards the need for transforming themselves before entering the career 3. To help them identify and prepare for choosing appropriate career with suitable skill sets and understanding.*

**I – Skills required for Career Development**

Introduction to skills for career development - Need for career development skills – Goal Setting – Team building skill – Conflict Resolution skill – Decision Making

**II – Communication & Assertive skills**

What is communication – Goals and Elements of communication – Types of communication – Barriers of communication – Assertive behavior – Types of assertive behavior – Assertiveness in cultures – Assertive rights

**III – Identifying Career**

Resume writing – Understanding HR agencies and portals – Interview skills – Mock Interview – Negotiation – Contracts – Employee rights

**IV – Time Management & Team management skills**

Understanding time management – Reasons for poor time management - Saboteur Time Styles - The 'Five Time Zone' Concept – Elements of effective time management – Essential skills for team management – Understanding the Team & Task - Deliverables

**V – Leadership Skills**

Understanding Leadership – Types of leadership – Power, Politics & Leadership – How to develop leadership competencies – Advantages of a leader

*Books for reference:*

1. "Voyages of the Heart: Living on emotionally Creative Life", Averill J. and Nunley E., Free Press, 1992
2. "Creative Leadership: Skills that Drive Change", Gerard J. Puccio, Mary C. Murdock, Marie Mance, SAGE Publications, London, 2006

**UNDERGRADUATE DEPARTMENT OF  
BACHELOR OF COMPUTER APPLICATIONS  
from 2018 - 2019 onwards**

Sem	Part	Course Code	Course Title	Hrs	Credit	Marks
I	I	TAS/HIS/FRS	Part I	3	2	30
	II	ENS 1201	Conversational Skill	3	2	30
	III	BCA 1441	Computer Fundamentals & Applications	4	4	60
	III	BCA 1543	Programming in C	5	5	75
	III	BCA 1445	C Laboratory	4	4	60
	IIIS	MAS XXXX	Discrete Mathematics	5	4	60
	IV-NME	BCA 1241	Office automation	3	2	30
	IV-LS	BCA 1243	Digital Marketing	3	2	30
<b>Total</b>				<b>30</b>	<b>25</b>	<b>375</b>
II	I	TAS/HIS/FRS	Part I	3	2	30
	II	ENS 1202	Reading and Writing Skills	3	2	30
	III	BCA 1442	Operating System with Unix	4	4	60
	III	BCA 1544	Object Oriented Programming using C++	5	5	75
	III	BCA 1446	C++ Laboratory	4	4	60
	III-S	CMC XXXX	Accounting for Managers	5	4	60
	IV-NME	BCA 1242	Web Designing	3	2	30
	IV-LS	BCA 1244	Multimedia Technology and Applications	3	2	30
	V	XXXX	Ext. activity NSS/PED/SLP		1	
<b>Total</b>				<b>30+1</b>	<b>25+1</b>	<b>375</b>
III	I	TAS/HIS/FRS	Part I	3	2	30
	II	ENS 2201	Study Skills	3	2	30
	III	BCA 2541	Data Structure using C++	5	5	75
	III	BCA 2543	Dot net Programming	5	5	75
	III	BCA 2545	Database Management System	5	5	75
	III	BCA 2447	Dot Net Laboratory	4	4	60
	III-S	PHS XXXX	Micro Controller Programming	5	4	60
	<b>Total</b>				<b>30</b>	<b>27</b>
IV	I	TAS/HIS/FRS	Part I	3	2	30
	II	ENS 2202	Career Skills	3	2	30
	III	BCA 2542	Software Engineering	5	5	75
	III	BCA 2544	Computer Graphics	5	5	75
	III	BCA 2546	Java programming	5	5	75
	III	BCA 2448	Java Laboratory	4	4	60
	III-S	MAS XXXX	Operation Research	5	4	60
	V	XXX 0000	Ext. activity NSS/PED/SLP		1	
<b>Total</b>				<b>30+1</b>	<b>27+1</b>	<b>405</b>

## BCA 2

Sem	Part	Course Code	Course Title	Hrs	Credit	Marks
V	III	BCA 3641	Computer Networks	6	6	90
	III	BCA 3643	Python Programming	6	6	90
	III	BCA 3645	Internet Technology	6	6	90
	III	BCA 3547	Internet Technology Laboratory	5	5	75
	IV	BCA 3200	Environmental Studies	4	2	30
	IV LS	BCA 3243	Cyber Security	3	2	45
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>
VI	III	BCA 3642	Big Data Analytics	6	6	90
	III	BCA 3644	Fundamentals of Linux	6	6	90
	III	BCA 3646	Fundamentals of mobile computing	6	6	90
	III	BCA 3548	Project	5	5	75
	IV	HVS 3200	Human Values	4	2	30
	IV LS	BCA 3244	Advanced Excel	3	2	30
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>
<b>Grand Total (Sem I –VI)</b>				<b>180+2</b>	<b>158+2</b>	<b>2370</b>

**S MAJOR SUPPORTIVE**  
**LS LIFESKILL**  
**VAL VALUE EDUCATION**

**NME NONMAJOR ELECTIVE**  
**EVS ENVIRONMENTAL STUDIES**

### Supportive course from Other Departments

Semester	Course Code	Course Title	Hrs	Credit	Marks
I	MAS XXXX	Discrete Mathematics	5	4	60
II	CMC XXXX	Accounting for Managers	5	4	60
III	PHS XXXX	Embedded Systems and Micro Controller	5	4	60
IV	MAS XXXX	Operation Research	5	4	60

### Non Major Electives

Semester	Course Code	Course Title	Hrs	Credit	Marks
I	BCA 1241	Office Automation	3	2	30
II	BCA 1242	Web Designing	3	2	30

### Life Skill

Semester	Course Code	Course Title	Hrs	Credit	Marks
I	BCA 1243	Digital Marketing	3	2	30
II	BCA 1244	Multimedia Technology and Applications	3	2	30
V	BCA 3243	Cyber Security	3	2	30
VI	BCA 3244	Advanced Excel	3	2	30

## **BCA 1441 Computer Fundamentals and Applications**

**4hrs/4cr**

### **Objective**

This course provides foundational understanding of Computer Hardware, Software, Operating System, and Peripherals along with how to get the most value and impact from Computer Technology. Students will gain skills on using Internet, system Software, Application software, DBMS, Programming Languages etc.

### **Learning Outcome**

- To know the basic operations of the computer.
- To clearly understand the process of the system.
- To gain knowledge in peripherals.
- To understand the process of programming
- To give an outlook on the security measures.

### **Unit I**

Introducing Computer Systems, Exploring Computers and their uses, interacting with the Computer System- Using Keyboard and Mouse, Seeing Hearing and Printing Data - Introduction to number system and number conversions.

### **Unit II**

Processing Data – Transforming Data into Information, Modern CPUs, Storing Data – Types of Storage Device- Using Operating System– Operating System Basics- Networks –Data Communications, Presenting the Internet – The internet and the world, Email.

### **Unit III**

Working with Application Software – Productivity Software, Graphics and Multimedia- Database Management – Database Management Systems, Survey of Database Systems.

### **Unit IV**

Software Programming and Development, Creating Computer Programs, Programming Languages and the Programming Process.

### **Unit V**

Protecting Computer and Data – Understanding the need for security Measures and taking protecting measures, Case Study – MS Office, Star Office, Open Office.

### **Text book:**

1. Introduction to Computers, Peter Norton, McGraw-Hill Education, 7th edition, 2013.

### **Reference Books:**

1. Computer Fundamentals, Anita Goel, Pearson Education India 2010.
2. Using Information Technology : A Practical Introduction to Computers & Communication, Brian Williams, StaceySawyer,2005
3. Fundamentals of Computers, E Balagurusamy, McGrawHill Education India 2014.
4. Digital Computer Fundamentals, Thomas C.Bartee, 6<sup>th</sup> Edition, Tata McGraw Hill Publishers. 2014.
5. Discovering Computers, Fundamentals, Gary Shelly, Misty Vermaat, 2011, Cengage Learning.

### **WebSites:**

1. [www.tutorialspoint.com/computer\\_fundamentals](http://www.tutorialspoint.com/computer_fundamentals).
2. [www.w3schools.com](http://www.w3schools.com).

**Objective**

The aim of this course is to enable the students to understand the programming concepts help them to write programs in c language.

**Learning Outcome**

- To understand the logic of the problem.
- To analyse the given concepts and write the algorithm.
- To gain knowledge in structured C programs.
- To understand the Preprocessor commands and functions.
- To handle file, file modes and command line arguments

**Unit I**

Introduction to Problem Solving- Flow charts- Tracing flow charts, Problem solving methods- Need for computer Languages- History of c – c program syntax-C character set- Identifiers and keywords- Data types-Declarations – Expressions- statements- symbolic constants

**Unit II**

Input-Output Statements – formatted input and output statements – unformatted input and output statements -Operators – control statements – if –if else – nested if – switch - looping statements – while – for – do while - break statement – continue statement

**Unit III**

Arrays –single dimension array – multi dimension array- character arrays- structures –union- pointers – function – declaration – definition – function call - call by value – call by reference – void function – recursive function – String function – math function

**Unit IV**

Pre-processor commands- #include - #define - #ifdef – graphics in c – graph mode initialization -circle –line- ellipse – sector – polygon – text output – text style -color function.

**Unit V**

File Handling – file open – file mode - read and write operation –file close- text file manipulation – binary file manipulation – command line arguments - storage classes – static - auto - extern – register.

**Text book:**

1. Programming using C, Pandiaraja,Cijay Nicholas publications, 2005.

**Reference books:**

1. Let us C :Y.P.Kanetkar, Bpb publication, 15<sup>th</sup> edition, 2016.
2. Schaum's Outline of Programming with C,Byron S. Gottfried, 3<sup>rd</sup> edition, McGraw Hill Professional, 2017.  
Programming in Ansi C, E. Balaguruswamy, 7<sup>th</sup> Edition, Tata McGraw Hill Publishing, 2017.

**Web Sites:**

1. [www.cprogramming.com/tutorial.html](http://www.cprogramming.com/tutorial.html).
2. [www.tutorialspoint.com/cplusplus](http://www.tutorialspoint.com/cplusplus).
3. [cforbeginners.com](http://cforbeginners.com).

**BCA 1445****C Programming Laboratory****4hrs/4cr****Objective**

To train the student learn a programming language and learn problem solving techniques.

**Learning Outcome**

- While completing the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.
1. Data types and Operators.
  2. Control statements.
  3. Looping statements.
  4. Break and continue statements.
  5. Arrays –single dimension arrays, multi-dimension array and character array.
  6. Pointers.
  7. String functions.
  8. User Defined function - call by value, call by reference, recursive functions.
  9. File Manipulation – binary file and text file.
  10. User Defined Data Types – struct, union, enum, typedef.
  11. Graphics in C.

**Objective**

The aim of this course is to understand the theory and to get hands-on experience in MS-Word, MS-PowerPoint and MS-Excel.

**Learning Outcome**

- To create professional and academic documents.
- To create and edit basic excel spreadsheets, formulas and charts.
- To use PowerPoint for preparing presentation
- To use Power point for creating animations.
- To include images, graphs and other objects in the presentation.

**Unit I**

Microsoft office basics-Microsoft word: Working with word documents-Word Editing techniques-Finding and replacing-spelling and Grammar-Formatting: Making titles and stand out-adding borders and shading-setting up multiple columns-creating lists-adding headers and footers-Formatting with styles: predefined styles-custom styles-Creating tables-Working with mail merge.

**Unit II**

Microsoft Excel: Excel Basics-Working with excel spreadsheets-Manipulating data- selecting ranges-editing entries-formatting entries-simple calculations-naming cells and Ranges-Efficient data display-printing worksheets.

**Unit III**

Working with workbooks-formulas-linking worksheets: testing links-Creating charts: sizing and moving charts- updating charts- changing the type-custom chart types.

**Unit IV**

Microsoft PowerPoint: Working with PowerPoint presentation-Creating a presentation-Editing slides in slide view-organizing slides in outline view- using design template- merging presentations in slide sorter view.

**Unit V**

Adding clip art to slides- adding graphs- adding special effects- running an electronic slide show. Presentation with multimedia effects: Adding image-animating text and objects- insert sounds and movies- recording sound slide by slide.

**Text book:**

1. Comprehensive computer learning: Microsoft office 2010, Bittu Kumar, V&S publishers, 2015.

**Reference books:**

1. Quick course in Microsoft office 2000, Joyce Cox, Polly urban, Christian Dudley, and Online press Inc.
2. The complete Reference – Office 2000, Stephen L.Nelson, Tata McGraw Hill publishing Company Limited.
3. Window and MS Office 2000 with Database Concepts, N.Krishnan, SciTech publications(India) Pvt Ltd., Chennai.

**BCA 1243****Digital marketing****3hrs/2cr****Objective**

The aim of this course is to enable the students to learn about digital marketing world, as it available for advertising, planning for online marketing that help them to plan.

**Learning Outcome**

- To understand the technology behind digital marketing.
- To learn about domain name, hosting, e-mail marketing and social media.
- To gain knowledge in game advertising.
- To understand the power of digital marketing
- To introduce digital marketing in various social media.

**Unit I**

The evolution of digital marketing - technology behind digital marketing – the need for digital marketing strategy, business and digital marketing, defining digital marketing strategy - Understanding the digital consumer- The website – the hub of the digital marketing world - Building an effective website - the main steps of building a website - choosing the domain name.

**Unit II**

Hosting – the website’s home on the internet -Arranging the information- writing effective web content- The online marketer - about the engines - Optimizing the site for the engines - Advertising on the search engines - Black Hat, the darker side of search - Bringing in the pros -Universal search – more opportunities to rank - Website intelligence and return on investment.

**Unit III**

Measuring the way to digital marketing success - How information is measured - Measuring what’s important, Testing, investing, tweaking, reinvesting - Action stations -Harness the power of online data, and watch the ROI take off.

**Unit IV**

E-mail marketing - the new direct mail–Concept of e-mail marketing - Planning the campaign - Dos and don’ts of an e-mail marketing campaign- Measuring the success - a vital component of digital marketing.

**Unit V**

Social media and online consumer engagement–Introduction to social media - The different forms of social media - the rules of engagement - Adding social media to the own site - Online PR and reputation management - fostering a positive online image - promoting the business through online channels –Introduction to affiliate marketing - game advertising.

**Text book:**

1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan, Calvin Jones,Kogan Page, 4th edition, 2016.

**Reference Books:**

1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan, Calvin Jones,Kogan Page, 1st edition, 2008.
2. Internet Marketing for your Tourism, Susan Sweeney, CA, New age International (P) Limited Publishers, New Delhi, 2005.



**WebSites:**

1. [www.coursera.org/specialization/digitalmarketing](http://www.coursera.org/specialization/digitalmarketing)
2. [www.digitalvidya.com](http://www.digitalvidya.com)
3. [www.marketingsay.com](http://www.marketingsay.com)

**BCA 1442**

**Operating System with UNIX**

**4hrs/4cr**

**Objective**

The aim of this course is to learn fundamental concepts and algorithms that are used in the existing operating systems.

**Learning Outcome**

- To learn basic concepts of Operating System.
- To understand the importance of Process and Threads
- To solve deadlock problems using algorithms
- To manage memory and Disk
- To acquire knowledge about Unix commands.

**Unit I**

Introduction – History – Operating System Environment – Components and Goals –Input and output devices – Process Concepts - Definition of Process- Process States: Life Cycle of a Process - Process Management - Process States and State Transitions – Process Control Blocks – Process Operations – Suspend and Resume-Inter process Communication- Signals – Message Passing.

**Unit II**

Thread Concept - Introduction - Definition of Thread – Thread States - Life Cycle of a Thread - Thread Operations - Threading Models –Thread Implementation - Introduction Mutual Exclusion- Implementing Mutual Exclusion Software Solutions to the Mutual Exclusion Problem- Hardware Solutions to the Mutual Exclusion Problem– Semaphores.

**Unit III**

Monitors–Information Hiding- Monitor Example - Deadlock - Introduction- Examples of Deadlock- Deadlock Prevention- Deadlock Avoidance with Dijkstra's Banker's Algorithm- Deadlock Recovery Deadlock Strategies. Processor Scheduling – Introduction – Scheduling Levels – Pre emptive and Non Pre emptive Scheduling Algorithms.

**Unit IV**

Physical and Virtual Memory – Memory Organization – Management – Hierarchy – Memory Management Strategies. Fixed Partition and Variable Partition Multiprogramming – Virtual Memory Organization – Paging and Segmentation - Demand Paging and Page Replacement Strategies.

**Unit V**

Disk Performance Optimization – Disk Scheduling Strategies. Introduction to Unix – Listing Files and Directories Commands – Making ,Changing, Removing Directories Commands- File Management Commands – Pipes and Filters – Case studies.

**Text book:**

1. Operating System concepts, Abraham Silberschatz, Peter B Galvin, Gerg Gagne, 9th Edition, Wiley, 2016.

**Reference books:**

1. Operating Systems, H.M. Deitaland P.J. Deital, D.R. Choffnes, 3rd Edition, Pearson Prentice Hall. 2004.
2. Mastering unix Shell Scripting: Bash, Bourne, and Korn Shell Scripting for Programmers, System Administrators, and UNIX Gurus, Randal K. Michael, John Wiley & Sons, 2011.
3. UNIX and SHELL Programming –simpleNeasyBook by WAGmob , 2014.
4. Operating System Concepts, Silberschatz, Galvin and Gagne, Wiley India Pvt Ltd, 9th Edition, 2013.
5. Operating Systems: Internals and Design Principles, William Stallings, Pearson Education, 2014.

**Web Sites:**

1. [www.tutorialspoint.com/operating\\_system](http://www.tutorialspoint.com/operating_system).
2. [os-book.com](http://os-book.com)
3. [www.computerhope.com/jargon/o/os.html](http://www.computerhope.com/jargon/o/os.html).

## **BCA 1544                      Object Oriented Programming using C++                      5hrs/5cr**

**Objective**

The aim of this course is to enable the students to get understanding of the OOP Concepts, and to write, debug and run complete console applications and ultimately, become proficient.

**Learning Outcome**

- Be able to understand the difference between object oriented programming and procedural oriented language and data types in C++.
- To handle different types of functions , string and math library functions
- Be able to program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.
- Understanding Constructor, destructor, Function Overloading and operator overloading
- File Handling using c++

**Unit I**

Introduction to Object Oriented Programming (OOP) and its basic features, namespace-Basic component of C++ program and program structure, Data types: Primitive, Derived, User Defined Data types – Operators - control and Loops.

**Unit II**

Function: simple functions, passing argument to functions, returning values from functions, reference arguments-recursive functions-String and String related Library function – mathematical functions.

**Unit III**

Objects and classes: Classes and Objects, Data Members, Member function – Object array, Object Pointer, this Pointer- Static Data Members and Static Functions – friend function – inline function.

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### Unit IV

Constructor - Characteristics of constructors – types of constructors - destructor – Inheritance – type of inheritance and its implementations – Polymorphism – compile time polymorphism – constructor overloading , function overloading, operator overloading – dynamic polymorphism – overriding – virtual function.

### Unit V

Files and Stream: String I/O, Object I/O with multiple objects, file pointer, disk I/O with member functions – Templates – Template Methods – Template Classes – Exception Handling.

#### Text book:

1. Object Oriented Programming in C++, E. Balaguruswamy, TMH Publishing Co. Ltd., 7th Edition, 2017.

#### Reference Books:

1. The C++ Programming Language, Bjarne Stroustrup, Addison Wesley, 3rd edition 2014.
2. Principles and Practice Using C++, Bjarne Stroustrup, Addison-Wesley Professional, 2014.
3. C++: The Complete Reference, Herbert Schildt McGraw Hill Education; 4<sup>th</sup> edition, 2017.

#### Web Sites:

1. [www.cprogramming.com/tutorial/c++-tutorial.html](http://www.cprogramming.com/tutorial/c++-tutorial.html)
2. [www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/index.html](http://www.tutorialspoint.com/object_oriented_analysis_design/index.html).
3. [ooadonline.hpage.com](http://ooadonline.hpage.com).

## BCA 1446

## C++ Laboratory

4hrs/4cr

### Objective

To train the student to learn OOP Concept and problem solving techniques using C++.

### Learning Outcome

- While completing the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.
1. Class and object.
  2. Static data members.
  3. Friend function.
  4. Inline function.
  5. Constructor – basic constructor, parameter constructor, dynamic constructor
  6. Destructor.
  7. Inheritance – single, multiple, multilevel, hierarchical, hybrid.
  8. Function overloading.
  9. Operator overloading.
  10. Dynamic polymorphism.
  11. Templates.
  12. Manipulators.
  13. File handling.

**BCA 1242****Web Designing (2T+1L)****3hrs/2cr****Objective**

The aim of this course deals with web page designing by using the techniques in web designing. It contains HTML, Java Script, and Dream weaver. Students will be able to design their web pages and place them in the web.

**Learning Outcome**

- To clearly understand the web designing.
- To design simple web pages using HTML
- To use CSS style sheets in a web page.
- Including Javascript in the HTML pages.
- To host website using Dreamweaver.

**Unit I**

Introduction to internet: Internet architecture - Basic concepts - Web server- Web client - Internet Services- Internet protocol-Remote Access and Transactions-Electronic Mail.

**Unit II**

Introduction to HTML: Mark-up languages - Basic tags – Formatting –images – lists – Tables – Frames – Links – Forms. Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Rule Cascading and Inheritance-Text Properties

**Unit III**

Dynamic HTML - Introduction to Java script: Variables – Data types – Statements-Operators - Control statements - Object based programming - Java script with HTML.

**Unit IV**

Java script objects - DOM - JS Browser detection – JS Cookies - JS Validation - JS Animation - JS image maps - JS Timing – JS create Objects - creating menu and slideshow using

**Unit V**

Dream weaver Concepts – designing Web Page with Dream Weaver. Website maintenance - types of service providers - web hosting - maintenance and other commercial issues.

**Text book:**

1. Ivan Bayross, Web Enabled Commercial Application Development using HTML, JAVASCRIPT, DHTML and PHP, BPB Publications, 4th Edition 2010.

**Reference books:**

1. Html5 Black Book by Kogent Learning Solutions Inc. Released 2011.
2. Jennifer Robbins, Learning Web Design, 4th Edition, O'Reilly Media, 2012
3. Robert. W. Sebesta, “Programming the World Wide Web”, fourth Edition, Pearson Education, 2007.

**Web Sites:**

1. [www.w3schools.com](http://www.w3schools.com)
2. [www.tutorialspoint.com](http://www.tutorialspoint.com)
3. [www.teacherclick.com](http://www.teacherclick.com)

## BCA 1244 Multimedia Technology and Applications (2T+1L)3Hrs/2cr

### Objective

The aim of this course is to enable the students to learn multimedia concepts, audio and video with text, image, graphics and animation.

### Learning Outcome

- To understand the multimedia concepts and applications.
- To learn digital audio and video concepts.
- To gain knowledge in working with Photoshop and flash.
- To learn basics of Flash
- To use advanced features in Flash

### Unit I

Introduction to Multimedia - products and evaluation -computer architecture standards-operating systems and software - Text - Graphics.

### Unit II

Introduction to Digital audio and video –characteristics of sound and digital audio and video-digital audio systems-MIDI\_audio file formats-using audio in multimedia applications.

### Unit III

Introduction to Photoshop – working with Photoshop – processing the image using Photoshop techniques-layers-filter.

### Unit IV

Introduction To Animation- How flash works- Flash tool box – creating objects – drawing characters for cartooning editing objects – Colors and text- symbols and instances – bitmaps.

### Unit V

Flash And Layers- Animation in flash key frame animation,tweened animation - Motion tween, shape tween-guide layers- Masking-Publishing in flash- action Script.

### Text book:

1. Introduction to Multimedia and its applications, V.K. Jain, 1<sup>st</sup> Edition , 2012

### Reference books:

1. Multimedia technology and applications, Hillman, David -Galgotia publications pvt ltd-2001
2. Multimedia in action, Shuman,J.E -Thomson Asia pvt ltd-2001.
3. Multimedia communications, Halsal,fredl-Pearson education pvt ltd-2003.
4. Michelle Perkins, Beginner's Guide to Adobe Photoshop, Amherst Media, Inc., 2006
5. Andrew Rapo, Understanding Macromedia Flash 8 ActionScript 2, Focal press, 2013

### Web Sites:

1. [www.insidegraphics.com](http://www.insidegraphics.com)
2. [www.entheosweb.com/Flash/motion\\_tween.asp](http://www.entheosweb.com/Flash/motion_tween.asp)

**BCA 2541****Data Structure using C++ (3T+2L)****5hrs/5cr****Objective**

To enable the students to understand the fundamentals of Data Structures, abstract concepts and how these concepts are used in problem solving and exposing them to algorithmic thinking and problem solving thoroughly imparting moderate skills in program.

**Learning Outcome**

- To identify the fundamental data structures and summarize their uses.
- To handle Stack and Queue data structures
- To understand and create various types of linked lists.
- To create binary representation of data structure and its operations
- TO handle BST and develop sorting algorithms for the search requirements.

**Unit I**

Introduction to Data structures: Definition- Classification of data structures: primitive and non-primitive- Operations on data structures-Dynamic memory allocation and pointers: Definition- Declaring and initializing pointers- Memory allocation functions: malloc, calloc, free and realloc-Arrays-Structures- Assumption Notation – complexity.

**Unit II**

Stack: Implementation-stack operations-Applications of a stack: Polish notations –Infix, Postfix and Prefix notations- Conversion of an arithmetic expression from Infix to postfix Recursion. Queue: Definition-Implementation -Types of queue simple queue, circular queue, double ended queue-operations on queue-applications of a queue.

**Unit III**

Linked list: Definition – Advantages and Disadvantages of linked list –Singly Linked List-Doubly linked list-circularly linked list-Doubly circular Linked List-Operations on Singly Linked List-Applications of linked list- Basic Graphs- shortest path-spanning tree-Searching.

**Unit IV**

Trees: Definition- Types of Trees- Binary tree: Creation of binary tree- Representation- Traversal of Binary Tree : Preorder, Inorder and Postorder-applications of tree.

**Unit V**

Binary Search Tree: Definition-Operations on BST-Application of BST - Sorting: Searching techniques: sequential search, Binary search –Sort: Bubble sort, Selection sort, Merge sort, insertion sort, Quick sort.

**Text book:**

1. Data Structures Using C++, D.S. Malik, Second Edition, 2010

**Reference Books:**

1. Data structures, A.Chitra, P.T Rajan, Tata McGraw Hill Education[India] Pvt.,Ltd 2006
2. Data structures with C,SeymourLipschutz,Tata McGraw Hill publishing 2011.
3. Data Structures Using C++ ,Varsha H. Patil,2012
4. Data Structures and Algorithms in C++,Joshi, Tata McGraw-Hill Education, 2010.

**Web Sites:**

1. [www.cprogramming.com/algorithms-and-data-structures.html](http://www.cprogramming.com/algorithms-and-data-structures.html)
2. [freevideolectures.com/Course/2279/Data-Structures-And-Algorithms](http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms)
3. [discuss.codechef.com/questions/48877/data-structures-and-algorithms](http://discuss.codechef.com/questions/48877/data-structures-and-algorithms)

**BCA 2543**

**Dot Net Programming**

**5hrs/5cr**

**Objective**

The aim of this course is to enable the studentsto gain depth knowledge and acquire skills to develop window based application and Rich Internet Web applications and also provides a deep exploration of Dot Net development philosophy and practical advice.

**Learning Outcome**

- To understand the dot net framework and its features
- To use vb.net and write programs including oops concepts
- To handle exceptions and create menus in vb.net
- Understanding the features of ADO.NET and handle sql commands for data manipulation
- Create dynamic websites using ASP.NET.

**Unit I**

Introduction to Dot Net platform-advantages of Dot Net-working of Dot Net- .basic architecture of net frame work-common language run time-common language specification-unified programming classes-security in Dot Net-CLR: Meta data –assembly-MSIL-Just in Time compiler-class loader-verifier-architecture of CLR-features of CLR.

**Unit II**

VB.NET: Visual studio .net IDE-Programming concepts- operators – control and looping statements - arrays - writing procedures-sub procedure – function procedure – property procedure – operator procedure - OOPs in VB.net: class-object-inheritance-polymorphism-inheritance-my base class keyword-my class keyword-abstract base class

**Unit III**

Exception handling-working with forms-Advanced window application: basic controls and methods – advanced controls – menustrip - context menu strip – status bar – rich text box – web browser - graphical application-custom window controls. Data access using ADO.NET: Overview of ODBC-UDA-ADO.NET Component model.

**Unit IV**

SQL Commands –Data Definition Language – Data Manipulation Language – Data Control Language - ADO.NET object model- managed provider in ADO.net –ADO.net name spaces and classes-Connection –Command – dataadapter – dataset –data reader - error – datagridview - advantages of using ADO.net-data access using ADO-using ADO.net data form wizard.

**Unit V**

ASP.NET: Features of ASP.net-structure of an ASP.net page-creating simple web application-using common web control-ASP.net Objects – request – response – server – session – application – error – Master page – validation controls- ASP.net State Management – web configuration -create web application using data base connectivity-web services.

**Reference books:**

1. Professional Visual Studio 2015 (WROX) ,Wiley ,2015
2. Microsoft Visual Basic 2013 , Microsoft Press US ,1st edition, 2013
3. Mastering Microsoft Visual Basic 2010 , Sybex , 1 st edition , 2010
4. .Net Programming Black Book, Kogent Solutions Inc, Published by Dreamtech Press, New Edition, 2005.

**Web Sites:**

1. [wisentechnologies.com/it-courses/.net-training.aspx](http://wisentechnologies.com/it-courses/.net-training.aspx)
2. [codemyne.net/articles/DotNet-framework-main-objectives.aspx](http://codemyne.net/articles/DotNet-framework-main-objectives.aspx)
3. [www.ajr2training.com/dot-net-training](http://www.ajr2training.com/dot-net-training)

**BCA 2545 Data Base Management System (3T+2L) 5hrs/5cr****Objective**

The aim of this course is to help the student learn the concept of data structure of a database model in detail and also extensively covers the normalization process, overview of the database systems, Relational model, SQL, Data mining and Data warehousing.

**Learning Outcome**

- To understand the database concepts and E-R models.
- To gain knowledge on various relational operations such as Join, etc.,
- To understand the concept of Normalization of data using various normal forms.
- To learn the concepts of data mining system
- To understand the concept of data warehousing and its operations

**Unit I**

Introduction: Purpose of database systems - view of data - data models – database languages - transaction management - storage manager - database administrator and database users - overall system structure. E-R model: E-R diagram – constraints – keys - Extended E-R features - Relational model: structure of relational databases - the relational algebra – Extended Relational algebra operations.

**Unit II**

Relational commercial languages: SQL- Basic structures, joins, set operations, aggregate functions, null values - query-by-example – domain constraints, referential integrity - assertions – triggers -view– exception- cursor-procedures.

**Unit III**

Relational database design: First normal form - pitfalls in relational database design - functional dependencies – Decomposition - Boyce–codd normal form, third normal form, and fourth normal form – de normalization.

**Unit IV**

Introduction to Data mining-Types of Data – Data Mining Functionalities – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse.



**Unit V**

Introduction to Data Warehousing - Data warehousing Components –Building a Data warehouse – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

**Text book:**

1. Database System Concepts, AviSilberschatz, Henry F. Korth, S. Sudarshan, McGraw Hill, 6<sup>th</sup> Edition,2010.

**Reference Books:**

1. Database Management System Concepts, N.F.Korth and A.Silberschatz, S.Sudarshan, 4/e, McGraw Hill Inc., 2002.
2. An Introduction to Database Systems, B.C. Desai, Galgotia Publications, New Delhi, 1995.
3. Fundamentals of Database Systems, R.Elmasri and S.B. Navathe Benjamin Cummings, Redwood City, 1994.
4. Database Management, Gordon C.Everest, TataMcGraw-Hill, NewDelhi, 2001.
5. Database Principles, Programme & performance – Patrick O’Neil, Elizebeth O’Neil, A hartcourt, 2006.

**Web Sites:**

1. [rdbms.ca/database/introduction.html](http://rdbms.ca/database/introduction.html).
2. [www.w3schools.com/sql/sql\\_intro.asp](http://www.w3schools.com/sql/sql_intro.asp).
3. [www.cramerz.com/database\\_concepts/dbms\\_and\\_rdbm](http://www.cramerz.com/database_concepts/dbms_and_rdbm).

**BCA 2447**

**Dot Net Laboratory**

**4hrs/4cr**

**Objective**

To train the student to learn a programming language and learn problem solving techniques.

**Learning Outcome**

- While completing the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.
1. NET (vb.net or c#) program for Feedback form
  2. Create a DOT NET for displaying the images with clear option
  3. Write Web Controls to display in Web form
  4. Prepare a button-click option to display a label3.
  5. Write mouse move over to change button color
  6. Create list box to display the selected item cost in web form2. Create another label to display the total cost3. Write a Java script program to display a calendar 4. Write a Java Script code to display advertisements as hyperlink
  7. Write a DOT NET program to calculate Boiling point of water using Compare Validate
  8. Create a DOT NET program for User input name validation using Required Field Validate
  9. Write a DOT NET program Checking the appropriate values using Validation button
  10. Create a form to validate the controls getting user inputs
  11. Create an application with content buffered
  12. Creating a file holding variables, hyperlinks with lock & unlock methods

13. Display a message when connection established with Database
14. Write a Program to create a table in Master Database
15. Updating the fields of a table in Database
16. Selecting the rows from a table in Database
17. Retrieving the Result in Dataset & Checkbox List by selecting a field
18. Bind the dataset to a Radio button list with different forms
19. Create a Table header fields in the form of drop down list

**BCA 2542****Software Engineering****5hrs/5cr****Objective:**

The aim of this course is to enable the students to understand Software requirements, specification, Software design techniques for developing large software systems, Software testing, documentation and maintenance.

**Learning outcome**

- To classify the various software process models.
- To understand and work on requirement engineering
- To work on analysis and design. Understanding various modeling
- To understand the software testing concept.
- To know the software quality and maintenance concept.

**Unit I**

Software Characteristics – Introduction to Software Engineering – Factors influencing quality and productivity – Software Process CMM – PSP – TSP – Software Engineering Models – Cost Estimation – Feasibility Analysis – Software Project management.

**Unit II**

Requirement Engineering – Requirements - Documents – Requirements Elicitation – Requirements Analysis and Negotiation – Requirements Validation – Requirements Management.

**Unit III**

Analysis and Design – Information Flow Analysis – DSSD-OOA- Use Case Modeling – Class Modeling – Dynamic Modeling – Design Engineering – Creating Architectural Design – Modeling Component level design – User Interface design – Transform and Transaction Analysis – OOD.

**Unit IV**

Testing Principles – Testing Strategies – Unit Testing – Integration Testing – White Box Testing -Black Box Testing – OOTM – Domain Testing -Implementation.

**Unit V**

Software Maintenance – Issues in Maintenance – Change Management – Software Quality and Quality Assurance – Human Factors in Software Engineering – Introduction to Web Engineering, Case studies.

**Text book:**

1. Software Engineering: A Practisener Approach, Roger S Pressman, McGrawHill, 8th Edition, 2015.

**Reference books:**

1. Requirements Engineering, Ian Somerville, Johnwiley, 1998.
2. Object Oriented and Classical Software Engineering, Stephen R. Schach, TataMcgrawHill, 5<sup>th</sup> Edition, 2006.
3. A Discipline for Software Engineering, Watts S. Humphrey, Pearson Education, 2001.
4. Software Engineering, K.K. Agarwal and Y. Singh, revised 2nd edition, New Age International Publishers, 2006.

**Web Sites:**

1. [www.tutorialspoint.com/software\\_engineering](http://www.tutorialspoint.com/software_engineering).
2. [www.jkinfoline.com/software-engineering.html](http://www.jkinfoline.com/software-engineering.html).
3. [www.wiziq.com/tutorials/software-engineering](http://www.wiziq.com/tutorials/software-engineering).

**BCA 2544 Computer graphics (3T+2L) 5hrs / 5cr**

**Objective**

The aim of this course is to enable the students to learn the basic principles and techniques of graphics, applications and to implement graphics program using two dimensional and three dimensional concepts.

**Learning Outcome**

- To understand the graphics, design and the primitives
- To learn the basic principles and techniques of graphics.
- To gain knowledge in working with graphics program using 2D and 3D concepts.
- To learn about transformations, clipping and projections
- To understand ray tracing process and apply on case studies.

**Unit I**

Overview of computer graphics – Display devices – Output Primitives – Points and Lines – Line drawing algorithms – Circles and ellipse generating algorithm- Other Curves.

**Unit II**

Introduction to attributes - Attributes of output primitives- line – curve – area – character attributes - Color filling – filled area primitives – fill area functions - Character Generation.

**Unit III**

Introduction to Transformations-2D affine Transformations-Two-Dimensional Transformation-Transformation-Matrix representation and homogeneous co-ordinates

**Unit IV**

3 D Concepts – 3 D co-ordinates systems – 3D display techniques – 3D transformations – 3D viewing – Windowing and Clipping – Projection

**Unit V**

Introduction to Ray Tracing-Ray tracing process-Ray tracer Application-Antialiasing Ray Tracing-reflections and transparency- case studies.

**Text book:**

1. Computer Graphics, Rajiv Chopra, S. Chand, 4<sup>th</sup> edition, 2011.

**Reference books:**

1. Computer Graphics, Donald Hearl, Pauline Baker M., Prentice Hall of India, New Delhi, 2<sup>nd</sup> edition, 2005.
2. William Newman, Sproul F, Principles of Interactive Computer Graphics Prentice Hall of India,2003.
3. John F Koegel Buford – Multimedia Systems – Pearson Education 2001.
4. Computer Graphics, ShaliniGovil-Pai, Springer (India) Private Limited, 2007.

**Web Sites:**

1. [www.4twk.com/shill/3rd-edition.html](http://www.4twk.com/shill/3rd-edition.html).
2. [www.tutorialspoint.com/computer\\_graphics](http://www.tutorialspoint.com/computer_graphics).
3. [www.inf.ed.ac.uk/teaching/courses/cg/Web/intro\\_graphics.pdf](http://www.inf.ed.ac.uk/teaching/courses/cg/Web/intro_graphics.pdf).
4. [www.coursera.org/learn/interactive-computer-graphics](http://www.coursera.org/learn/interactive-computer-graphics).

**BCA 2546****Java Programming****5hrs/5cr****Objective**

The Objective of this course is to introduce the programming techniques in Java, java applet, awt, multithreading, iostreams, database connectivity and swing components also to enrich the creativity of GUI applications using java.

**Learning Outcome**

- To gain knowledge of the structure and model of the Java programming language.
- To use the Java programming language for various programming technologies.
- To understand Java IO Streams and using thread concept.
- To propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.
- To understand awt concept, applets and java swing.

**Unit I**

Java Fundamentals -Features of Java-OOPs concepts-Java virtual machine-Reflection byte codes -Byte code interpretation-Data types, variable, arrays, expressions, operators, and control structures Objects and classes.

**Unit II**

Java Classes-Abstract classes-Static classes-Inner classes-Packages-Wrapper classes-Interfaces-This –Super-Access control - Exception handling - Exception as objects-Exception hierarchy- Try catch finally- Throw, throws.

**Unit III**

IO package -Input streams-Output streams-Object serialization-Deserialization-Sample programs on IO files-Filter and pipe streams - Multi threading- Thread Life cycle-Multi threading advantages and issues-Simple thread program-Thread synchronization-Inter Thread Communication.

**Unit IV**

GUI-Introduction to AWT programming -Layout and component managers-Event handling-Applet class- Applet life-cycle-Passing parameters embedding in HTML.

**Unit V**

Swing components – JApplet, JButton, JFrame, etc.Database Connectivity-JDBC architecture-Establishing connectivity and working with connection Interface-Working with statements-Creating and executing SQL statements-Working with Result Set.

**Text book:**

1. Programming with Java A Primer, E. Balaguruswamy Tata McGraw Hill,5<sup>th</sup> Edition , 2017

**Reference books:**

1. Java - The Complete Reference ,Herbert Schildt , McGraw Hill Education; Tenth edition,2017
2. Core Java: An Integrated Approach, New: Includes All Versions upto Java 8 ,R. NageswaraRao,Dreamtech Press ,2016
3. Java Programming: A Beginners Guide to Learning Java, Troy Dimes, Create Space Independent Publishing Platform,2015.

**Web Sites:**

1. [www.tutorialspoint.com/javaexamples](http://www.tutorialspoint.com/javaexamples).
2. [www.vogella.com/tutorials/JavaIntroduction/article.html](http://www.vogella.com/tutorials/JavaIntroduction/article.html).
3. [www.udemy.com/java-tutorial](http://www.udemy.com/java-tutorial).

**BCA 2448**

**Java Laboratory**

**4hrs/4cr**

**Objective**

To train the student to learn a programming language and learn problem solving techniques.

**Learning Outcome**

- While completing the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.
1. Programs using constructor and destructor.
  2. Creation of classes and use of different types of functions.
  3. Count the number of objects created for a class using static member function.
  4. Concept of interface.
  5. Concept of package.
  6. Function overloading.
  7. Concept of inheritance.
  8. IO streams & Files.
  9. Exception handling mechanism.
  10. AWT
  11. Swing.
  12. Event handling.
  13. JDBC.

**BCA 3641****Computer Networks****6hrs/6cr****Objective**

The aim of this course is to impart a basic understanding of how computers communicate using different devices and protocols.

**Learning Outcome**

- To gain knowledge about networks, internal components and its functionality.
- To understand about layers of OSI and TCP/ IP protocols and its process.
- To understand IP datagrams, address and Protocol mapping
- To gain advantage of the transport layer
- To understand real time application examples of networking such as email, DNS, File transfer.

**Unit I**

Network Fundamentals: Uses of Computer networks Transmission Media - Classification of Networks - Network Topology - Transmission technology-Transmission Modes – Network models- OSI Reference model –TCP / IP model.

**Unit II**

Physical layer: Data and Signals- Data Encoding – Multiplexing and Switching- Data link layer – Data link control- Error detection and correction – Block coding - wired LANs- Wireless LANs – IEEE 802.11 – Bluetooth-Wireless WANs.

**Unit III**

Network Layer: IP Datagrams- IP address- IPV4 Addresses – IPV6 Addresses - Internet Protocol- Address Mapping - ICMP- IGMP – Delivery, Forwarding and Routing.

**Unit IV**

Transport Layer: Process to Process delivery - Connection establishment -User Datagram Protocol –Transmission control protocol -Congestion Control – Flow Control.

**Unit V**

Application Layer – Domain Name System Remote Logging, Electronic Mail and File Transfer- WWW and HTTP-Network Management: SNMP – Multimedia.

**Text book:**

1. Computer Networks Hardcover, Andrew S. Tanenbaum , David J.Wetherall 2010.

**Reference books:**

1. Data communication and Networking, Behrouz A Forouzan, 2nd Edition 2014.
2. Computer Networks, 5th Edition, A Systems Approach, Peterson & Davie, 2011
3. Computer Networking: Principles, Protocols and Practice Release 0.25, Olivier Bonaventure, the Saylor Foundation, 2011.
4. Internetworking with TCP/IP Volume One, 6/E, Douglas E. Comer, 2014.

**Web Sites:**

1. [www.elsevier.com /Browse journals/Computer Networks](http://www.elsevier.com/Browse/journals/Computer_Networks)
2. [en.wikipedia.org/wiki/Computer\\_network](http://en.wikipedia.org/wiki/Computer_network)
3. [www.techtutorials.net](http://www.techtutorials.net)

**BCA 3643 Python Programming (4T+2L) 6hrs/6cr**

**Objective**

The aim of this course is to enable the students to learn program and concepts acquiring programming skills in python. It covers expressions, variables, functions, logic, and conditionals, which are foundational concepts, File Handling and Regular Expressions.

**Learning Outcome**

- To understand why Python is a useful scripting language for developers.
- To gain knowledge of the basics of python programming such as datatypes, variables, control statements.
- To handle functions in Python Language
- To learn how to use files in Python applications.
- To learn how to implement oops concepts and GUI programming.

**Unit I**

History of Python–Features of Python – working with Python – Basic Syntax – input / output functions - Variables and data types – operators- conditional and control statements – looping statements.

**Unit II**

String Manipulations – Access Strings – Basic Strings – String Slices – Functions and Methods-List, Tuples, Dictionaries – Operations – working with list- functions and methods.

**Unit III**

User Defined function – defining function-calling function-types of functions – arguments – anonymous functions – global and local variables- modules- importing module -Math module - Random module - Packages - Composition

**Unit IV**

File handling - Opening and closing file -Reading and writing files – file handling functions - Exception Handling - Except clause -Try finally clause -User Defined Exceptions

**Unit V**

Oops concept - class and object – attributes – Inheritance – Overloading – Overriding – Data hiding - Regular expressions-Match function-Search function - Matching VS Searching – Database – GUI Programming

**Text Book:**

1. Introduction to Computing and Problem Solving Using Python, Balagurusamy, McGraw Hill Education India Private Limited; First edition ,2017

**Reference books:**

1. Think Python: How to Think Like a Computer Scientist, Allen B. Downey, Updated for Python 3, Shroff/O'Reilly Publishers, 2nd edition, 2016.
2. Core Python Programming , R. NageswaraRao , Dreamtech Press, 2016
3. An Introduction to Python – Revised and updated for Python 3.2, Guido van Rossum and Fred L. Drake Jr, Network Theory Ltd., 2011

**Websites:**

1. [www.learnpython.org](http://www.learnpython.org)
2. [www.codecademy.com/learn/learn-python](http://www.codecademy.com/learn/learn-python)

**BCA 3645****Internet Technology****6hrs/6cr****Objective**

This course will make the students to understand surfing the web and trying to figure out how specific functionality is brought to a website and molds the student to learn and develop various PHP technology applications which definitely will meet the current industry need.

**Learning Outcome**

- To analyse a web page and identify its elements and attributes.
- To select and apply mark-up languages for processing, identifying and presenting, also to use scripting languages to add interactive components to web pages.
- To gain knowledge on JSON and PHP basics
- To handle mysql database using PHP programs.
- To understand and use XML syntax, attributes etc.,

**Unit I**

Introduction to HTML - Basic tags- Formatting: images, lists, Tables, Frames, Links, Form. Styling with Classes- Styling with IDs.CSS - The Presentation Semantics- CSS Properties- Types of Style Sheets

**Unit II**

JavaScript with HTML- Variables, Operators, Expressions, Arrays - Handling Loops & Decision structures - Understanding jQuery-Selectors- Event Manipulation Methods- Sliding, Easing, Fading, Toggling - jQuery and AJAX calls.

**Unit III**

Introduction to JSON- Overview of PHP –Data types –Variables –Expressions –control and Structure – functions –classes and objects –arrays –simple and multiple Dimensional arrays.

**Unit IV**

Using Mysql in PHP- Connection to a Data base – Listing DB –Displaying DB Tables – inserting a row of data using forms in PHP – Using Images –Mail management – File management.

**Unit V**

Introduction to XML – How to use XML –XML syntax –XML elements- XML attributes – Displaying XML Files – Working with XSL –Web Application Development using WordPress - Working with Code Igniter Framework.

**Text book:**

1. Web Technologies--A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education, 2011.

**Reference books:**

1. Web design with HTML, CSS, JavaScript and jQuery set, John Duckett, Wiley, 2014.
2. HTML Complete reference,Powell A.T., TataMcgrawHillPublications , 3<sup>rd</sup>edition(2000).
3. The complete Reference Java Script,PowellA.T.TataMcgrawHill Publications 2<sup>nd</sup> edition,2004.
4. PHP and MySql web Development, Luke Welling, Laura Thomson, 5<sup>th</sup> edition, publisher: addison – Wesley professional, 2016.
5. HTML, XHTML and CSS Bible, Steven M.Schafer, 5<sup>th</sup> edition, Wiley –Eastern publishing Inc., 2011.



**Objective**

To make the student learn a programming language and learn problem solving techniques.

**Learning Outcome**

- While completing the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement.
- 1. HTML Basic Tags.
- 2. Example for Table Tag.
- 3. HTML Formatting Tags.
- 4. HTML Frame.
- 5. HTML Input Tags.
- 6. Image Map.
- 7. Style Sheet-XSL,CSS.
- 8. Form Validation.
- 9. MYSQL Commands (DDL, DML, TCL, DCL).
- 10. PHP Program with Data base Connectivity.
- 11. Cookies.
- 12. Session Object.
- 13. Error Object.
- 14. XML

**Objective**

The aim of this course to gain knowledge about environmental issues and to create awareness of environment and pollution to students. The various aspects of environment like ecosystem, biodiversity, pollution and e-waste.

**Learning Outcome**

- To understand about environmental system its issues and awareness.
- To learn about ecosystem, biodiversity, pollution.
- To gain knowledge about energy sources
- To understand different types of pollution and how to avoid
- To know what is e-waste and how to manage it.

**Unit I**

Introduction – Terms and Definitions – Scope and history of Ecology - Ecosystem – Types and functions of structural components (i) A-biotic-atmosphere-lithosphere-hydrosphere – light and temperature (ii) Biotic-Organisms –tropic levels – and interactions among organisms -food chains – food-web-ecological pyramids and energy flow.

**Unit II**

Bio diversity: definition –genetics-species and ecosystem diversity-biodiversity at global national and local levels- conservation methods (in situ and ex situ)-patents-bio safety protocol- Role of technology in environmental protection.

**Unit III**

Energy sources: renewable and non-renewable energy sources. Renewable: energy from biomass-gobar glass plant-solar-wind-water-tidal energy. On-renewable energy: fossil fuels-coal-crude oil and natural gas-oil (shale –tar –sands)-nuclear energy-geothermal energy ocean thermal energy-bio fuels.

**Unit IV**

Environmental surveillance: pollution types -air pollution: global warming-ozone hole – smog and CFC –water pollution: BOD-COD-eutrophication-thermal pollution -noise pollution-nuclear pollution- sources of radiation- solid waste pollution- pollution control-water treatment and waste management - remote sensing.

**Unit V**

e-waste – toxic constituents – pollution problems – health impact of hazardous waste – reuse and recycling – collection process - separation process - e-waste recycling act – e-waste policy for India – Computer uses and impact on Health

**Text book:**

1. Environmental Studies from crisis to cure, R. Rajagopalan, 3<sup>rd</sup> edition, 2015.

**Reference books:**

1. Environmental bio technology- industrial pollution management Enger, ED and ROSS, Tata McGraw hill Publishing, 2000.
2. Essentials of ecology and environmental sciences, Jogdand.N, Himalaya publishing house, Bombay, Rana, SVS Prentice Hall of India Pvt.Ltd, 2003.
3. Enger, ED and ROSS, concepts in biology, Tata McGraw hill Publishing, 2000.
4. Environmental bio technology- industrial pollution management,Jogdand. N, Himalaya publishing house, Bombay, 2000.

**BCA 3243****Cyber Security (4T+2L)****3hrs/2cr****Objective**

The aim of the course is to familiarize students with the basic problems of information systems security, various categories and kinds of cyber-crimes. It includes the risks of information systems in the context of confidentiality, integrity and availability of information security policy development and issues system.

**Learning Outcome**

- To evaluate the computer network and information security needs of an organization
- To understand information systems security, various categories and kinds of cyber-crimes
- To gain knowledge on cyber terrorism and the challenges in our nation
- To access cyber security risk management policies
- To understand what is IPR, its need and how it will help in cyber security.

**Unit I**

History of Internet -Internet Addresses - DNS - Internet Infrastructure - World Wide Web - Classification of Cyber Crimes - Reasons for Commission of Cyber Crimes Management of Cyber security Risks, Threats – Vulnerabilities – Impacts, Federal Role - Federal Spending Legislative Proposals and Actions

**Unit II**

Cyber-attacks: the evolution of modern warfare - malware And Its Type - Kinds of Cyber Crime - Authentication - Encryption - Digital Signatures - Antivirus - Firewall - Steganography - Computer Forensics

**Unit III**

Cyber terrorism – Method of attack – tools for Terrorism – Challenges to India’s National security – existing cyber security initiatives - challenges and concerns

**Unit IV**

Cyber security in India present status – national cyber security policy – Indian cyber space – private public partnership – R & D in the field of Cyber Security.

**Unit V**

Intellectual property issue areas – cyber law issue – practice settings – career narratives – preparing for a career in Intellectual property or cyber law – fellowship & other Opportunities.

**Text Book:**

1. AvantikaYadav, “Cyber Security”, Narosa publishing House Pvt., Ltd., New Delhi, 2017

**Reference books:**

1. Introduction to Cyber Security, JeetendraPande, Dr. JeetendraPande, Assistant Professor- School of CS & IT, Uttarakhand Open University, Haldwani, 2015
2. Cyber security Issues and Challenges: In Brief Eric A. Fischer Senior Specialist in Science and Technology August 12, 2016.
3. Intellectual property and cyberlaw, Joan Ruttenberg, 2013
4. James Graham, Cyber Security Essentials, Taylor and Francis Group, LLC, 2011

**Websites:**

1. [www.tutorialspoint.com/information\\_security\\_cyber\\_law/information\\_security\\_cyber\\_law\\_tutorial.pdf](http://www.tutorialspoint.com/information_security_cyber_law/information_security_cyber_law_tutorial.pdf)

**BCA 3645                      Big Data Analytics (4T+2L)      6hrs/6cr**

**Objective**

This course Big Data Analytics largely involves collecting data from different sources, Optimize business decisions and create competitive advantage with Big Data analytics, Preparing for data summarization, query, and analysis. Applying data modeling techniques to large data sets, creating applications for Big Data analytics, Building a complete business data analytic solution.

**Learning Outcome**

- To demonstrate knowledge of big data analytics.
- To think critically in making decisions based on data and deep analytics.
- To understand the tool R Language for handling Big data
- To use technical skills in R for predicative and prescriptive modelling.
- To use various graphic tools for data representation.

**Unit I**

Introduction to Big Data Analytics- Overview - State of the Practice in Analytics - Data Analytics Lifecycle – Discovery - Data Preparation - Model Planning - Model Building.– Communicate results – Operationalize.

**Unit II**

Big Data Analytics – Problem definition – Data Collection – Cleansing Data – Summarizing Data – Data Exploration – Data Visualization, Sources of Big Data , Big Data Analytics Tools - open source big data analysis tools –

**Unit III**

Introduction to R- R Graphical User Interface – Features of R – Basic Syntax – data types – variables – Operators - Decision Making – Loops – Function - Strings

**Unit IV**

R Vectors – Lists – Matrices – Arrays – Factors – Data Frames, Importing csv files, Excel files, Binary files, xml file

**Unit V**

An Introduction to Graphics - Basic Plotting Tools - Plot Function, par Function, Pie Chart ,Bar Chart, Box plots, Histograms, Line Graphs, Scatter plots.

**Text Book:**

1. Big Data and Analytics, Seema Acharya, Wiley India Pvt.Ltc. New Delhi, 2015

**Reference Books:**

1. DT Editorial Services, “Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)”, Dream tech Press edition 2016.
2. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Published by John Wiley & Sons, Inc.2015.
3. Garrett Golemund, Hands – On Programming with R, O’Reilly Media Inc., 2014
4. SudhaG.Purohit, “Statistics using R”, Narosa publishing House Pvt., Ltd., New Delhi, 2015

**Web Sites:**

1. [www.tutorialspoint.com/big\\_data\\_analytics/index.htm](http://www.tutorialspoint.com/big_data_analytics/index.htm)
2. [www.tutorialspoint.com/r/r\\_tutorial.pdf](http://www.tutorialspoint.com/r/r_tutorial.pdf)
3. [pig.apache.org/docs/r0.7.0/tutorial.html](http://pig.apache.org/docs/r0.7.0/tutorial.html)

**BCA 3644****Fundamentals of Linux (4T+2L)****6hrs/6cr****Objective**

The main objective of this course is to provide Students a comprehensive overview of the Linux operating system along with Shell commands and shell scripting, Implementation of Linux System programs through GCC compiler, Understanding of basic concept of Socket programming (TCP and UDP).

**Learning Outcome**

- To understand about features and administration of Linux.
- To understand Linux desktop KDE.
- To learn the Linux commands, shell scripts, multimedia in Linux and open Office.
- To gain knowledge about resource management and networking in Linux.
- To use GTK tools and awk programming.

**Unit I**

Linux – The Operating System: Linux history, Linux features, Linux distributions, Linux’s relationship to UNIX, Overview of Linux architecture, Installation, Startup scripts, system processes - Linux Security - File systems: General Characteristics of File system, file permissions. User Management: Types of users, The powers of Root, managing users (adding and deleting): using the command line & GUI tools.

**Unit II**

Getting started with the desktop-logging in to linux getting familiar with the desktop-using the KDE desktop -using linux commands-the shell interface-understanding the linuxshell – using the shell in linux –working with the linux file system.

**Unit III**

Accessing and publishing in linux –finding common application in linux – other word processors –working with graphics -Multimedia in linux –Tools for using internet and the web –browsing the web –instant messaging with gain.

**Unit IV**

Resource Management in Linux: file and directory management, system calls for files Process Management, Signals, IPC: Pipes, FIFOs, System V IPC, Message Queues, system calls for processes, Memory Management, library and system calls for memory. Red hat package manager, RPM commands.

**Unit V**

Introduction to GTK – tools – commands – GTK basic programming – awk programming - Networking in LINUX: Socket Introduction, Elementary TCP Sockets (Socket Function, Connect Function, Bind, Listen, Accept, Fork and Exec), TCP Client server Example, Elementary UDP Sockets.

**Text Book:**

1. Linux Bible, Christopher Negus, 9th Edition,2015.

**Reference books:**

1. Linux Programming by Examples of the Fundamentals, Arnold Robbins, Pearson Education, 2nd Edition, 2008.
2. Red Hat Linux Administrator’s Guide, Cox K, PHI, 2009.
3. UNIX Network Programming, R. Stevens, PHI, 3rd Edition, 2008.
4. Beginning Linux Programming, Neil Mathew & Richard Stones, Wiley Dreamtech India,4<sup>th</sup> Edition,2008.

**Web Sites:**

1. [www.linuxtopia.org](http://www.linuxtopia.org)
2. [www.advancedlinuxprogramming.com](http://www.advancedlinuxprogramming.com)
3. [how-to.linuxcareer.com/c-development-on-linux-introduction](http://how-to.linuxcareer.com/c-development-on-linux-introduction).

## **BCA 3646 Fundamentals of mobile computing (4T+2L)6hrs/6cr**

### **Objective**

The aim of this course is to understand the theory as well as practical knowledge of mobile computing using android.

### **Learning Outcome**

- To learn the basic concepts of mobile communications and the devices
- To build understand the architecture and the features of android OS.
- To create applications using android
- To understand layout and managing layouts
- To gain knowledge on the various views

### **Unit I**

Introduction to mobile computing – wireless transmission – signals – antennas –cellular wireless networks - Devices: Information Access Devices – Smart Identification – Smart Cards, Labels, Tokens, Smart Sensors and Actuators – Smart Appliances and Home Networking.

### **Unit II**

Introduction to mobile generations -Android-Android architecture -Features -Applications - Versions -Flavors-Building the project.

### **Unit III**

User Interface Architecture -Activity life cycle - Intents – Services – Content providers - UI Widgets – Text controls –Button controls – Toggle buttons – Menus – Options menu – Context menu – popup menu.

### **Unit IV**

Layout manager – Relative layout – Linear layout - Table layout – Grid layout – Adaptor – Array adaptor – ArrayList adaptor – Base adaptor – Lists.

### **Unit V**

View – Grid view – Web view – Scroll view – Search view – Dynamic list view – Expanded list view – Working with data storage – Shared preferences – Preferences activity – Files access – database connectivity using SQLite.

### **Text book:**

1. Learning Android, Marko Gargenta, Masumi Nakamura, O'Reilly, 2nd edition, 2014.

### **Reference books:**

1. Principles of Mobile Computing, UweHansmann, LotharMerk, Martin S.Nicklous and Thomas Stober , Springer Professional Computing, 2nd Edition, 2008.
2. Mobile Computing Theory and Practice, KumKumGarg, Pearson Education, illustrated edition, 2010.
3. Mobile Computing and Wireless Communications, Amjad Umar, NGE Solutions, 2004.

### **Web Sites:**

1. [www.edunotes.in/mobile-computing](http://www.edunotes.in/mobile-computing)
2. [www.tutorialspoint.com/android](http://www.tutorialspoint.com/android).
3. [www.javapoint.com/android](http://www.javapoint.com/android).

**BCA 3548**

**Project**

**5hrs/5cr**

**Objective**

The aim of this course is to encourage the students to develop a Real Time Application for client with the guidance of internal and external faculty.

**Learning Outcome**

- The student experiences and learns the company software technology and methodologies.

**Evaluation Pattern:**

Internal (3 Presentations) - 75 marks

External (Final Presentation and Viva Voce) - 25 marks

**BCA 3244**

**Advanced Excel (2T+1L)**

**3hrs/2cr**

**Objective**

Upon Successful completion of this course students will be able to use advanced graphs and presentation techniques to maximize impact, use macros and VBA automate your spreadsheets and increase interactivity, Using PivotTables and Power Pivots to turn raw data into clear information that supports key decisions.

**Learning Outcome**

- To identify the different components of the Excel worksheet.
- To differentiate between an Excel workbook & worksheet.
- To construct formulas, including the use of built-in functions, and relative and absolute references.
- To create and modify charts also to create macros in excel.
- To understand the various ways of customization in excel.

**Unit I**

Introduction to Excel - Formulas with Multiple Operators - Inserting and Editing a Function - Auto Calculate and Manual – Calculation - Defining Names - Using and Managing Defined Names - Displaying and Tracing Formulas – Database Functions - Using Lookup Functions (VLOOKUP) - User Defined and Compatibility Functions – Financial - Date & Time - Math & Trig - Statistical.

**Unit II**

Sorting by One Column, Colors or Icons - Multiple Columns - a Custom List - Filtering Data - Creating a Custom AutoFilter - Using an Advanced Filter - Creating a PivotTable - Specifying PivotTable Data - Changing a PivotTable's Calculation - Filtering and Sorting a PivotTable - Working with PivotTable Layout - Updating a PivotTable - Formatting a PivotTable - Creating a PivotChart.

**Unit III**

Working with Data Tables - Using Goal Seek – Text to Columns - Grouping and Outlining Data - Using Subtotals - Consolidating Data by Position or Category - Consolidating Data Using Formulas - Working with the Web and External Data - Inserting a Hyperlink - Importing Data from an Access Database or Text File - Importing Data from the Web and Other Sources.

**Unit IV**

Working with Macros - Recording a Macro - Playing and Deleting a Macro - Adding a Macro to the Quick Access Toolbar - Editing a Macro's Visual Basic Code - Inserting Copied Code in a Macro - Declaring Variables and Adding Remarks to VBA Code - Prompting for User Input - Using the If...Then...Else Statement.

**Unit V**

Customizing the Ribbon - Customizing the Quick Access Toolbar - Using and Customizing AutoCorrect - Changing Excel's Default Options - Creating a Custom AutoFill List - Creating a Custom Number Format.

**Text book:**

1. Excel 2013 Bible, Walkenbach, Illustrated, John Wiley & Sons, 2013

**Reference Books:**

1. Excel 2013 Formulas, Walkenbach, John Wiley sons, 2013
2. Business Math Using Excel, Sharon Burton, Nelda Shelton, Cengage Learning, 2011.
3. Excel Dashboards and Reports, Michael Alexander, Walkenbach, John Wiley & sons, 2013
4. Advanced Regression in Excel – The Excel Statistical Master, Mark Harmon, 2011.

**Web Sites:**

1. [chandoo.org/wp/excel-basics](http://chandoo.org/wp/excel-basics)
2. [www.gcflearnfree.org](http://www.gcflearnfree.org)
3. [support.office.com/.../Excel-2013-training-courses](http://support.office.com/.../Excel-2013-training-courses).



**Department of Business Administration**  
**With effect from June 2018 onwards**

<b>COURSE FRAME</b>					
<b>Semester</b>	<b>Part</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Hours</b>	<b>Credit</b>
I	I	TAS/FRS/HIS	Tamil/ French/ Hindi	3	2
	II	ENS1201	Conversational Skills	3	2
	IIIC	BBA1441	Principles of Management	4	4
	IIIC	BBA1425	Financial Accounting - I	4	4
	IIIC	BBA1525	Corporate Communication	5	5
	LS1	BBA1231	Personality Development	3	2
	NME	BBA1229	Banking Law and Practice	3	2
	SUPPO	BBA1423	Advertising and Salesmanship	5	4
II	I	TAS/FRS/HIS	Tamil/ French/ Hindi	3	2
	II	ENS1202	Reading & Writing Skills	3	2
	IIIC	BBA1430	Financial Accounting - II	4	4
	IIIC	BBA1432	Business Environment	4	4
	IIIC	BBA1554	Marketing Management	5	5
	LS2	BBA1226	Entrepreneurial Skills	3	2
	NME	BBA1224	Foundations of Management	3	2
	SUPPO	MAS1440	Business Statistics	5	4
III	V	XXXxxxx	NSS/PED/SLP		1
	I	TAS/FRS/HIS	Tamil/ French/ Hindi	3	2
	II	ENS2201	Study Skills	3	2
	IIIC	BBA2447	Organizational Behaviour	4	4
	IIIC	BBA2543	Human Resource Management	5	5
	IIIC	MAS2439	Quantitative Techniques	5	5
	IIIC	BBA2539	Portfolio Management	5	5
	SUPPO	BBA2451	Business Law	5	4
IV	I	TAS/FRS/HIS	Tamil/ French/ Hindi	3	2
	II	ENS2202	Career Skills	3	2
	IIIC	BBA2428	Production Management	4	4
	IIIC	BBA2552	Industrial Relations	5	5
	IIIC	BBA2554	Entrepreneurial Development	5	5
	IIIC	BBA2556	Financial Services	5	5
	SUPPO	BBA2430	Total Quality Management	5	4
	V	XXXxxxx	NSS/PED/SLP		1
V	LS3	BBA3223	Business Organisation	3	2
	HVS	HVS3200	Human Value Development	4	2
	IIIC	BBA3635	Management Information System	6	6
	IIIC	BBA3627	Cost Accounting	6	6
	IIIC	BBA3631	Marketing Research	6	6
	IIIC	BBA3535	International Marketing	5	5
VI	LS4	BBA3260	Organisational Leadership	3	2
	EVS	BBA3200	Environmental Studies	4	2
	IIIC	BBA3650	Strategic Management	6	6
	IIIC	BBA3644	Management Accounting	6	6
	IIIC	BBA3638	Logistics Management	6	6
	IIIC	BBA3550	Retail Management	5	5

**PERSONALITY DEVELOPMENT**

**BBA1231**

**3Hrs / 2Cr**

**Objective:** The learner will gain the skills required for the corporate world that would enhance one's employability.

**UNIT-I**

Individual Behavior: Factors – Models; Personality: Definition – Dimensions –Theories – Types - Determinants; Perception: Nature – Importance – Process.

**UNIT-II**

Attitude: Nature – Components – Functions – Barriers and Types; Values: Characteristics – Sources –Importance and Types of Values.

**UNIT- III**

Goal Setting: Meaning – Importance- Stages – Types of Goals; Leadership: Definition- Functions – Characteristics – Styles and Theories.

**UNIT –IV**

Learning and Behavior Modification: Nature and Theories of Learning- Shaping and Reinforcement of Behavior.

**UNIT- V**

Team Development: Introduction – Definition – Difference between Work Group and Work Team – Characteristics of Effective Team- Team Objective- Importance- Role of Team Leader.

**Text Book:**

R. Machakkalai, L. Saraswathi, Personality Development – A Need, Mangai Publishers, 2014.

**Reference Books:**

1. K. Aswathappa, Organisational Behavior, Himalaya Publishing House, New Delhi, 2012.
2. Alex, Soft Skills, Sultan Chand & Sons, New Delhi, 2012.
3. N.M.Khandelwal, Executive Excellence, Himalaya Publishing House, New Delhi, 2008.
4. Rathan Reddy, Knowledge Management, Himalaya Publishing House, New Delhi, 2011.

## PRINCIPLES OF MANAGEMENT

BBA 1441

4Hrs / 4Cr

**Objective:** The students will have a clear understanding on the basic knowledge of managerial functions in all aspects of organizational administration.

### UNIT - I

Management: Meaning – Definitions – Features – Functions of management – Administration Vs. Management; Profession – Role of manager – Contributions of F.W.Taylor, Henry Fayol and Peter.F.Drucker.

### UNIT - II

Planning: Definitions – Characteristics – Objectives – Importance – Steps in Planning process - Advantages of Planning; MBO: Meaning- Process of MBO; Business Forecasting: Definition – Methods of forecasting; Decision making: Characteristics – Process – Types of decisions.

### UNIT - III

Organization: Meaning – Definitions – Functions – Importance – Classification of Organization; Departmentation: Process – Need and Importance – Factors; Span of Management: Meaning – Factors affecting Span of Management.

### UNIT - IV

Staffing: Definition – Elements – Functions; Recruitment: Meaning – Sources of Recruitment; Selection: Meaning – Stages of Selection Procedure; Training and Development: Meaning – Types of Training; Directing: Definition – Principles of Direction; Motivation: Meaning - Nature – Types; Leadership: Definition – Functions of Leader.

### UNIT – V

Controlling: Definition – Control Process – Requisites of Effective Control System – Advantages and Limitations of Effective Controlling; Co-ordination: Definition – Need & Importance – Types – Problems of Co-ordination.

### Text Book:

T. Ramaswamy, Principles of Management, Himalaya Publishing House, New Delhi 2016.

### Reference Books:

1. J. Jeyasankar, Principles of Management, Margham Publications, Chennai, 2011.
2. Deepak kumarBattacharya, Principles of Management – Text and cases, Pearson, New Delhi, 2012.
3. L.M. Prasad, Principles and Practice of Management, Sulthan Chand and sons, New Delhi, 2013.
4. JAF Stomer, Freeman R. E. and Daniel R Gilbert, Management, Pearson Education, 2009.

**MARKETING MANAGEMENT**

**BBA 1554**

**5Hrs / 5Cr**

**Objective:** The learners will understand the concept of marketing and its applications and will expose them to the latest trends in marketing.

**UNIT - I**

Market: Introduction – Evolution – Meaning – Definition – Classification; Marketing: Objectives – Importance – Marketing and Merchandising - Marketing and Selling – Marketing and Distribution – Marketing and Business – Modern marketing – Role of Marketing in Economic Development.

**UNIT - II**

Product: Meaning – Features – Classification – Policies – Planning and Development – Product line – Product Mix: Product Mix Strategies – Product Innovation; New Product: Life Cycle – Planning Process – Product Diversification – Product Elimination – Product Modification – Product Failure.

**UNIT - III**

Pricing: Meaning – Objectives – Factors affecting Pricing Decisions – Procedure for Price Determination; Kinds of Pricing: Psychological – Customary – Skimming – Penetration – Geographical – Administrated – Dual – Mark up – Price lining – Negotiated – Competitive – Monopoly – Oligopoly; Price Differentials – Price Leader – Factors Affecting Price – Resale Price Maintenance.

**UNIT - IV**

Branding: Brand – Branding – Brand Name – Types of Brand – Reasons for Branding - Conditions Favorable to Branding – Brand mark – Functions – Advantages – Trade mark; Labeling: Meaning - Types – Functions – Advantages and Disadvantages; Packaging: Meaning – Growth – Functions – Kinds; Channels of Distribution: Definition – Importance – Types – Factors affecting the choice of distribution channel.

**UNIT - V**

E- Business: Introduction – Telemarketing – Automatic Vending – E-Business – E-Commerce – Electronic Data Interchange – E-Mail – Internet – E-Auctioning – E-Marketing – E-Trading; Recent Trends in Marketing: Relationship Marketing – Word of mouth Marketing – Test Marketing.

**Text Book:**

R.S.N. Pillai and Bagavathi, Modern Marketing, S.Chand Ltd, New Delhi 2014.

**Reference Books:**

1. Philip Kotler, Marketing Management, Pearson Education, New Delhi, 2010.
2. Stanton William J, Fundamentals of Marketing, McGraw Hill, New Delhi, 10<sup>th</sup> Edition, 2010.
3. V.V.Ramaswamy and S. Namakumari, Marketing Management, McGraw Hill Publication, 4<sup>th</sup> Edition, New Delhi, 2011.
4. S. A. Sherlekar and K. Nirmala Prasad, Principles of Marketing, Himalaya Publication, New Delhi, 2011.

**TOTAL QUALITY MANAGEMENT****BBA 2430****5Hrs / 4Cr**

**Objective:** The learner will inculcate the need for quality centric perspective in the conduct of Business both as managers and entrepreneurs.

**UNIT- I**

Quality Concepts: Definition – Dimensions; Total Quality Management: Evolution - Dimensions – Basic Concepts – Principles – Role of TQM Leaders - Barriers to TQM Implementation; Contributions of Quality Gurus: Deming - Juran - Crosby – Taguchi.

**UNIT - II**

Customer Satisfaction: Meaning – Types of Customers; Customer Perception of Quality: Factors Influencing Customer Perception of Quality - Identifying Customer Needs - Customer Retention and Feedback; Employee Motivation: Concept – Importance – Theories of Motivation; Employee Empowerment: Definition – Principles – Characteristics; Recognition and Reward: Meaning – Types of Rewards; Performance Appraisal: Need – Process – Benefits.

**UNIT– III**

PDSA Cycle: Meaning – Phases – Benefits; 5S: Meaning – Objectives – Factors – Benefits; Kaizen: Various Aspects – Features; Performance Measures: Objectives – Pre-Requisites - Implementation Strategy; Quality cost: Definition - Elements – Analyzing Techniques - Trend analysis - Characteristics - Pareto Analysis – Uses.

**UNIT– IV**

Bench marking: Meaning - Types - Process – Benefits; Quality Function Deployment: Definition - Methodology – Process; Total Productive Maintenance: Definition - Types – Objectives- Eight Pillars of TPM; Failure Mode Effective Analysis: Definition - Types – Stages.

**UNIT – V**

Six Sigma: Definition - Process - Advantages; ISO 9000 Quality System: Definition – Objectives – Benefits – Process Model – Elements - Implementation- Documentation; Quality Auditing: Types of Audit; Environmental Management System Standards: Concept- Requirements and Benefits.

**Text Book:**

V. Jayakumar, R. Raju, Total Quality Management, Lakshmi publications, Chennai, 2016.

**Reference Books:**

1. R. Ramakrishnan – Total Quality Management, Eswar Press, 2010
2. Dale. H, Carol Glen, Mary- Total Quality Management, Pearson Education, 2011
3. SridaraBhat – Total Quality Management, Himalaya Publishing House Private Limited, Mumbai, 2012.

**ORGANIZATIONAL BEHAVIOUR**

**BBA 2447**

**4Hrs / 4Cr**

**Objective:** A student of Organizational Behaviour will get himself acquainted with Organizational theory and develop a better conceptualization of organizational life.

**UNIT - I**

Overview of Organisational Behaviour: Definition and Meaning - Importance - Foundation; Organization Theory: Evolution of OB - Industrial Revolution - Scientific Management - Human Relations Movement - Hawthorne Studies.

**UNIT - II**

Personality and Perception: Nature of Personality -Types- Determinants - Theories of Personality - Shaping of Personality; Perception: Meaning and Definition - Perceptual Process - Factors influencing Perception.

**UNIT - III**

Learning: Meaning and Definition - Theories of Learning- Learning Process; Attitudes: Components of Attitudes – Types – Formation of Attitudes - Job Satisfaction - Causes.

**UNIT - IV**

Work Motivation: Nature - Importance - Theories of Motivation – Maslow’s Hierarchy of Needs Theory - Alderfer’s ERG Theory - Herzberg’s Motivation Hygiene Theory - Vroom’s Expectancy Theory.

**UNIT – V**

Group Dynamics: Nature and Types of Groups – Why do people join groups?; Team: Nature - Benefits and Types of Teams; Leadership: Nature – Importance – Styles of Leadership.

**Text Book:**

K. Aswathappa, Organizational Behaviour, Himalaya Publishing House, Mumbai, 2012.

**Reference Books:**

1. S.S. Khanka, Organisational Behaviour, S. Chand & Company Pvt. Ltd, 2010.
2. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 2009.
3. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, 2008.
4. Robbins, S.P., T.A. Judge & S. Sanghi, Organisational Behaviour, Pearson, 2007.

**BUSINESS LAW****BBA 2451****5Hrs/4Cr**

**Objective:** The Learner will understand the legal rules which provide a framework for making business decisions and facilitates commercial transactions.

**UNIT-I**

Contract Act, 1872: Definition – Growth and Sources – Essential Elements of a Valid Contract- Kinds of Contracts- Contingent Contract - Discharge of Contract - Offer and Acceptance - Consideration.

**UNIT – II**

Indemnity and Guarantee: Contract of Indemnity: Definition – Rights of Indemnity Holder When Sued; Contract of Guarantee: Definition - Consideration of Guarantee – Distinction between Indemnity and Guarantee; Rights of Surety - Discharge of Surety from Liability.

**UNIT-III**

Bailment: Definition- Essential Features- Kinds; Duties of Bailee- Rights of Bailee and Bailor – Termination of Bailment; Pledge or Pawn: Definition – Rights of Pawnee and Pawnor- Distinction between Bailment and Pledge - Pledge by Non-Owner.

**UNIT-IV**

Agency: Definition of Agent and Principal - General Rules of Agency - Distinction between Agent and Servant - Kinds of Agents - Creation of Agency - Rights and Duties of Agent - Rights and Duties of Principal - Termination of Agency - Irrevocable Agency.

**UNIT-V**

Sale of Goods Act, 1930: Definition- Essentials of a Contract of Sale- Kinds of Goods - Difference Between Sale and Agreement to Sell - Sale and Hire Purchase; Conditions and Warranties: Definition – Express and Implied Conditions and Warranties; Doctrine of Caveat Emptor.

**Text Book:**

S. S. Gulshan, Business Law, Third edition, Excel Books, New Delhi, 2016.

**Reference Books:**

1. N.D.Kapoor, "Elements of Mercantile Law", Sultan Chand & Sons, New Delhi, 2014.
2. P. Saravanavel and S.Sumathi, "Business Law", Himalaya Publishing House, 2012.
3. M.C.Kuchhal, "Mercantile Law", Vikas Publishing House Pvt Ltd, New Delhi, 2012.
4. Avatar Singh, "Mercantile Law", Eastern Book Company, Lucknow, 2010.

**PORTFOLIO MANAGEMENT**

**BBA 2539**

**5 Hrs/ 5 Cr**

**Objectives:** The students will comprehensively be introduced to the areas of security analysis and portfolio management; and will be equipped with the advanced tools and techniques for making profitable investment decisions.

**UNIT -I**

Investment Management: Definition of Investment - Classification – Speculation - Factors favouring Investment – Objectives - Essential features of an Investment Program - Investment Process - Investment Alternatives; Mutual funds:Types – Importance - Government Securities - Characteristics of Government Securities - Structure of Financial Markets in India.

**UNIT- II**

Portfolio Management: Meaning –Definition – Process - Factors contributing to Portfolio Management – Principles – Policies – Duties and responsibilities of Portfolio Manager-Portfolio Theory- Markowitz Model – Assumptions – Features-Sharpe’s Portfolio Model.

**UNIT -III**

Capital Asset Pricing Model: Assumptions –Explanation - Limitations - Problems in Portfolio Management- Arbitrage Pricing Theory Model -CAPM vs. APT; SEBI: Objectives – Functions - Powers of SEBI - Various departments of SEBI.

**UNIT- IV**

Approaches to Security Analysis: Fundamental Analysis - Economic, Industry, Company; Technical Analysis: Assumptions- Fundamental vs. Technical analysis - Dow Theory - Chartist Method – Charts - Chart pattern in Technical Analysis- Triangles.

**UNIT -V**

Risk and Return Analysis: Risk – Meaning – Causes- Factors for Risks in Investment- Classification of Risk- Minimizing Risk; Credit Rating: Definitions - Functions –Benefits – Limitations - Factors influencingCredit Rating - Return on Investment – Components - Factors determining Return on Investment.

**Text book:**

L. Natarajan, “Investment Management - Security Analysis and Portfolio Management”, Margham Publications, Chennai 2017.

**Reference books:**

1. V.A. Avadhani, “Securities analysis and portfolio management”, Himalaya publishing house, Mumbai, 2013
2. PrasannaChandra , “Securities analysis and portfolio management”, Tata Mcgraw Hill. New Delhi,2010.
3. S.K.Barua, V. Ragunathan and J.R Varma,“Portfolio management” Tata Mcgraw Hill. New Delhi,2011.
4. V.K. Bhalla, “Investment management”, S.Chand Publication, New Delhi, 2009.



**INDUSTRIAL RELATIONS****BBA 2552****5Hrs / 5Cr**

**Objectives:** The learner will develop an understanding about different facts and the entire machinery of industrial relations.

**UNIT - I**

Industrial Relation: Concepts – Factors Affecting Industrial Relation – Importance – Approaches; National Commission for Labour & Industrial Relation Policy.

**UNIT - II**

Trade Unionism: Recommendation of National commission on Labour 1969 for strengthening Trade Unions; Trade Union Act 1926: Definitions – Registration – Cancellation – Duties and Liabilities.

**UNIT - III**

Payment of Wages Act 1936: Important Definitions – Responsibilities for Payment – Time for Wage Payment – Mode of Wage Payment – Authorized Deduction – Rights of Employers – Rights of Employees.

**UNIT - IV**

Grievance Procedure: Concept – Essence of Model Grievance Procedure – Causes of Misconduct – Forms of Misconduct – Procedure for Punishment – Types of Punishment; Ethical Codes: Principles of the Code – Chief features of the Code – Code of Discipline in Industry.

**UNIT - V**

Industrial Disputes Act 1947: Conciliation – Arbitration – Adjudication – Strikes or lockouts – Lay off – Retrenchment closure – Unfair Labour Practices.

**Text Book:**

Mamoria and Gankar, “Dynamics of Industrial Relation”, Himalaya Publishing House, Mumbai, 2012.

**Reference Books:**

1. N. D. Kapoor, “Elements of Mercantile Law”, Sultan chand & sons, New Delhi, 2009.
2. P. Subba Rao, “Industrial Relations”, Himalaya Publishing House, Mumbai, 2013.
3. G. Gankar, “Industrial Relations”, Himalaya Publishing House, Mumbai, 2012.
4. S. D. Punekar, S. B. Deodhar and Saraswathi Sankaran, “Labour welfare, Trade Unionism and Industrial Relation”, Himalaya Publishing House, Mumbai, 2012.

**INTERNATIONAL MARKETING**

**Objectives:** The students will gain an exposure to marketing strategies, inviting them to the International market, propel export and import of goods globally.

**UNIT - I**

International Marketing: Definition – Special Problems in International Marketing – Reasons for motives of International Marketing – Internalization Stages – International Marketing Decisions – Participants in International Marketing.

**UNIT - II**

International Marketing Environment: Economic environment – Social Environment – Demographic environment – Political & Government environment – Technological environment; Market selection: Selection Process – Determinants of Market selection; Market entry strategies.

**UNIT - III**

International Product Decisions: Product Decisions – Product – Components and Levels of Product – Product Mix – Product life cycle and International Marketing – New product Development steps; Branding: Global Brand – Branding problems in International Marketing; Packaging and Labeling; Functions & Importance – Factors influencing Packaging Decisions.

**UNIT - IV**

International Pricing: Types of cost in Export Marketing – Objectives – Factors affecting Pricing – Pricing Methods – Steps in Pricing; International Distribution: International Channel System – Types of Foreign Intermediaries.

**UNIT - V**

Export Finance: Payment Terms; Letter of credit: Parties of the Letter of Credit – Kinds of Letter of Credit; Export Document: Reshipment Document – Documents Related to Goods – Certificates Related to Shipment – Documents Related to Payment.

**Text Book:**

International marketing, Francis Cherunilam, 15<sup>th</sup> Edition, Himalaya Publishing House Pvt. Ltd., Mumbai – 400004, 2017.

**Reference Book:**

1. R. Srinivasan, International Marketing, PHI Learning [P] Limited, New Delhi – 110042, 2013.
2. Varshney&Battacharya, International Marketing Management, Sultan Chand &sons, New Delhi – 110002, 2012.
3. Justing Paul and Ramneekappor, Text & Cases International Marketing, Tata McGraw Hill Publication, New Delhi, 2012.
4. U.C. Mathur, Sage Publications, International Marketing Management, New Delhi, 2013.

**MANAGEMENT INFORMATION SYSTEM****BBA 3635****6 Hrs/ 6Cr**

**Objective:** The learner will gain fundamental knowledge about the information infrastructure that the modern organization would require to exercise its various functions.

**UNIT - I**

Information System: Definition-Features -Dimensions - Types - Value -Management Information; Management Information System: Definition -Functions -Process - Role - Objectives - Components -Characteristics - Benefits - Decision Support System-Executive Information System-Information Resource Management.

**UNIT - II**

System Concepts: Meaning -Elements -Characteristics -Types – Subsystems – Reasons for Subsystems; Structure of MIS: Multiple approaches to structure of MIS -Man Machine Interaction; Transactional Processing System: Features – Functions - Transactional Processing Cycle-Transaction Processing Model.

**UNIT - III**

Decision Support System: Meaning -Types -Characteristics -Components -DSS Tools- DSS Capabilities-MIS and DSS-Business Intelligence System-Online Analytical Processing - Data Mining – Process; Expert System: Components -Characteristics -Advantages - Limitations – Applications.

**UNIT - IV**

Enterprise Resource Planning: Evolution – Manufacturing Resource Planning activities - Objectives - Information Integration through ERP - ERP Implementation - Benefits – Disadvantages; Customer Relationship Management: Meaning – Definition-Role - Advantages – Disadvantages.

**UNIT - V**

Electronic Commerce: Definition-E-Commerce and Business Models; Electronic Data Interchange: Components-Advantages and Disadvantages-Business Opportunities opened up by the Internet-Computer in MIS-Production Information System-Marketing Information System-Finance Information System-Personnel Information System.

**Text Book:**

P.Mohan, “Management Information Systems”, Himalaya Publishing House, Mumbai, 2012

**Reference books:**

1. W.S.Jawadekar, Management Information Systems, Tata McGraw Hill Publications, New Delhi 2010.
2. S.Sadagopan, Management Information Systems, PHI Learning Pvt Ltd., Delhi 2009.
3. S.Shajahan, Management Information Systems, New Age international, Delhi, 2007.
4. Hitesh Gupta, Management Information Systems, Pearson Publications, Delhi, 2011.

**LOGISTICS MANAGEMENT**

**Objective:** The learner will be able to comprehend the concept-based and systemic approach towards those business ventures that involve logistical expertise coupled with the functional knowledge of Supply Chain Management.

**UNIT - I**

Introduction and Planning: Definition – Importance – Objectives; Logistics / Supply Chain Strategy and Planning: Logistics/SC Strategy – Selecting the Proper Channel Strategy – Measuring Strategy Performance.

**UNIT - II**

The Logistics and Supply Chain Product: Nature – The 80-20 Curve – Product Characteristics – Product Packaging – Product Pricing; Logistics and Supply Chain Customer Service: Definition – Order Cycle Time – Importance; Order Processing and Information Systems: Definition – Examples – Affecting Factors – Logistics Information System.

**UNIT - III**

Transport Fundamentals: Importance – Single Service Choices and their Characteristics – Intermodal Services – Transport Cost Characteristics – Rate Profiles - International Transport Documentation.

**UNIT – IV**

Forecasting Supply Chain Requirements: Nature – Methods; Inventory Policy Decisions: Appraisal – Types of Inventories – Objectives; Purchasing and Supply Scheduling Decisions: Scheduling – Purchasing (activities).

**UNIT - V**

Storage and Handling System: Reasons for Storage – Functions – Alternatives; Storage and Handling Decisions: Planning for Design and Operation – Order Picking Operations; Facility Location Decision: Classification – Single and Multiple Facility Location – Dynamic Warehouse Location – Retail / Service Location.

**Text Book:**

Ronald H. Ballou – Business Logistics / Supply Chain Management, Pearson Education, 2012.

**Reference Books:**

1. Donald J. Bowersox, David J. Closs – Logistical Management, Tata McGraw-Hill, 2005.
2. Sridhara Bhatt – Logistic Management, Himalaya Publishing house Private Limited, Mumbai. 2010
3. P.SaravanaVel - Logistics and Supply Chain Management, Himalaya Publishing house Private Limited, Mumbai. 2010.
4. Bhatt –Supply Chain Management, Himalaya Publishing house Private Limited, Mumbai. 2011.

**THE AMERICAN COLLEGE- MADURAI**  
**DEPARTMENT OF FOOD SCIENCE**  
**Choice Based Credit System**  
**Program for B.Sc. – Food Science and Nutrition (2017 onwards)**

Sem	Part	Course No	Course Title	Hrs	Credits	Marks
I	I	XXX 0000	Tamil/French/Hindi	3	2	30
I	II	ENS 1201	Conversational Skills	3	2	30
I	III-C	FSN 1511	Food Science	5	5	75
I	III-C	FSN 1413	Lab in Food Science	4	4	60
I	III-C	FSN 1415	Nutrition Science	4	4	60
I	III-S	FSN 1401	Human Physiology	5	4	60
I	IV-E	XXX 0000	Non Major Elective –I	3	2	30
I	IV-LS	XXX 0000	Life Skill –I	3	2	30
I	V	XXX 0000	Extension Activity (NSS/SLP/PED)			
			<b>Total</b>	<b>30</b>	<b>25</b>	<b>375</b>
II	I	XXX 0000	Tamil/French/Hindi	3	2	30
II	II	ENS 1202	Reading & Writing Skills	3	2	30
II	III-C	FSN 1512	Nutritional Biochemistry	5	5	75
II	III-C	FSN 1414	Lab in Nutritional Biochemistry	4	4	60
II	III-C	FSN 1416	Food Microbiology	4	4	60
II	III-S	FSN 1402	Dietetics	5	4	60
II	IV-E	XXX 0000	Non-Major Elective –II	3	2	30
II	IV-LS	XXX 0000	Life Skill – II	3	2	30
II	V	XXX 0000	Extension Activity (NSS/SLP/PED)		1	
			<b>Total</b>	<b>30</b>	<b>25+1</b>	<b>375/390</b>
III	I	XXX 0000	Tamil/French/Hindi	3	2	30
III	II	ENS 2201	Study Skills	3	2	30
III	III-C	FSN 2517	Food Chemistry	5	5	75
III	III-C	FSN 2519	Food Processing – I	5	5	75
III	III-C	FSN 2411	Lab in Food Processing	4	4	60
III	III-C	FSN 2513	Food Service Management	5	5	75
III	III-S	FSN 2403	Child development	5	4	60
III	V	XXX 0000	Extension Activity – NSS/SLP/PED			
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>

**FSN 2**

<b>Sem</b>	<b>Part</b>	<b>Course No</b>	<b>Course Title</b>	<b>Hrs</b>	<b>Credits</b>	<b>Marks</b>
IV	I	XXX 0000	Tamil/French/Hindi	3	2	30
IV	II	ENS 2202	Career Skills	3	2	30
IV	III-C	FSN 2510	Therapeutic Nutrition-I	5	5	75
IV	III-C	FSN 2412	Lab in Therapeutic Nutrition-I	4	4	60
IV	III-C	FSN 2514	Food Processing - II	5	5	75
IV	III-C	FSN 2516	Food packaging	5	5	75
IV	III-S	FSN 2404	Functional foods and Nutraceuticals	5	4	60
IV	V	XXX 0000	Extension Activity NSS/SLP/PED	-	1	15
			<b>Total</b>	<b>30</b>	<b>27+1</b>	<b>405/420</b>
V	III-C	FSN 3615	Therapeutic Nutrition – II	6	6	90
V	III-C	FSN 3517	Lab in Therapeutic Nutrition– II	5	5	75
V	III-C	FSN 3619	Food Biotechnology	6	6	90
V	III-C	FSN 3621	Baking and Confectionary	6	6	90
V	IV-LS	XXX 0000	Life Skill –III	3	2	30
V	ES	FSN 3200	Environmental Studies	4	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
VI	III-C	FSN 3618	Food safety and Quality control	6	6	90
VI	III-C	FSN 3520	Mini Project	5	5	75
VI	III-C	FSN 3622	Health and Fitness	6	6	90
VI	III-C	FSN 3624	Public Health Nutrition	6	6	90
VI	IV-LS	XXX 0000	Life Skill – IV	3	2	30
VI	V-VE	XXX 0000	Value education	4	2	30
			<b>Total</b>	<b>30</b>	<b>27</b>	<b>405</b>
			<b>GRAND TOTAL</b>	<b>180</b>	<b>158+2</b>	<b>2370/2400</b>

**C - Core Courses**

**NME - Non - Major Elective    LS - Life Skill**

**S – Supportive Courses**

**VE- Value Education**

**ES- Environmental Studies**

**Courses offered by the Department of Food sciences to Non-Major Students**

**Part III Supportive**

<b>SEM</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Hrs.</b>	<b>Cr</b>	<b>Marks</b>
I	FSN 1404	Human Physiology	5	4	60
II	FSN 1402	Human Nutrition	5	4	60
III	FSN 2403	Child Development	5	4	60
IV	FSN 2404	Functional foods and Nutraceuticals	5	4	60
<b>Total</b>			<b>20</b>	<b>12</b>	<b>240</b>

**Part IV Life skill course**

<b>SEM</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Hrs.</b>	<b>Cr</b>	<b>Marks</b>
I	FSN 1201	Home Food Catering	3	2	30
II	FSN 1202	Ethnic Foods	3	2	30
V	FSN 3203	Obesity Management	3	2	30
VI	FSN 3204	Food additives	3	2	30
<b>Total</b>			<b>12</b>	<b>8</b>	<b>120</b>

**Part IV Non-Major Electives**

<b>SEM</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Hrs.</b>	<b>Cr</b>	<b>Marks</b>
I	FSN 1211	Basic Nutrition	3	2	30
II	FSN 1212	Diet and Disease	3	2	30
<b>Total</b>			<b>6</b>	<b>4</b>	<b>60</b>

This is a foundational course for students to obtain knowledge on different food groups and their nutritive value, this course helps to understand the scientific principles underlying in food preparation and it also develops skills and techniques in food preparation with conservation of nutrients and palatability using cooking methods generally employed.

**OBJECTIVES:**

- To help them study the different methods of cooking and their advantages and disadvantages.
- To gain experience in the preparation of foods with attention to the preservation of their nutritive value - oriented to Indian cooking.
- To help them understand the scientific principles governing the acceptability of food preparations.
- To understand biochemical reactions taking place in the body and their relationship to nutrition.
- To familiarize the students to various equipment packaging & manufacturing useful in the industry.

**UNIT -I Introduction to foods:** Food - Definition, Functions, classification of foods, Food groups -Basic Four, Basic Five and Basic Seven, Food pyramid. Cooking - Definition, objectives, preliminary preparation of food, Methods of cooking - Moist heat and Dry heat methods, advantages and disadvantages. Micro-wave cooking, Solar cooking - advantages and disadvantages.

**UNIT -II Cereals and pulses:** Cereals - wheat and rice - structure, composition and Nutritive value -milling - by products of wheat and rice, parboiling - methods, advantages, Effect of cooking on the nutritive value of cereals, Gelatinisation, Dextrinization, gluten formation. Millets - Ragi, Bajra, Italian millet, Varagu, Samai-Composition, Nutritive value. Pulses - Composition and Nutritive value, Germination, Effect of cooking on pulses, factors affecting cooking quality of pulses, role of pulses in cookery.

**UNIT-III Vegetables, Fruits and Milk:** Classification, Composition and Nutritive value, Conservation of nutrients during cooking, role of vegetables in cookery, pigments in fruits and vegetables and effect of cooking on pigments. Milk - composition and Nutritive value, physical properties of milk, Different types of milk and milk products, role of milk and milk products in cookery.

**UNIT - IV Flesh foods:** Meat - Classes of meat, composition and Nutritive value, methods of cooking and its effects Post mortem changes, ageing of meat, tenderising meat. Fish - Classification, composition and Nutritive value, selection criteria, Methods of cooking and its effects. Poultry - Classification, composition and nutritive value, Principles and methods of cooking poultry. Eggs - Structure composition and nutritive value, role of egg in cookery, evaluation of egg quality, effect of cooking and factors affecting coagulation.



**UNIT -V Fats& Oils, Sugars, Spices, Nuts & Oilseeds:** Composition & nutritive value, Types of fats and oils, Hydrogenation, role of fat in cookery, effect of heating, factors affecting absorption of fats, smoking point Rancidity-Types, Prevention. Sugar: Nutritive value, properties, Types of sugars, stages in sugar cookery, sugar and related products. Spices: Functions, role of spices in cookery, Types, Nutritive value, Uses and abuses. Nuts & Oilseeds: Types, Composition Nutritive value, role of nuts and oil seeds in cookery.

**Text Books:**

1. Srilakshmi B (2005) Dietetics. New Age International Publishers, New Delhi.
2. Swaminathan M (1979) Food Science and Experimental foods. Ganesh and Co, Madras.
3. Mudambi SR and Rao SM (1986) Food Science. Wiley Eastern Ltd. New Delhi.

**References:**

1. Bennion M and Hughes D (1975) Introductory Foods. Macmillan Publishing Co. Inc. New York.
2. Brich CG, Spencer M and Cancerron AG (1977) Food Science. Pergamon Press, New York.
3. Gopalan C, Ramasastri PN and Balasubramanian SC (1977) Nutritive value of Indian Foods. National Institute of Nutrition, Hyderabad.

## FSN 6

### FSN 1413

### LAB IN FOOD SCIENCE

(4hrs/wk) (4cr)

This course is aimed to create awareness on the effect of various cooking methods on different food groups and it also helps to understand the various methods of sensory analysis.

#### OBJECTIVES:

- To understand the basic principles of sensory analysis.
  - To know the methods and principles involved in cooking.
  - To learn the selection, purchase and storage of foods.
  - To know about various adulterants and the methods of detecting them.
  - To learn the prevailing food, hygiene and sanitation of foods.
1. Technique in measurement of different food stuffs - use of standard measuring cups and spoons.
  2. Different recipes from cereals, pulses, vegetables, fruits, fleshy foods, egg, milk and milk products.
  3. Cereals - Examination of different starch granules, Gelatinisation, Dextrinisation.
  4. Beverages - preparation of stimulating, nourishing and refreshing beverages.
  5. Pulses - Effect of hard and soft water, alkali, cooking time of grams and dahls.
  6. Vegetables - Effect of acids, alkali, steaming and pressure cooking on the different pigments and acceptability of vegetables.
  7. Fruits - Study of different methods of preventing enzymatic browning of cut fruits, pectin content of fruits.
  8. Sugars - Stages of sugar cookery.

#### Text Book:

1. Jamesen SK (1998) Food Science Laboratory Manual. Purdue University.

### FSN 1415

### NUTRITION SCIENCE

(4hrs/wk) (4cr)

This course enables the students to gain basic knowledge of the different nutrients and their role in maintaining health of the community and it also develop skills in qualitative analysis and quantitative estimation of nutrients.

#### OBJECTIVES:

- To understanding the meaning of Nutrition
- To understanding the role of Nutrition in human life
- To increasing the ability to overcome Deficiency
- To understand the vital link between nutrition and health
- To gain knowledge on functions, metabolism and effects of deficiency of nutrients

**UNIT-I Concept of nutrition:** Definitions - Nutrition, Health, Malnutrition, Nutritional status, Balanced diet, Under nutrition & over nutrition, Nutrients - classification of nutrients relation of food and health. RDA - Definition, factors, methods used for deriving RDA, Reference man and woman - Definition. Energy - Definition, units of measurement, determination of energy value of foods, physiological fuel value. Total energy requirement - Factorial method, experimental determination, Thermic effect of food - factors. BMR - Definition, measurement, factors.

**UNIT-II Carbohydrates:** Definition, classification, digestion, absorption and metabolism. Functions, deficiency, requirement and sources. Dietary fiber - Definition, classification, physiological effects, role of fiber in human nutrition, sources.

**UNIT-III Proteins and Lipids:** Definition, classification of proteins and amino acids, functions of proteins, sources, and requirements, deficiency, Digestion absorption and metabolism, quality of proteins. Lipids - Definition, classification, functions, sources, requirements, deficiency, digestion, absorption and metabolism of fats.

**UNIT-IV Minerals:** Definition, classification, functions, Sources, deficiency of calcium, Sodium, phosphorus, Iron, Zinc, Iodine, fluorine, magnesium, potassium

**UNIT-V Vitamins:** Definition, classification, functions, Sources, deficiency of vitamins A, D, E, K, C, B1, B2, Niacin, folic acid, pyridoxine, B12.

#### **Text Books:**

1. Mudambi SR, Rajagopal MV (1997) Fundamentals of Foods and Nutrition. Third Edition. New Age International (P) Ltd, Publishers, New Delhi.
2. Srilakshmi B (2004) Nutrition Science, New Age International (P) Ltd, Publishers. New Delhi.
3. Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Beppo publications, Madras.

#### **References:**

1. Kango M (2005) Normal nutrition, curing diseases through diet. Third Edition CBS Publications, New Delhi.
2. Paul S (2003) Text book of Bio-Nutrition, Fundamental and Management. RBSA Publishers, Rajasthan.
3. Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition. C.V. Melskey Publications, USA

This course helps the students to understand the structure and basic physiology of various organs of the body. The students will obtain better understanding of the principles of Foods and Nutrition through the study of physiology.

**OBJECTIVES:**

- To understand the basic structure and functions of human body.
- To create awareness about common diseases/ disorders affecting each system.
- To advance their understanding of some of the relevant issues and topics of human physiology.
- To understand the integrated function of all systems and the grounding of nutritional science in Physiology.
- To understand alterations of structure and function in various organs and systems in disease conditions.

**UNIT-I Digestive System and Excretory System:** structure and functions of digestive system, process of digestion and absorption, Saliva - composition, function. Bile - composition, function. structure and function of kidney, nephron – composition of urine, mechanism of urine formation, Micturition.

**UNIT-II Blood and Cardiovascular System:** Blood – composition - RBC, WBC, platelets – functions of blood, clotting mechanism, blood groups. Heart - structure and functions, cardiac muscle, cardiac output, heart rate, heart sounds.

**UNIT-III Respiratory System:** Respiratory organs - structure, functions, mechanism of respiration, lung volumes, types of breathing , artificial methods of breathing – mouth to mouth, Eve's rocking method.

**UNIT-IV Nervous System and Sense Organs:** Nervous system - structure, functions of neuron, brain, spinal cord. Sense organs - structure and functions of eye, ear and skin.

**UNIT-V Reproductive and Endocrine System:** Structure and function of male and female reproductive organs, menstrual cycle, conception and contraception. Endocrine System - Structure and functions of thyroid, parathyroid, adrenal and pituitary glands.

**Text Books:**

1. Chatterjee CC (1988) Text Book of Medical Physiology. W B Sounder's Co. London.
2. S.Subramanian and S.M.Kutty (1971) Text Book of Physiology, Orient Longman.
3. Elaine N and Marie RN (1997) Human Anatomy and Physiology. Addison Wesley Longman, Inc., UK.
4. Ahuja(2001)Textbook of Physiology, CBS Publishers,New Delhi.

**References:**

1. Ganong (1995) Review of Medical physiology. Prentice Hall international, London.
2. Muthaiya N. M (2006) Human Physiology, 4th Edition, Jaypee Brothers Medical Publishers Ltd, New Delhi.
3. Guyton,A.C(2009):FunctionoftheHumanbody,4thEdition,W.B.SandersCompany, Philadelphia.
4. Guyton,A.C, and Hall., J.B (2010)Text Book of Medical Physiology, Ninth Edition, W.B. Sanders company, Prime Books (Pvt.) Ltd., Bangalore.

FSN 1512

**NUTRITIONAL BIOCHEMISTRY (5hrs/wk)(5cr)**

This course will foster understanding on the basis of nutrition and the effects of varied nutrition, it further provides knowledge on the effect of diet on health and the functions of biological systems in relation to Nutritional biochemistry.

**OBJECTIVES:**

- To augment the biochemistry knowledge acquired at the undergraduate level.
- To understand the mechanisms adopted by the human body for regulation of metabolic pathways.
- To get an insight into interrelationships between various metabolic pathways.
- To understand the principles and use of Instruments used for biochemical analysis.
- To become proficient for specialization in nutrition.

**UNIT - I Introduction to Biochemistry:** Definition, objectives, scope and inter relationship between biochemistry and other biological science.

**UNIT - II Enzymes:** Definition - types - classification - specificity - Isozymes - Coenzymes - Enzyme kinetics - Factors affecting enzyme action - Enzyme inhibition.

**UNIT - III Intermediary metabolism:** Carbohydrate metabolism, Glycolysis, TCA cycle and energy generation, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation.

**UNIT - IV Lipids and proteins:** Oxidation and biosynthesis of fatty acids (saturated and mono-unsaturated): Synthesis and utilization of ketone bodies, Ketosis, fatty livers. Proteins - General reaction of amino acid metabolism, urea cycle. Lipoproteins: Types, composition, role and significance in disease

**UNIT - V Introduction to Nucleic acids:** Structure, replication, transcription, genetic code elementary knowledge of biosynthesis of proteins.

**Text Books:**

1. Murray R K, Grannen DK, Mayes PA and Rodwell VW (2012) Harper's Illustrated Biochemistry. Twenty Ninth Edition, Lange Medical Book, Mc Graw Hill Edition.
2. Lehninger AC, Nelson DL and Cox MM (2001) Principles of Biochemistry. Fourth Edition, W.H. Freeman Company, USA.

**References:**

1. Voet D (2004) Biochemistry. Third Edition, John Wiley & Sons Inc. USA.
2. Berg JM, Tymoczko JL, Stryer L (2011) Biochemistry. International Edition, Seventh Edition, W.H. Freeman publishing & Co. USA.

## **FSN 10**

### **FSN 1414                      LAB IN NUTRITIONAL BIOCHEMISTRY                      (4hrs/wk)(4cr)**

This course emphasizes the clinical significance and understanding of the basic concepts and enables the students to get practical experience in lab and clinical nutrition.

#### **OBJECTIVES:**

- To understand the use of colorimetry in biochemical estimations.
  - To detect the purity of samples by using biochemical techniques.
  - To understand various methods of quantitative estimations of biomolecules.
  - To learn the basic analytical techniques.
  - To get practical experience in the Laboratory and develop the skills to undertake research work.
- 
1. Identification of carbohydrates (Qualitative,quantitativetests)
  2. Identification of proteins (Qualitative Tests)
  3. Estimation of glucose in urine by Benedict's methods
  4. Urine analysis - normal & abnormal constituents of urine.
  5. Blood glucose estimation.

#### **Text books**

1. Miller DD (2014) Food chemistry: a laboratory manual. First Edition, John Wiley & Sons.USA
2. Plummer DT (1996) An introduction to Practical Biochemistry. Tata McGraw Hill, New Delhi.

#### **References**

1. Conn EE and Stump PK (1981) Outlines of Biochemistry. Wiley Eastern (P) Ltd., New Delhi.
2. Linder MC (1991) Nutritional Biochemistry and Metabolism: with clinical applications. Second Edition, Appleton and Lange. New York,

FSN 1416

**FOOD MICROBIOLOGY****(4hrs/wk) (4cr)**

The goal of teaching this course to students is to gain knowledge about the role of micro-organisms in health and disease, understand the role of micro-organisms in spoilage of various foods and its role in relation to food and food preservation.

**OBJECTIVES:**

- To understand the nature of microorganisms involved in food spoilage, food infections and intoxications and also those used in food biotechnology (food fermentation and various food processing industries)
- To gain knowledge of principles of various techniques used in the prevention and control of the microorganisms in foods.
- To gain an insight of the types and role of micro-organisms affecting man and the environment.
- To understand criteria for microbiological safety in various foods operations to avoid public health hazards due to food contamination.
- To gain knowledge of micro-organisms in relation to food and food preservation.

**UNIT-I History and scope of food microbiology:** Contributions of Louis Pasteur - Fermentation - Pasteurization - Role of microbiologist in food industries - Scope of food microbiology.

**UNIT-II Food as a substrate for microorganism:** Hydrogen ion concentration, Moisture requirement, Nutrient content - inhibitory substances of biological structure, combined effects of factors affecting growth. Role of microorganism in food microbiology.

**UNIT-III Contamination and spoilage of foods:** Principles of food spoilage - microbiological, physical and biological factors - contamination, preservation and spoilage of cereal and cereal products, baked products, Fruits and vegetables and their products, Fleshy food, Milk and Milk products.

**UNIT-IV Food infections and food borne diseases:** Microbial food poisoning - Staphylococci, Salmonella, Clostridium botulinum. Measures to prevent microbial food poisoning. Food infections - Food borne diseases - Dysentery diarrhoea, Typhoid, Cholera.

**UNIT-V Fermented food products:** Fermentation - aerobic respiration, anaerobic respiration, products of fermentation - Bread, Malt Beverages, Wine, Distil liquor, Vinegar, Fermented Vegetables and dairy products.

## FSN 12

### Text Books:

1. Frazier WC and West off DC (2013) Food Microbiology. Fifth Edition, McGraw Hill Education(India) Pt. Ltd., New Delhi.
2. Adams MR and Moss MO (1991) Food Microbiology. The Royal society and chemistry,Cambridge.

### References:

1. Banwart GJ (1989) Basic Food Microbiology. Second Edition, Chapman and Hall, New York.
2. Pelczar MJ, Chan ECS and Kreigh NR (2000) Microbiology. Eighth Edition, Tata McGraw Hill,New Delhi.
3. Willey UM, Sherwood LM and WoolvertonCJ(2011) Prescott's Microbiology. Eighth Edition, Mc Graw-Hill International.USA.
- 4.

## FSN 1402

## DIETETICS

(5hrs/wk) (5cr)

This course helps the students to have basic understanding on the nutritional needs from birth to adolescence and old age; it provides necessary theoretical background for the field of child guidance. Acquaint them about the needs of guidance and counselling at various stages of development.

### OBJECTIVES:

- Understand the role of nutrition in different stages of life cycle.
- Gain experience in Planning menu for different stages.
- Gain knowledge about the method of assessment of nutritional status of a community.
- Students develop an understanding of self in relation to family and society.
- They understand their roles and responsibilities as productive individuals, as members of family, community and society.

**UNIT-I Nutrition in pregnancy:** Food and nutrient requirements, physiological changes during pregnancy, developmental stages of the embryo, physiological cost of pregnancy and complications in pregnancy. Nutrition in lactation - Food and nutrient requirements, physiology of lactation, composition of breast milk, influence of mother's diet on the quality and quantity of milk production and breastfeeding practices.

**UNIT-II Nutrition during infancy:** Food and nutrient requirements, weaning, types of weaning foods and supplementary foods, changes in growth pattern - height and weight. Nutrition during preschool age - Food and nutrient requirements, eating habits and behavior, growth, factors inhibiting growth and increment in height and weight.

**UNIT-III Nutrition during school-going age:** Food and nutrient requirements, factors affecting eating habits, school lunch and mid-day meal program.



**UNIT-IV Nutrition in adolescence and adult:** Food and nutrient requirements, changes in growth pattern, puberty, menarche, changes in food habits, nutritional disorders, psychological and peer group pressure on eating habits. Nutrition in adulthood- Food and nutrient requirements, changes in consumption pattern: physical, mental and social changes influencing meal pattern.

**UNIT-V Nutrition in old age:** Food and nutrient requirements, physical, physiological, biological and psychological changes influencing meal pattern.

**Text Books:**

1. Srilakshmi B. (2018) Dietetics, New Age International (P) Ltd, Publishers. Delhi.
2. Swaminathan M (1985) Advanced Text Book on Food and Nutrition. Vol.II. BAPPOO, No.88, Mysore Road, Bangalore.
3. Robinson CH, Lawber MR, Chenoweth WL and Garwick AE (1986) Normal and Therapeutic Nutrition. Seventh Edition, Mc Millan Publishing company, New York.

**References:**

1. Whitney EN and Cataldo CB (1983) Understanding normal and clinical Nutrition. West Publishing Company, New York.
2. Krause MV and Mohan LK (1984) Food, Nutrition and Diet Therapy. W.B. Saunders company, Philadelphia.
3. Passmore R and East Wood MA (1987) Human Nutrition and Dietetics. English Language Book Society/Chrchill, Livingstone.

**FSN 1201**

**HOME FOOD CATERING  
(Life Skill Course)**

**(3hrs/wk) (2cr)**

This course will provide the students to face the challenges of the food industry and provide theoretical knowledge along with practical skill for proper motivation to build a career in the Hotel industry.

**OBJECTIVES:**

- To Gain knowledge about various types of food services.
- Gain knowledge about the Principles and functions of Management.
- To understand about personnel Management, financial management and legal aspects of catering.
- To realise the importance of sanitation and hygiene in food service institutions.

**UNIT-I Food production:** Menu planning - Importance - Factors affecting menu planning, different kinds of food service units - Food Purchase and Storage. Quantity Food Production- Standardization of recipes, quantity food preparation techniques, recipe adjustments and portion control. Hygiene and Sanitation.

## FSN 14

**UNIT-II Kitchen organization and layout:** General layout of kitchen in various organizations - receiving and preparation area - storage area- cooking areas - service and washing areas - obtaining supplies.

**UNIT-III Resources management:** Money-Manpower-Time-Facilities and equipment-Utilities.

**UNIT-IV Sanitation and safety:** Sanitation of plant, kitchen, hygiene, personal hygiene, garbage disposal, pest control - Health and safety at work, causes and types of accidents, accordance and applications

**UNIT -V Planning of a Food Service Unit:** Preliminary Planning-Survey of types of units, identifying clientele, menu operations and delivery. Planning the set up-Identifying resources, developing Project plan, determining investments.

### **Text Books:**

1. Bessie WB and Lavelle W (1988) Food Service in Institutions. Sixth Edition. Macmillan Publishing Company New York.
2. Mohini S (2005) Institution Food Management. New Age International Publishers. New Delhi.

### **References:**

1. Thangam Philip (2008) Modern Cookery for Teaching and Trade. Part I & II Orient Longman, Chennai.
2. Taneja S and Gupta SL (2001) Entrepreneurship Development. Galgotia Publishing, Delhi.

## FSN 1202

### **ETHNIC FOODS (Life Skill Course)**

**(3hrs/wk) (2cr)**

This course deals with the nutritional, social, cultural, economic and health effects of traditional foods.

### **OBJECTIVES:**

- To understand the historical perspective of nutrient requirements.
- To learn to critically evaluate the methodology and derivation of requirements for specific macronutrients.
- To appreciate importance of nutrition immunity interactions and their implications.
- To learn various measures for enhancing nutritional quality of diets.
- To stay updated with emerging concepts in nutrition.

**UNIT-I Traditional food style:** History–Concept and Principles of Traditional Foods–Benefits and nutritional content of Traditional Foods.

**UNIT-II Traditionally fermented foods:** Unsweetened yogurt, kefir, dahi, lassi, shrikhand, miso, kimchi, kombucha, tempeh, pickles and sauerkraut – processing methods, nutritional benefits and therapeutic uses

**UNIT-III Healthy aspects of traditionally foods:** National health benefits - impacts of consuming traditional foods.

**UNIT-IV Traditional methods of cooking and preservation:** Introduction - cooking techniques -conventional cooking - dry cooking - wet cooking - thermal processing – effect of time and temperature - equipments.

**UNIT-V Traditionally fermented fruits and vegetables:** Cucumber, onion, olives, carrot, caper berries, pickled garlic - safety and regulations.

**Text book:**

1. Kristbergsson K and Oliveira J (2016) Traditional foods: General and Consumer Aspects. Springer, New York.

**References:**

1. Pathak YV, (2011) Handbook of Nutraceuticals, Volume 2, CRC Press. USA
2. Prakash V and Belloso OM (2015) Regulating safety of traditional and ethnic foods. Academic Press, Elsevier, USA.

**FSN 1211**

**BASIC NUTRITION**  
*(Non-Major Elective)*

**(3hrs/wk)(2cr)**

This course provides an overview of the major macronutrients relevant to human health. They gain knowledge on dietary sources, intake levels, physiological role, and requirement of major nutrients on human body. They also attain knowledge about major nutrition-related deficiency conditions.

**OBJECTIVES:**

- Understand the relationship between nutrition and human well being
- Know and understand the functions, importance of all nutrients for different age group and special group.
- Understand critical periods in growth and development and impact of malnutrition on it.
- Understand the demographic transition and its implications on the quality of life.
- Learn to critically evaluate the methodology and derivation of requirements for specific micronutrients.

## **FSN 16**

**UNIT-I Introduction to nutrition:** Definition of nutrition- food, health, nutritional status, malnutrition, over nutrition, under nutrition, functions of food, balanced diet, food pyramid, ICMR Basic five food groups.

**UNIT-II Macro nutrients:** carbohydrates-composition, classification, functions, food sources. Dietary fibre-Functions, food sources, Deficiency. Lipids and fats- definition, composition, classification, functions, Deficiency, sources-Proteins, Definition, composition, classification, functions, deficiency, sources.

**UNIT-III Micronutrients:** vitamins-, definition, classification, functions of vitamins Nomenclature, functions, deficiency & sources of vitamins A, D, E, K Nomenclature, functions, deficiency & sources of vitamins B1, B2, B3, folic acid, B6, B12

**UNIT-IV Minerals:** definition, functions and classification, Nomenclature, functions, deficiency sources of calcium, Iron, Zinc, phosphorus, iodine, fluorine, sodium

**UNIT-V Water:** Distribution of water & electrolytes, functions, requirements, sources, water balance, water depletion, water excess.

### **Text Books:**

1. Mudambi SR and Rajagopal MV (1997) Fundamentals of Foods and Nutrition. New Age International (P) Ltd, Publishers. Delhi.
2. Srilakshmi B (2004) Nutrition Science. New Age International (P) Ltd, Publishers. Delhi.
3. Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Bappco publications, Madras.

### **References:**

1. Kango M (2005) Normal Nutrition, Curing diseases through diet. First Edition CBS Publications. Delhi.
2. Paul S (2003) Text Book of Bio-Nutrition, Fundamental and Management. RBSA Publishers.
3. Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition C.V. Melskey Co. Delhi

## **FSN 1212**

### **DIET AND DISEASE (Non-Major Elective)**

**(3hrs/wk) (2cr)**

This course imparts knowledge in the field of clinical nutrition to make appropriate dietary modifications for various disease conditions based on the pathophysiology. They develop capacity and aptitude in taking up dietetics as a profession by understanding the consequences of nutritional problems in the society to create awareness on community nutrition-based programmes.

**OBJECTIVES:**

- To Understand causative factors and metabolic changes in various disease/disorders
- To Gain knowledge of the principles of diet therapy and dietary counselling
- To Understand the rationale of prevention of various diseases/disorders
- To Plan and prepare suitable therapeutic diets based on patient needs for various diseases/disorders
- To Prepare special therapeutic / health foods.

**UNIT-I Therapeutic diets:** Introduction- routine hospital diet - clear fluid, full - liquid and soft diets, pre and post-operative diet. Regular normal diet. Special feeding methods -tube feeding - types of food - food requirements- parental feeding. TPN formula for children, adolescents.

**UNIT-II Diet in obesity and underweight:** Introduction-aetiology-types, complication. Regional distribution of adipose tissues - treatment-diet therapy. Principles of dietetic management. Limitation of underweight - aetiology dietary modifications.

**UNIT -III Diet in fever:** Types - causes - metabolic changes -dietary modifications. Typhoid-malaria,tuberculosis - symptoms-causes, principles of diet- dietary managements.

**UNIT-IV Diet in diabetes mellitus:** introduction-symptoms-diagnosis- types-nutritional care-meal distribution-changes - exchange list-control of diabetes-complications.

**UNIT- V Diet in cardiovascular disease:** Introduction - risk factors - nutritional plan-meal planning-heart and blood vessel diseases.

**Text Books:**

1. Garrow JS, James W PT and Ralph A (2000) Human Nutrition and Dietetics. Tenth Edition, Churchill Livingstone, London.
2. Bamji MS and Reddy V (1998) Text Book of Human Nutrition ford. IBH Publishing Co. Ltd New Delhi.

**References:**

1. Antia P and Abraham P (1998) Clinical Dietetics and Nutrition, 2nd edition, Oxford University Press. New York.
2. Guthrie HA and Picciano M F (1995) Human Nutrition. Mosby, St. Louis Missionary, England.
3. Sharon M (1994) Complete Nutrition. Avery publishing group, New York.
4. Robinson CH and Lawler MR (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, MacMilan Publishers, London.

Enable students to gain knowledge on the composition and chemistry of foods in relation to food processing and quality of physical, chemical and nutritional properties of major and minor food components of the functional properties of food components and their applications.

**Unit-II Fruits and vegetables:** Plant, anatomy, composition Enzymes in fruits and, vegetables. Flavor constituents, plant phenolics, pigments, post-harvest changes. Texture of fruits and vegetables. Effects of storage, processing and preservation.

**Unit-I Cereals and legumes:** Structure, composition, processing, Changes during Moist heat & dry heat method. Toxic constituents. Nut and oil seeds: Composition, oil extraction and by-products. Nut and oil seeds: Protein concentrates: Hydrolysates and textured vegetable proteins, milk Protein concentrates: substitutes.

**Unit-III Spices and condiments:** Composition, flavoring extracts - Natural and synthetic. Processed foods: Jams, jellies, squashes, pickles, dehydrated products. Beverages: Synthetic and natural, alcoholic and non-alcoholic, carbonated and non-carbonated, coffee, tea, cocoa, malted drinks.

**Unit-IV Meat and poultry:** Muscle composition, characteristics and structure. Postmortem changes processing, preservation and their effects. Heat induced changes in meat variables in meat preparation, Tenderizing treatments, and meat products.

**Unit-V Eggs:** Structure and composition, changes during storage. Functional properties of eggs, use in cookery. Egg processing, low cholesterol egg substitutes. Fish and sea foods: Fish and sea foods: Types and composition, storage and changes during storage, changes during processing, by-product and newer products.

#### **Text Books:**

1. Charley, H. (1982) Food Science (2nd edition), John Wiley and Sons, New York.
2. Potter, N. and Hotchkiss, J.H. (1996) Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi.

#### **References:**

1. Belitz, H.D. and Grosch, W. (1999) Food Chemistry (2nd edition), Springer, New York.
2. Hartel, Richard W, Heldman, Dennis R (1998). Principles of Food Processing, An Aspan publications, Aspan Publishers, geithersberg, Maryland.
3. Cherry, R.J. (1981) Protein Functionality in Food. American Chemical Society, Washington D.C.

This course focuses on fundamentals of processing, nature, harvesting, and storage conditions of varying food products. The students gain knowledge in the various methods used for preservation of food products. This provides comprehensive coverage on processing and preservation aspects of food science that include chemical, microbiological and technological processes.

**Unit-I: Processing of foods:** Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing. Effects of processing on components, properties and nutritional value of foods.

**Unit-II: Cereals and pulses:** Milling of wheat - extraction of flour, refined wheat flour and pasta products Milling of rice – parboiled rice, rice based instant food Processing of corn, barley and millets – pearling, flaking and puffing, corn starch products, Malting-Pulses – Red gram, Bengal gram, black gram, green gram, soy-based products, Decortication and dhal milling, elimination of toxic factors, fermentation and germination

**Unit-III: Milk and milk products:** Collection, Standardization, pasteurization, homogenization, UHT processing, manufacture of paneer, khoa, curd, yogurt, cream, butter, cheese, ghee, flavoured milk, ice creams, dehydrated milk products

**Unit-IV: Fruits and vegetables:** Harvesting, physiological and bio chemical changes during ripening, handling and storage, general methods of processing - extraction and pulping, raw material and product specifications and standards.

**Unit-V: Meat, poultry, fish and egg:** Ageing and tenderizing, curing, smoking and freezing of meat, fresh storage of meat. Meat based products: sausages, salami, bacon. Fish: Dry fish - Tuna Fish Canning - Fish processing and storage, pickling. Egg: storage, frozen egg, dehydrated egg powder.

**Unit-VI: Others:** nuts and oil seeds – pressing, solvent extraction, purification – degumming, refining, bleaching, deodorizing. Hydrogenation – margarines, shortenings. Spices – processing and extraction of essential oils and colors, storage and preservation. Tea, coffee and cocoa – Processing and storage

#### **Text Books:**

1. Desrosier N W and Desrosier J N (1987) The Technology of Food Preservation, 4<sup>th</sup> Edition, CBS, New Delhi.
2. Fellows P J (2000) Food Processing Technology: Principles and Practice 2<sup>nd</sup> edition CRC Woodhead Publishing Ltd., Cambridge.USA

#### **References:**

1. Khetarpaul Neelam (2005) Food Processing and Preservation, Daya Publications, New Delhi.
2. Salunke D K and Kadam S (1995) Hand book of Food Science and Technology - production, composition, storage and processing, Marcel Dekker INC, New York.
3. Sivasankar B (2002) Food Processing & Preservation, Prentice Hall, India.

## FSN 20

### FSN 2511                                      LAB IN FOOD PROCESSING – I                                      (4hrs/wk) (4cr)

This course is to make the student familiar with the principles and methods of food preservation and understand about the various preservatives and their use in food.

1. Natural / Artificial Preservation
2. Preparation of brix solution and checking by hand refractometer.
3. Different methods of Food preservation – Drying, Freezing, Frying, canning, bottling.
4. Preparation of pickles, Sauce, Jam, jelly, puree, squash etc.
5. Estimation of Chemical Oxygen Demand (Demonstration).
6. Preservation by fermentation- Wine, Vinegar.
7. Visit to canning industry and dairy firm etc.
8. Canning of foods.

#### **Text Books:**

1. Fellows P J (2002) Food Processing Technology. Principles and Practices, 2<sup>nd</sup> Edition, Woodland Publishing Ltd, Cambridge, England.
2. Avantina Sharma (2006) Text Book of Food Science and Technology, International Book, Distributing Co, Lucknow, Uttar Pradesh.
3. Sivasankar (2005) Food Processing and Preservation, Prentice hall of India Pvt Ltd, New Delhi.

#### **References:**

1. Potter, N. (1998) Food Science, Fifth Edition, CBS Publication, New Delhi.
2. Ramaswamy H and Marcotte M (2009) Food Processing Principles and Applications, CRC Press, USA
3. Manay NS and Shadaksharaswamy M, (1987) Food-Facts and Principles, New Age International (P) Ltd. Publishers, New Delhi.

### FSN 2513                                      FOOD SERVICE MANAGEMENT                                      (5hrs/wk) (5cr)

This course gives a comprehensive understanding of the basic principles of management in food service units. It helps to accept responsibilities in catering establishment and hospitals and paves a way for becoming a conscientious caterer and food service administrator. The major aim is to develop skills in setting up food service units.

**Unit-I:Food Service Industry:**Definition and scope of Food Industries – classification of Commercial and Non-commercial food service and welfare food service institutions.

**Unit-II:Principles and Functions of Management:**Management Definition, principles and functions of management Organization – Types and theories of organisation. Tools of management.

Staffing Manpower Planning Labour sources, Selection, Recruitment and training wages, salaries, incentives, promotion demotion, transfer, dismissal. Managerial Problems of Food Service Unit. Directing and direction, leadership, delegation and controlling decentralization, centralization, supervision, human relation industry, authority and responsibility, motivation, communication evaluation techniques. Leadership styles and qualities.



**Unit-III:Developing of Kitchen Plant:** Flow of work, characteristics of a typical food service layout, layout of food plants-space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas; arrangements of equipment's in work centers, optimum working heights.

**Unit-IV:Equipment in Food Service:** Classification of equipment, factors affecting selection of equipments-electrical and nonelectrical equipment for food storage, preparation, service and dishwashing Base materials and insulating materials

**Unit-V:Sanitation and Safety:** Sanitation of plant, kitchen, hygiene, personal hygiene, garbage disposal pest control - Health and safety at work, causes and types of accidents, accordance and applications

#### **Text Books:**

1. Mohini Sethi and SurjetMalhan, (1987). Catering Management, "An Integrated Approach. Wiley Eastern Ltd, India.
2. West. B.B. Wood L., Harger, V.F (1977) Food Service Institutions, JohnWiley and sons, Inc.
3. NewYork, V Ed. 2. Shukla. M.C. (1982) Business Organization and Management S. Chand and Co., Ltd., Ramnagar, New Delhi.

#### **References:**

1. Nathaniel, R. S. (1991) Catering Management for Hotel Restaurants and Institute, Surjeet Pub. Delhi.
2. P.N. Reddy, S.S. Gulshan. Principles of Business Organization and Management. Eurasia Publishing House, Ramnagar New Delhi.
3. West. B.B. Wood L., Harger, V.F. (1977) Food Service Institutions, JohnWiley and sons, Inc., NewYork.

**FSN 2403**

**CHILD DEVELOPMENT**

**(5hrs/wk) (4cr)**

This course helps the students to understand human development (both normal and exceptional) to guide effectively. They have complete knowledge about the behaviour pattern of the individual and various factors influencing them.

**Unit-I:Growth and Development:** Principles of development - continuous, sequential, specific responses, different rates. Stages of growth and development. The nutrition - smoking - alcohol consumption - drugs - age of mother-neonatal stage. The characteristics- Infancy Stage, Early childhood years, Late childhood, adolescence, Early adulthood, Middle age, Old age.

**Unit-II:Theory of Development:** Psychodynamic Theory - Psycho analytic theory - Erick Erickson psycho - socio theory - Learning Theory - Social Learning Theory - Kohlberg's moral reasoning theory - Life span and life cycle theories- Bronfenbrenner's theory.

## FSN 22

**Unit-III:Child Rearing Practices:** Authoritarian pattern -Permissive pattern - Democratic pattern. Development problems, Emotional and behavioural problems - Issues and Concerns, Mental retardation.

**Unit-IV:Early Childhood Care & Education:** Degrees of Mental Retardation. Learning Disabilities. Behavioural Difficulties, Functional Factors, Speech and Language Disorders, Visual Impairment, Giftedness.

**Unit-V: Adolescent and Care:** Problems of adolescent development, Treatment and Preventions, Guidance and Counselling.Maturation,Major group cycle, Emotional disturbance, Peer group influence, Psychological Significances.

### Text Books:

1. Devadass R. and P, Jaya N (1996) A Text Book on Child Development, Macmillan Indian Ltd., Delhi.
2. Parikh S, and Sudarshan R (1993) Human Development and Structural Adjustment, UNPP, Delhi.
3. Mussen et al (1990) Child Development and personality, Harper and Row publishers, New York.

### References:

1. Suriakanthi.A (1991) Child Development, 2<sup>nd</sup> edition, Kavitha publications, Chennai.
2. Papalia, D.E and Olds, S.W. (2005) Human Development, Tata Mc.Graw Hill Company, New York.
3. Suriakanthi,A (1992) A Handbook on Human Development, Gandhigram Rural University, Gandhi gram, Dindigul.

## FSN 2510

## THERAPEUTIC NUTRITION

(5hrs/wk) (5cr)

The prime objective of this course is to provide an exposure on the study of aetiology, symptoms and medical nutrition therapy in various diseases. They easily learn the method to plan and prepare diet for various diseases.

**Unit-I:Therapeutic diets:** Definition - Introduction - Types - routine hospital diet - clear fluid, full - liquid and soft diets, Pre and Post-operative diet. Regular normal diet. Special feeding methods-tube feeding - types of food- food requirements- parental feeding. TPN formula for children, adolescents.

**Unit-II:Diet in Obesity &Underweight:**Aetiology, symptoms,medical nutrition therapy for obesity and underweight.

**Unit-III:Diet in Gastrointestinal Disease:**Aetiology, symptoms and medical nutrition therapy for Oesophagitis, Dyspepsia, Gastritis, Peptic ulcer, Constipation, Diarrhea,

**Unit-IV: Diet in Diabetes Mellitus:** Types, aetiology, Symptoms, factors affecting normal blood sugar level, Diagnosis, Dietary modifications, food exchange system, Glycaemic Index, Glycaemic load, Complications of diabetes.

**Unit-V:Diet in Cardiovascular Diseases:** Aetiology, symptoms, risk factors - Atherosclerosis and Hypercholesterolemia.

Hypertension – Aetiology, symptoms, medical nutrition therapy.

**Text Books:**

1. Srilakshmi, B. (2018). Dietetics, New Age International Publishers, New Delhi
2. Bamji M.S. and Vinodini Reddy (1998) Text Book of Human Nutrition, ford and IBH Publishing Co. Ltd New Delhi.
3. Mohan K. L. and Krause M.V (2002), 2nd edition Food, Nutrition and Diet Therapy, W.S. Suders Co, Philadelphia.
4. Antia P. (2001) Clinical Dietetics and Nutrition, 4<sup>th</sup> edition, Oxford University Press.UK
5. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missionery.

**References:**

1. Sharon, M. (1994) Complete Nutrition, Avery publishing group. New York.
2. Garrow J.S, James W. P.T. and Ralph A, (2000) Human Nutrition and Dietetics, 10th edition, Churchill Livingstone, London.
3. Robinson C.H, Lawler M.R, Cheweth W.L and Gaswick A.E (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, Mac Milan Publishers. New York.

**FSN 2412**

**LAB IN THERAPEUTIC NUTRITION**

**(4hrs/wk.) (4cr)**

This course emphasizes skill development in planning therapeutic diets using food exchange lists. It provides greater exposure to dietetic practices followed in Indian hospitals.

1. Planning of routine hospital diet: Clear fluid diet, Full fluid diet, Soft diet,
2. Planning of diet in Underweight & Obesity: High calorie and low-calorie diet, High residue and low residue diet.
3. Planning of diet in Gastrointestinal diseases: Peptic ulcer, ORS
4. Planning of diet in Diabetes Mellitus
5. Planning of diet in Cardiovascular Disease & Hypertension: Low sodium diet

**Text Books:**

1. Bhala S.M.L, Bhatia N, Gopinath (1983). Diet Manual for heart patient, CTC, AHMS, New Delhi.
2. Gibney M.J, Elia, M Ljngquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co. USA.

**References:**

1. Robinson C.H and Winely E.S, (1984) Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York.
2. Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company. Bangalore.

This course equips the students to study the importance of microorganisms in food preservation and introduces the basics of various food processing and preservation technologies. This course helps the students to contribute proper utilization of food and to prevent wastage.

**Unit-I:Importance of food processing:** Methods of processing cereals - wheat, rice, maize, pulses. Processing of fruits and vegetables - meat - fish - poultry - egg. Processing of oil seeds. processing of milk and milk products. Processing of condiments and spices - Beverages, tea, coffee and cocoa.

**Unit-II:Food preservation by low temperature:** freezing and refrigeration: Introduction to refrigeration - cool storage - freezing – definition - principle of freezing - freezing curve - changes occurring during freezing - types of freezing - slow freezing, quick freezing. introduction to thawing, changes during thawing and its effect on food.

**Unit-III:Food preservation by high temperature:** Thermal Processing- Commercial heat preservation methods - Sterilization, commercial sterilization, Pasteurization, and Canning – bottling.

**Unit-IV:Food preservation by moisture control drying and dehydration:** Definition of drying - preservation, sun drying - dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying - normal drying curve - names of types of driers used in the food industry. Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry.

**Unit-V:Food preservation by irradiation:** Introduction - units of radiation - kinds of ionizing radiations used in food irradiation- mechanism of action - uses of radiation processing in food industry.

**Text Books:**

1. Potter NN (2013) Food science. CBS Publishers and Distributors, New Delhi.
2. Brennan JG and Grandison AS (2012) Food processing handbook. Second Edition, John Wiley.USA

**References:**

1. Manoranjan Kalia (2014)Food Quality Management Second Edition, Agrotech Publishing Academy, Udaipur.
2. Walter A. Mercer, (1988) Advances in Food Research First Edition, Academic Press,University of California, U.S.A.
3. Potter N (1995) Food Technology, 5<sup>th</sup> Edition, Cornell University, Ithaca, New York.

FSN 2516

**FOOD PACKAGING****(5hrs/wk) (5cr)**

This course deals with the functions of packaging along with the influence of various factors on food and different packaging materials like cans, bottles, flexible films etc. and helps to study about the various methods of packaging to improve the shelf life of the products. This course especially emphasizes on the equipment used for packaging and applications during transportation.

**Unit-I:Food packaging:** Definition, functions of packaging materials for different foods, characteristics of packaging material. Food packages – bags, pouches, wrappers, tetra packs.

**Unit-II:Types of Packages:** Introduction, purpose, requirements, types of containers. Modern Packaging Materials and Forms: Glass containers, metal cans, composite containers, aerosol containers, rigid plastic packages, semirigid packaging, flexible packaging.

**Unit-III:Packaging of finished goods:** Weighing, filling, scaling, wrapping, cartooning, labeling, marking and trapping. Labeling: Standards, purpose, description types of labels, labeling regulation barcode, nutrition labeling, health claims, mandatory labeling provision.

**Unit-IV:Packages of dehydrated products:** Orientation, metallization, co-extrusion of multilayer films, stretch, package forms and techniques. Aseptic packaging, retortable containers, modified and controlled atmosphere packaging, skin, shrink and cling film packaging, micro-oven able containers, other package forms and components of plastics.

**Unit-V:Packages of radiation stabilized foods:** Introduction, rigid containers, flexible containers, general methods for establishing radiation stabilization. Radiation measurement of radiations. Biodegradable packaging material - biopolymer based edible film.

**Text Books:**

1. Vijaya Khader (2001) Text book of Food Science and Technology, Indian Council of Agricultural Research, New Delhi.
2. Stanley Sacharous. Roger C Griffin (1972) Principles of Food Packaging, 2<sup>nd</sup> Edition AVI Publishers Co. Westport.
3. F.A. and Paine. H.Y. Leonard Hill (1987) A hand book of Food Packaging. Blackie Sons Ltd., London.
4. Sacharows.S. (1976) Handbook of packaging materials, AVI Publishers Co., Westport.

**Reference Books:**

1. NIIR Board (2004) Food Packaging Technology Handbook National Institute of Industrial Research, New Delhi.
2. Frank A. Paine and Heather Y.Paine (1983) A Hand Book of Food Packaging, Leonard Hill Publications (Blackie and sons).UK
3. O.G.Pirenger and A.L.Baver (2000) Plastic Packaging Materials for Food, Wiley VCH, GmbH, Germany.
4. Shirly V. Vangrade and Morgy Woodburn, Food Preservation and Safety Surabhi Publications, Jaipur India.

## FSN 26

### FSN 2404            **FUNCTIONAL FOODS AND NUTRACEUTICALS**            (5hrs/wk) (4cr)

This course gives comprehensive understanding of different nutraceuticals and functional foods and students will understand the potential of various functional foods in promoting human health.

**Unit-IIntroduction:** Background, status of nutraceuticals and functional food market, definitions, difference between functional foods and nutraceuticals.

**Unit-IIFunctional Foods& Nutraceutical ofPlant Origin:** Sources – Bio active compounds – Potential Health benefits.

**Unit-IIIFunctional Foods& Nutraceutical ofAnimal Origin:** Sources – Bio active compounds – Potential Health benefits

**Unit-IVFunctional Foods& Nutraceutical of Microbial Origin:**Prebiotics, Probiotics and Symbiotic -role in disease prevention – health promotion.

**Unit-VLegal Aspects:**Safety, Consumer acceptance and assessment of health claims, labelling, Consumer acceptability and marketing - regulatory issues related to nutraceuticals and functional foods.

#### **Text Books:**

1. Wildman REC (2001) Handbook of Nutraceutical and Functional Foods, CRC Press, USA.
2. Ghosh D et al, (2012) Innovations in Healthy and Functional Foods, CRC Press, USA.

#### **References:**

1. Pathak YV (2011) Handbook of nutraceuticals Volume 2, CRC Press, USA.

### FSN 3615                            **THERAPEUTIC NUTRITION – II**                            (6hrs/wk) (6cr)

This course imparts knowledge in the field of clinical nutrition to make appropriate dietary modifications for various disease conditions based on the pathophysiology. They develop capacity and aptitude in taking up dietetics as a profession by understanding the consequences of nutritional problems in the society to create awareness on community nutrition-based programmes.

**Unit-I:Diet in Liver:** Hepatitis - aetiology - Symptoms - Dietary Management. Cirrhosis of Liver - aetiology - Symptoms - Dietary Management. Jaundice - aetiology - Symptoms - Dietary Management

**Unit-II:Diet in gout** - Aetiology - Symptoms –Medical Nutritional Therapy

**Unit-III: Diet in kidney disease:**Nephritis- aetiology - Symptoms - Dietary Management. Nephrosis - Aetiology - Symptoms - Dietary Management. Kidney Stones - Prevention - Dietary Modification.

**Unit-IV: Diet in cancer&AIDS:**Aetiology - Symptoms - Dietary Management-nutritional

**Unit-V:The Dietitian:** Introduction- Classification - Code of Ethics - Responsibilities - Assessment and diet planning - Diet Counselling and Nutrition Education.

**Text Books:**

1. Bamji M.S. and Vinodini Reddy (1998) Text Book of Human Nutrition, Ford and IBH Publishing Co. Ltd New Delhi.
2. Mohan K. L. and Krause M.V (2002) Food, Nutrition and Diet Therapy, 2<sup>nd</sup> edition W.S. Suders Co, Philadelphia.

**References :**

1. Guthrie H. A, Picciano M. F (1995) Human Nutrition, St. Louis, MO: Mosby-Year Book.
2. Sharon,M (1994), Complete Nutrition, Avery publishing group, New York.
3. Garrow J.S James W. P.T. and Ralph A (2000) Human Nutrition and Dietetics, 10<sup>th</sup> edition, Churchill Livingstone, London.
4. Robinson C.H, et.al., (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, Mac Milan Publishers.USA.

**FSN 3517**

**LAB IN THERAPEUTIC NUTRITION – II**

**(5hrs/wk) (5cr)**

This course understands the history of nutritional sciences to gain knowledge about the principles of meal planning, diet therapy, therapeutic diets and nutrition support. They also learn about multi-disciplinary approach to medical nutrition therapy and the role of clinical nutritionist in health care team. They develop an aptitude for taking dietetics as a profession.

**Planning and preparation of Diets for the following diseases:**

1. Meal planning for Liver disease -Hepatitis, Cirrhosis
2. Meal planning forGout
3. Meal planning for kidneydisease - Nephrosis, Nephritis
4. Meal planning for Cancer and AIDS.

**Text Books:**

1. Anderson, L et.al., Nutrition in Health and Disease, Seventh edition, J.B. Lipincott& Co. Philadelphia.
2. Anita F. P.(2002) Clinical Dietetics and Nutrition, Fourth Edition, Oxford University Press, Delhi.
3. Mahan, L. K. and Arlin, M. T (1972) Kranse's Food, Nutrition and Diet Therapy. 8<sup>th</sup> edition, W. B. Saunders Company, London.

**References:**

1. Robinson. C.H. et.al., (1986) Normal and Therapeutic Nutrition, Seventh edition, Mac Milian Publishing Co.USA
2. Raheena, B (2009) A Textbook of Food, Nutrition and Dietetics, Sterling Publishers, New Delhi.
3. Joshi, S. A (1998) Nutrition and Dietetics, Fourth edition, Tata McGraw Hill Publications, New Delhi.

This course helps to enable the students to understand the basic principles of biotechnology and application of the knowledge of biotechnology for the development of new food products.

**Unit-I:Introduction to biotechnology:** Genetically modified foods-Definition, examples of GM foods, advantages, disadvantages and safety aspects of foods produced by genetic engineering.

**Unit-II: Food fermentation:** Concept of microbial fermentation; fermentation process: Dual and multiple fermentation, continuous fermentation and batch fermentation; factors controlling fermentation.

**Unit-III:Fermented food products:** Beer, wine, vinegar, sauerkraut, tempeh, soya sauce, cheese and bread Preparation.

**Unit-IV:Enzymes in food processing industries:** Principles of enzyme immobilization: Types of immobilization techniques and their importance; Immobilized enzymes in food processing.

**Unit-V:Biotechnology for Food Production:** History, developments, current status of transgenic crops -Crop improvement and enhanced agronomic performance- Food products with enhanced shelf-life, processing and functional quality- Nutritional enhancement-macro and micro-nutrients.

**Text Books:**

1. Mary, k. et.al., (2000) Essentials of functional foods, Culinary and Hospitality Industry Publication Services.
2. Israel Goldberg (2001) Functional foods, Pharma foods and Nutraceuticals, Culinary and hospitality Industry Publication Services.
3. Robert Easy Wildman (2001) Handbook of Nutraceuticals and functional foods, Culinary and Hospitality Industry Publication Services.

**References:**

1. Owen Pward (1989) Fermentation Biotechnology Principles, Processes and Products, Prentice H New Jersey.
2. Dubey, R.C (2001) Text Book of Biotechnology, S.Chand and Co. Ltd, New Delhi.
3. Frazier and West Hoff (1996) Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.



FSN 3621

FOOD SAFETY AND QUALITY CONTROL

(6hrs/wk) (6cr)

This course enables students to gain knowledge on food safety and food laws and study about quality control and common food standards.

**Unit-I:Food safety:** Meaning of food safety Importance of Food: Quality and safety for developing countries. Patent: Definition, requirements, patent law in India, administrator, need for patent system, advantages, precautions to be taken by applicants, patent procedures, non-patentable. Food Hazards: Physical, Chemical, Biological hazards associated with food types. Effect of processing and storage on microbial safety.

**Unit-II:Quality control:** Objectives, Importance, functions of quality control, stages of quality control in food industry. Food Quality Assurance: Design of company quality assurance program, Microbiological concerns. Managing quality in supply chain and marketing of food products.

**Unit-III:Food adulteration:** Adulteration of food - common adulterants and tests to detect common adulterants. Cereals and products - bread, biscuits, cakes products. Fruits Products: Jam, juices, squashes, ketchup, sauce. Oils and Fats: Coconut oil, groundnut oil, palm oil, sunflower oil, Vanaspati. Milk and Products: Skimmed milk powder, partly skimmed milk powder, condensed sweetened milk. Other products - coffee, tea, sugar, honey, toffees.

**Unit-IV:Hygiene and Sanitary Practices:** Personal Hygiene - Health Requirements - Location and Surroundings of Food Industry - Slaughter House - Good Manufacturing Practices - Good Food Hygiene Practices - Storage.

**Unit-V:National and International laws:** FAO/WHO, FSSAI Codex Alimentarius commission, fair average quality (FAQ) specification for food grains, ISO 22000 series. HACCP: Background, current status, structured approach, principles, benefits and limitation. Consumer Protection Act (CPA).

**Text Books:**

1. Sather A.Y (1999) A first course in food analysis, New Age Publications, New Delhi.
2. Potter N and Joseph.H (1996) Food Science CBS Publishers, New Delhi.
3. M.Swaminathan (1995) Food Science, Chemistry and Experimental Foods, The Bangalore Printing & Publishing Co. Ltd, Bangalore.

**References :**

1. The Bureau of Indian Standards Act, 1986
2. Desrosier and Desrosier (1999) Technology of food preservation,4<sup>th</sup> edition, CBS Publishers. New Delhi.

**FSN 3618                                      BAKERY AND CONFECTIONARY                                      (6hrs/wk) (6cr)**

This course provides the opportunity for the students to study and understand the fundamentals of baking and learn the technologies behind bakery products. The main aim is to understand industry trends.

**Unit-I Bakery industry:** Current status, growth rate, and economic importance of Bakery Industry in India. Product types, nutritional quality and safety of products, pertinent standards & regulations.

**Unit-II Bread, buns and pizza base:** Ingredients & processes for breads, buns, pizza base, Equipments used, product quality characteristics, faults and corrective measures. Cakes - Ingredients and processes for cakes, Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

**Unit-III Biscuits, cookies and crackers:** Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures.

**Unit-IV Modified bakery products:** Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free bakery products.

**Unit-V Breakfast cereals, macaroni products and malt:** Production and quality of breakfast cereals, macaroni products and malt.

**Text Books:**

1. Dubey, S.C (2007) Basic Baking 5<sup>th</sup> edition. Chanakya Mudrak Pvt. Ltd. New Delhi.
2. Raina et.al. (2003) Basic Food Preparation-A complete Manual. 3<sup>rd</sup> edition, Orient Longman Pvt. Ltd. USA.
3. Manay, S and Shadaksharaswami, M. (2004) Foods: Facts and Principles, New Age Publishers. New Delhi.
4. Barndt R. L. (1993) Fat & Calorie – Modified Bakery Products, Springer USA.

**References:**

1. Samuel A. Matz (1999). Bakery Technology and Engineering, PAN-TECH International Incorporated ltd., Taiwan.
2. FaridiFaubion (1997). Dough Rheology and Baked Product Texture, CBS Publications. New Delhi.
3. Samuel A. Matz (1992). Cookies & Cracker Technology, Van Nostrand Reinhold.USA

FSN 3622

**HEALTH AND FITNESS****(6hrs/wk) (6cr)**

This course enables the students to learn about the terms related to health and fitness and to comprehend the interaction between fitness and nutrition.

**Unit-I:Health:** Concept of Health, changing concepts definitions of health, dimensions of health, concept of wellbeing, spectrum of health, determinants of health, ecology of health, right to health, responsibility for health, indicators of health.

**Unit-II:Exercise and health related fitness:** Health related fitness, health promotion, physical activity for health benefits. Sports related fitness: Role of nutrition in sports, nutrition to athletic performance.

**Unit-III:Body weight and composition for health and sports:** Ideal body weight, values and limitations of the BMI, composition of the body, Diet during training, prior to competition, during Dietary supplements after competition for sports.

**Unit-IV:Exercise performance:** Energy expenditure during physical activity, carbohydrate metabolism and performance, fat metabolism and performance, effect of exercise on protein requirements, physique and sports performance.

**Unit-V:Exercise programmes:** Resistance exercise training, aerobic exercise, types of exercise, effective for weight contrast, - dieting or exercise, weight reduction programme for young athletes.

**Text books:**

1. K. Park, (1997) Text book of Preventive and Social Medicine, Fifteenth edition, MIS BanarsidasBhano Publishers, Jabalpur.
2. Melvin H.Williams (2005) Nutrition for Health, fitness and Sports, Seventh edition, MC Graw Hill international Edition, USA
3. MichealJ.et.al., (2004) Nutrition and Metabolism, Blackwell Publishing Company, Bangalore.

The course is designed to enable the students to understand the importance of nutrition in national progress and the significance of assessment of nutritional status. The course also aims to recognize the solutions to overcome problems of malnutrition in the community and the role of national and international agencies in this area.

**Unit-I: Nutrition and Health in National Development:** Malnutrition- meaning, factors contributing to malnutrition, over nutrition. Nutritional disorders- Epidemiology, clinical features, prevention and dietary treatment for Protein Energy malnutrition, nutritional anaemias & vitamin deficiency disorders. Methods of assessing nutritional status: Sampling techniques, Identifications of risk groups, Direct assessment - Diet surveys, anthropometric, clinical and biochemical estimation, Indirect assessment- Food balance sheet, ecological parameters and vital statistics.

**Unit-II: Improvement of nutrition of a community:** Modern methods of improvement or nutritional quality of food, food fortification, enrichment and nutrient supplementations. Nutrition education themes and messages in nutrition and health, Antenatal and postnatal care.

**Unit-III: Nutritional and infection relationship:** Immunization and its importance, Food borne infection and intoxication diseases, foods involved, methods of prevention, Infestation of food borne diseases, Outbreak, Prevention signs and control of infection.

**Unit-IV: National and International agencies in uplifting the nutritional status:** WHO, UNICEF, CARE, ICMR, ICAR, CSIR, CFTRI. Various nutrition related welfare programmes, ICDS, SLP, MOM, and others (in brief).

**Unit-V: Community nutrition programme planning:** Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme.

#### **Text Books:**

1. Dandiya, P.C, and Zafer, Z.Y.(2003) Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.
2. Khader, V. (2003) Foods, Nutrition and Health, Kalyani Publishers, New Delhi.
3. Park. K, (2005) Park's Textbook of Preventive and Social Medicine, 18<sup>th</sup> edition, Banarsidas Bhanot Publishers, Jabalpur.
4. Reddy, R.S. (1998) Nutrition Education, Commonwealth Publishers, New Delhi.

#### **References:**

1. Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Srilakshmi, B. (2004) Nutrition Science, New Age International Pvt. Ltd, New Delhi.
3. Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.
4. Ramachandran, L. and Dharmalingam, T. (2005) Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.

FSN 3203

**OBESITY MANAGEMENT**  
(Life Skill Course)

(3hrs/wk) (2cr)

This course describes the health risks and problems associated with obesity. It differentiates the theories of obesity through which the students will learn the role of nutrition/diet in the treatment of obesity. The need of physical activity and exercise are also stressed in this paper. The behavioral theory also applies to weight loss.

**Unit-I:Introduction to obesity:** Introduction, aetiology, genetic factors-age, sex, eating habits, physical activity, stress, endocrine factors-trauma, prosperity and civilisation. Physiology of obesity.

**Unit-II:Theory of obesity:** Fat cell theory, set point theory, Leptin. Regional distribution of adipose tissues, metabolic changes,

**Unit-III:Assessment:** Body weight Measurement-body mass index (BMI)- waist circumference-Measurement of body fat. Ponderal index, waist- hip ratio.

**Unit-IV:Treatment:** Diet therapy, principles of dietetic management - glycaemic index physical exercise, stress management, pharmaco therapy, behaviour therapy, weight loss surgery.

**Unit-V:New trends in nutrition:** Introduction-health-specific meals. Fast food-junk foods. Convenience foods-types.

**Text Books:**

1. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi
2. Swaminathan. M (1979) Food Science and Experimental foods. Ganesh and Co, Madras.
3. SunetraRoday(2007) Food Science and Nutrition,2<sup>nd</sup> edition, oxford higher education publishers. New Delhi.

**References:**

1. Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Srilakshmi, B. (2004), Nutrition Science, New Age International Pvt. Ltd, New Delhi.
3. Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

The students will attain an in depth understanding of the Chemical additives added to a food, importance of additives in maintaining or improving food quality, to know the limits of addition as prescribed by FAO/WHO and PFA and develop knowledge on newer additives with improved safety standards.

**Unit I:Food additives:** definitions, classification and functions, need for food additives application, safety concerns, regulatory issues in India – Leavening agent, Humectants and Acidulants, pH Control agents, Buffering Salt, Anticaking agents.

**Unit II:Colouring agents:** natural colorants, applications and levels of use, Artificial Colorants sources, applications and levels of use, misbranded colors, color stabilization.

**Unit III:Flavouring agents:**flavors - natural and synthetic flavors, flavor enhancers, flavor stabilization, flavor encapsulation, Emulsifiers

**Unit IV:Sweeteners:** natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products.

**Unit-V:Contaminants and Regulations:** Contamination in Food - Physical, chemical (heavy metals, pesticide residues, antibiotics, veterinary drug residues, dioxins, environmental pollutants, radionuclides, solvent residues, chemicals Natural toxins. Food Laws and Regulations- Codex, HACCP, ISO, FSSAI etc.

**Text Books:**

1. Food additives by Brannen A.L., Davidson P.M., Salminen S. and Thorngate J.H. Second Edition, Revised and Expanded. Marcel dekker Inc. USA, 2002.
2. Handbook of Food additives by Thomas Furia,
3. Watson, D.H. (1998) Natural Toxicants in Food, CRC Press, USA.

**References:**

1. Duffus, J.H., and Worth, H.G. J. (2006) Fundamental Toxicology, The Royal Society of Chemistry.UK.
2. Stine, K.E., and Brown, T.M. (2006) Principles of Toxicology, CRC Press. USA.
3. Tönu, P. (2007) Principles of Food Toxicology. CRC Press, USA.

**Department of Biochemistry**  
**B.Sc. Biochemistry**

**Frame work – from 2018 Onwards**

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks	
1	I	XXXX	TAM/FRE/HIN	3	2	30	
	II	XXXX	English	3	2	30	
	III	Core	BCH 1431	Fundamentals of Biochemistry	4	4	60
			BCH 1533	Biomolecules	5	5	75
			BCH 1435	Biomolecules Lab	4	4	75
		Supportive	BCH 1241	Biochemistry - I	3	2	30
		Supportive	BCH 1243	Biochemistry – I - Lab	2	2	30
		Life skill-1	BCH 1239	Food Technology	3	2	30
V	NSS/PED/SLP		Extension	-	-	-	
<b>Total</b>				<b>30</b>	<b>23</b>	<b>360</b>	

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks	
2	I	XXXX	TAM/FRE/HIN	3	2	30	
	II	XXXX	English	3	2	30	
	III	Core	BCH 1432	Cell Biology & Genetics	4	4	60
			BCH 1534	Human Physiology	5	5	75
			BCH 1436	Cell Biology, Genetics & Human Physiology Lab	4	4	60
		Supportive	BCH 1241	Biochemistry - I	3	2	30
		Supportive	BCH 1243	Biochemistry – I - Lab	2	2	30
	IV	Non-Major Elective -2	BCH 1238	Medical Fitness and Health	3	2	30
		Life skill-2	BCH 1240	First Aid	3	2	30
	V	NSS/PED/SLP		Extension	-	-	-
<b>Total</b>				<b>30</b>	<b>23</b>	<b>360</b>	

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks	
3	I	XXXX	TAM/FRE/HIN	3	2	30	
	II	XXXX	English	3	2	30	
	III	Core	BCH 2631	Metabolism	6	6	90
			BCH 2633	Enzymology	6	6	90
			BCH 2335	Nutritional Biochemistry	3	3	45
			BCH 2437	Metabolism, Enzymology & Nutritional Biochemistry Lab	4	4	60
		Supportive	BCH 2439	Immunology	5	4	60
	V	NSS/PED/SLP		Extension	-	-	-
<b>Total</b>				<b>30</b>	<b>27</b>	<b>405</b>	

**BCH 2**

Sem	Part		Course No.	Course Title	Hr/wk	Credit	Marks
4	I		XXXX	TAM/FRE/HIN	3	2	30
	II		XXXX	English	3	2	30
	III	Core	BCH 2632	Medical Microbiology	6	6	90
			BCH 2634	Clinical Biochemistry	6	6	90
			BCH 2336	Cancer Biology	3	3	45
			BCH 2438	Medical Microbiology & Clinical Biochemistry Lab	4	4	60
	Supportive		MAS2454	Biostatistics	5	4	60
V	NSS/PED/SLP			Extension	-	-	-
<b>Total</b>					<b>30</b>	<b>27</b>	<b>405</b>

Sem	Part		Course No.	Course Title	Hr/wk	Credit	Marks
5	III	Core	BCH 3631	Molecular Biology & Genetic Engineering	6	6	90
			BCH 3633	Analytical Techniques	6	6	90
			BCH 3635	Pharmacology & Toxicology	6	6	90
			BCH 3537	Molecular Biology & Analytical Techniques Lab	5	5	75
	IV	Life skill-3	BCH 3239	Forensic Science	3	2	30
		EVS	BCH 3241	Environmental Studies	4	2	30
<b>Total</b>					<b>30</b>	<b>27</b>	<b>405</b>

Sem	Part		Course No.	Course Title	Hr/wk	Credit	Marks
6	III	Core	BCH 3632	Plant Biochemistry	6	6	90
			BCH 3634	Protein Chemistry & Proteomics	6	6	90
			BCH 3642	Hormones and Human Behaviour	6	6	90
			<b>BCH 3544</b>	<b>Plant Biochemistry, Protein Chemistry and Hormones Lab</b>	<b>5</b>	<b>5</b>	<b>75</b>
	IV	Life skill-4	BCH 3240	Clinical Diagnostics	3	2	30
		VAL	VALxxxx		4	2	30
<b>Total</b>					<b>30</b>	<b>27</b>	<b>405</b>
<b>Grand Total</b>					<b>180</b>	<b>154</b>	<b>2340</b>



## Part-III-Supportive

Courses offered by Department of Biochemistry

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks	Target Department
1.	III	BCH 1241	Biochemistry - I	3	2	30	Chemistry
2.	III	BCH 1243	Biochemistry – I Lab	2	2	30	Chemistry
3.	III	BCH 1242	Biochemistry - II	3	2	30	
4.	III	BCH 1244	Biochemistry – II - Lab	2	2	30	
5.	III	BCH 2439	Immunology	5	4	60	Biochemistry
<b>Total</b>				<b>15</b>	<b>12</b>	<b>180</b>	

Courses offered by other Departments

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks	Target Department
1	III	CHS 1425	Chemistry for Biochemist – I	5	4	60	Biochemistry
2	III	CHS 1426	Chemistry for Biochemist – II	5	4	60	
4	III	MAS 2454	Biostatistics	5	4	60	
<b>Total</b>				<b>15</b>	<b>12</b>	<b>180</b>	

## Part-IV-Non-Major Elective

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks
1	IV	BCH 1237	Wonders of Human Body	3	2	30
2	IV	BCH 1238	Medical Fitness and Health	3	2	30
<b>Total</b>				<b>6</b>	<b>4</b>	<b>60</b>

## Part-IV Life Skill Courses

Sem	Part	Course No.	Course Title	Hr/wk	Credit	Marks
1	IV	BCH 1239	Food Technology	3	2	30
2	IV	BCH 1240	First Aid	3	2	30
5	IV	BCH 3239	Forensic Science	3	2	30
6	IV	BCH 3240	Clinical Diagnostics	3	2	30
<b>Total</b>				<b>12</b>	<b>8</b>	<b>120</b>

## BCH 4

**The new course to be introduced in the Academic council – BCH – 3544 Plant Biochemistry, Hormones & Protein Chemistry Laboratory to be implemented from the year 2017 - 2018**

### **BCH 3544 Plant Biochemistry, Protein Chemistry & Hormones Lab 5 Hrs/5 Cr**

The lab course aims the students to have a practical experience in the isolation and estimation of primary and secondary metabolites of plants and in estimations of hormones in human. The lab course inculcates the students with the knowledge of extraction and estimation of proteins.

**Outcome** - The course gives them practical experience and helps the students to understand the unique features of plant cells and isolate cellulose from plant and understand the biochemistry of plant growth and development. It also helps the students to know the importance of plant growth hormone and secondary metabolites. The student will also be exposed to practical knowledge of isolation, identification and sequencing of proteins. The course also enables the student to learn the significant role of hormones in human health.

1. Estimation of Cellulose from plants - Colorimetric method.
2. Isolation of chloroplast – Centrifugation method.
3. Estimation of pigments like chlorophyll, carotenes, Anthocyanin.
4. Estimation of capsaicin – Colorimetric method.
5. Estimation of Nitrate reductase - Spectrophotometry method
6. Preparation of plant extracts - Decoction, Maceration & Soxhlet extraction.
7. Estimation of Indole Acetic Acid.
8. Estimation of proline – a stress indicator.
9. Estimation of hCG hormones – kit method
10. Estimation of thyroid hormone – kit method
11. Estimation of protein – Bradford method
12. Extraction of keratin from chicken feathers.
13. Isolation and identification of protein by silver staining technique
14. *In vitro* digestion of proteins.
15. Protein sequencing – Edman degradation method – Demo.

#### **References:**

1. Ashok M Bendre AK nad Kumar A 2006. A Textbook of Practical Botany II, Rastogi Publications. ISBN 81-7133-852-6
2. Crawford, N. (1995) Nitrate: nutrient and signal for plant growth. *The Plant Cell* **7**: 859-868.
3. Ross, C. (1974) Plant Physiology Lab Manual. Wadsworth, Belmont, CA.
4. Sadasivam, S, and Manickam, A., (2011), Biochemical Methods, 3rd edition, New Age International Publishers, New Delhi
5. Jeyaraman J (2011). Laboratory Manual in Biochemistry. New Age International Publishers. ISBN-10: 812243049X. ISBN-13: 978-8122430493.

## UNDERGRADUATE DEPARTMENT OF PSYCHOLOGY

## PROGRAMME FOR B.Sc. PSYCHOLOGY FROM 2017 BATCH ONWARDS

SEM	PART	CODE	TITLE	Hr/Wk	Cr	Marks
I	Part I	Lang	Tamil/Hindi/French	3	2	30
	Part II	Lang	English	3	2	30
	Part III Major	PSY 1501	General Psychology - I	5	5	75
		PSY 1403	Developmental Psychology - I	4	4	60
		PSY 1405	Biological Psychology	4	4	60
	Supportive course	PSY 1407	Introduction to Sociology	5	4	60
	Part IV	NME XXXX	XXX	3	2	30
		LS XXXX	XXX	3	2	30
		<b>TOTAL</b>	<b>30</b>	<b>25</b>	<b>375</b>	
II	Part I	Lang	Tamil/Hindi/French	3	2	30
	Part II	Lang	English	3	2	30
	Part III Major	PSY 1502	General Psychology - II	5	5	75
		PSY 1404	Developmental Psychology - II	4	4	60
		PSY 1406	Statistics For Psychology - I	4	4	60
	Supportive Course	PSY 1408	Educational Psychology	5	4	60
	Part IV	NME XXXX	XXX	3	2	30
		LS XXXX	XXX	3	2	30
	Part V	Extension	NSS, SLP, PED	2	1+1	
		<b>TOTAL</b>	<b>30+2</b>	<b>25</b>	<b>375</b>	
III	Part I	Lang	Tamil/Hindi/French	3	2	30
	Part II	Lang	English	3	2	30
	Part III Major	PSY 2501	Social Psychology - I	5	5	75
		PSY 2503	Experimental Psychology - I	5	5	75
		PSY 2405	Rehabilitation Psychology	4	4	60
		PSY 2507	Abnormal Psychology - I	5	5	75
	Supportive Course	PSY 2409	Geriatric Psychology	5	4	60
		<b>TOTAL</b>	<b>30</b>	<b>27</b>	<b>405</b>	

PSY 2

SEM	PART	CODE	TITLE	Hr/Wk	Cr	Marks
IV	Part I	Lang	Tamil/Hindi/French	3	2	30
	Part II	Lang	English	3	2	30
	Part III Major	PSY 2502	Social Psychology - II	5	5	75
		PSY 2404	Research Methods in Psychology	4	4	60
		PSY 2506	Abnormal Psychology - II	5	5	75
		PSY 2508	Experimental Psychology - II	5	5	75
	Supportive Course	PSY 2410	Industrial Psychology	5	4	60
	Part V	Extension	NSS, SLP, PED	2	1	
		<b>TOTAL</b>	<b>30 + 2</b>	<b>27+1</b>	<b>405</b>	
V	Part III Major	PSY 3601	Cognitive Psychology	6	6	90
		PSY 3603	Health Psychology	6	6	90
		PSY 3605	Principles of Counselling	6	6	90
		PSY 3507	Disaster Management	5	5	75
	Part IV	LS XXXX	XXX	3	2	30
		EVS	Understanding our Environment	4	2	30
			<b>TOTAL</b>	<b>30</b>	<b>27</b>	<b>405</b>
VI	Part III Major	PSY 3602	Positive Psychology	6	6	90
		PSY 3604	Organizational Behaviour	6	6	90
		PSY 3606	Research Project	6	6	90
		PSY 3509	Sports Psychology	5	5	75
	Part IV	LS XXXX	XXX	3	2	30
		HVS		4	2	30
		<b>TOTAL</b>	<b>30</b>	<b>27</b>	<b>405</b>	
<b>GRAND TOTAL FOR SEMESTER (1 TO 6)</b>				<b>180+4</b>	<b>158+2</b>	<b>2370</b>

**SUPPORTIVE COURSES**

<b>SEM</b>	<b>PART</b>	<b>CODE</b>	<b>TITLE</b>	<b>Hr/Wk</b>	<b>Cr</b>	<b>Marks</b>
I	III	PSY 1407	Introduction to Sociology	5	4	60
II	III	PSY 1408	Educational Psychology	5	4	60
III	III	PSY 2409	Geriatric Psychology	5	4	60
IV	III	PSY 2410	Industrial Psychology	5	4	60

**NON-MAJOR ELECTIVE COURSES**

<b>SEM</b>	<b>PART</b>	<b>CODE</b>	<b>TITLE</b>	<b>Hr/Wk</b>	<b>Cr</b>	<b>Marks</b>
I	IV	PSY 1201	Psychology in Daily Life	3	2	30
II	IV	PSY 1202	Guidance & Counselling	3	2	30

**LIFE – SKILL COURSES**

<b>SEM</b>	<b>PART</b>	<b>CODE</b>	<b>TITLE</b>	<b>Hr/Wk</b>	<b>Cr</b>	<b>Marks</b>
I	IV	PSY 1203	Life Skill Education	3	2	30
II	IV	PSY 1204	IT Skills for Psychologists	3	2	30
V	IV	PSY 3201	Cyber Psychology	3	2	30
VI	IV	PSY 3202	Consumer Psychology	3	2	30

## PSY 4

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-1</b>	<b>5 Hrs Per week</b>
<b>Semester – I</b>	<b>GENERAL PSYCHOLOGY I</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 1501</b>		

### OBJECTIVES:

- To help the students to understand the Basic concepts of Psychology.
- To facilitate their understanding application of the basic components of Psychology.

### UNIT I:

A definition of Psychology-practical problems, Methods of Psychology, Work of Psychologists, Schools of psychology.

### UNIT II:

Attention & Perception- Conscious clarity, determinants of Attention, Distraction, Training attention, Physiological basis of attention, Sensory deprivation, attention and overt behaviour; Perceptual constancies, Instabilities, perception of fundamental physical dimensions, illusions, Organizational factors of perception, sensory interaction; Perception in learning.

### UNIT III:

Learning: Principles of learning - Classical conditioning, Operant Conditioning, Principles of reinforcement, Cognitive Learning, Individualized learning, Learner & learning.

### UNIT IV:

Memory - Kinds Of memory, Processes of memory, Stages of memory, Levels-Of-Processing model, Forgetting, Biology of memory.

### UNIT V:

Thinking and language- Thinking process, Concepts, Problem-solving, Decision Making, Creative thinking, Language, communication.

### REFERENCE

1. Morgan, Clifford.T., King, Richard.A., Weisz, John.R., Schopler, John (1993): *Introduction to Psychology*, TataMcGraw Hill.
2. Marx, Melvin H. (1976) *Introduction to psychology - Problems, Procedures & Principles*, MacMillan Publishing Co.
3. Hilgard, E.R., Atkinson, R.L., Atkinson, R.C., (1979): *Introduction to Psychology*, Harcourt Brace Jovanovich. Inc.
4. Baron, R. A., & Misra, G. (2014). *Psychology*, 5th ed. New Delhi: Pearson Education
5. NCERT (2002). *Introduction to Psychology- Part-I*. New Delhi: NCERT

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>4 Hrs Per week</b>
<b>Semester – I</b>	<b>DEVELOPMENTAL PSYCHOLOGY I</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1403</b>		

**OBJECTIVES:**

- To help the students to understand the Basic concepts of Development Psychology.
- To facilitate their understanding application of the components of Development Psychology.

**UNIT I:**

Conception through birth: Fertilization, Prenatal development, Environmental Influences on prenatal development; stages of child Birth, types of childbirth: prenatal hazards & complications of low birth weight.

**UNIT II:**

Infancy & Toddlerhood (0-3 years) - Physical & Cognitive Development - Body Systems of neonate, infant reflexes, infant Sensory capacities, Milestones of motor development, Environmental influences on motor development; Piaget's Sensorimotor Stage.

**UNIT III:**

Infancy & Toddlerhood - Language and Personality Development - Theories of language development, Stages of language development from 0-3 years; Emotional development - Temperamental differences, Development of Attachment - Individual differences and long term correlates of attachment.

**UNIT IV:**

Early childhood (3-6 years) - Motor Skills, Piaget's Preoperational stage, Development of language; gender differences, fears and aggression; prosocial behaviour, Child rearing practices and parenting styles

**UNIT V:**

Middle Childhood (6-12 years) - Piaget's Stage of Concrete operations, Development of self concept, Components of self concept, Theoretical perspectives on self concept - Freud's latency period, Erickson's Industry vs Inferiority, Social learning theory, Information processing approach; The child in the peer group, functions and influences of the peer group, Friendship & popularity Visits to nursery schools / hospitals to get an idea about preschoolers and infants should be arranged.

**REFERENCES:**

1. Hurlock, E(1980), *Developmental Psychology*, Tata McGraw Hill Publishing Co.
2. Papalia, Diane E, Olds, Sally Wendoks (2003): *Human Development*, Tata McGraw Hill Publishing Co
3. Brown, Carol (2008), *Developmental Psychology*, Sage publications

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-3</b>	<b>4 Hrs Per week</b>
<b>Semester – I</b>	<b>BIOLOGICAL PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1405</b>		

**OBJECTIVES:**

- To lend a hand to the students to understand the Basic concepts of Biological Psychology.
- To make easy their understanding & application of the components of Biological Psychology.

**UNIT I**

The Nature of Biological Psychology- Meaning and Definition of Physiological Psychology - Historical views on human behavior - The Modern Era of Brain Imaging - Physiological Psychology and Neuroscience

**UNIT II:**

Neuroanatomy - The neuron: Structure of the neuron, types of Neurons; The Peripheral Nervous system: Structure and function The Skeletal Nervous system-structure and function; The Autonomic Nervous System-Structure & function The Central Nervous System: Spinal cord - structure and function The Brain - hindbrain, midbrain & forebrain.

**UNIT III:**

Neural Impulse: Neural impulse Cycle: membrane potential, resting potential, action potential; conduction across the length of a neuron and conduction across the synapse; Neurotransmitters and the nervous system - acetylcholine, dopamine, norepinephrine & GABA.

**UNIT IV:**

Hormones and Behaviour-Main endocrine glands, their hormone products and principal effects of the hormones

**UNIT V:**

The Biology Of Emotions, Learning & Memory Emotional behaviour - Visceral factors in emotional behaviour, Autonomic nervous system & emotions; Brain mechanisms Learning & Memory: Various types of memory, brain damage & Impairments of implicit memory; brain damage & experiments Of explicit memory; The story of H.M: a man with hippocampal Damage; role of hippocampus, amygdala and frontal cortex.

**REFERENCE**

1. Kalat, James. W., (2003) *Physiological Psychology*, Brooks/Cole Publishers
2. Morgan (1965): *Physiological Psychology*, International student edition, McGraw Hill Series
3. Rosenweig, Breedlov, Leiman (2002): *Biological Psychology*, 3rd edition, Sinaven Associates, Inc



<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: SUPPORTIVE PAPER- 1</b>	<b>5 Hrs Per week</b>
<b>Semester - I</b>	<b>INTRODUCTION TO SOCIOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1407</b>		

**OBJECTIVES**

- To help the students understand the concepts of society.
- To facilitate their understanding about the components of society.
- To help them understand the relevance of the knowledge of society for Psychological practice.

**UNIT I**

Sociology: Definition, Meaning, Characteristics and Concept. Society, Community, Social group, Associations, and Institution: Definition, Meaning, Characteristics, Types.

**UNIT-II**

Social Processes - Meaning, Types -Co-operation, Competition, Conflict, Accommodation, and Assimilation. Concept and meaning of culture, civilization, customs, folkways and mores.

**UNIT-III**

Social Institutions – Meaning, Primary & Secondary Institution, and Functions. Socialization – Definition and functions. Agencies of Socialization.

**UNIT-IV**

Social stratification - concept, and forms. Concept of Caste, Class, and Race. Caste System in India.

**UNIT-V**

Social Control-, Definition, Concept, agents of Social Control. Social Change – Definition, concept, process, factors for Social Change.

**REFERENCES:**

1. Shankar Rao (2011) *Principles of sociology*, Tata Macraw Hill, New Delhi.
2. Mangal(PD), (2011) *Sociology of Social Stratification*, Centurypress, New Delhi
3. Ashok Walekar, (2012), *Encyclopedia of Sociology and Social Work –I*, ABD Publishers
4. Ashok Walekar, (2012), *Encyclopedia of Sociology and Social Work –II*, ABD Publishers.
5. Haralambos & Holborn (2013), *Sociology : Themes and Perspectives* 8<sup>th</sup> Edition. Collins UK

<b>B.Sc. PSYCHOLOGY</b>	<b>PART IV :Non Major Elective (NME) PAPER-1</b>	<b>3 Hrs Per week</b>
<b>Semester - I</b>	<b>PSYCHOLOGY IN DAILY LIFE</b>	<b>Credit 2: MARKS:30</b>
<b>Code: PSY 1201</b>		

**OBJECTIVES**

- To help students to understand the concept of behavior.
- To enable them to understand the factors influencing human behavior.
- To help them to understand the importance of studying human behavior.

**UNIT –I**

Psychology - Meaning, Definition, Scope. Branches of Psychology. Importance of Psychology in Daily Practice.

**UNIT -II**

Developmental Psychology: Conception, Pregnancy – Child growth & development. Importance of prenatal development. Developmental tasks in each stage: Infancy to old age.

**UNIT -III**

Personality – Definition, Types of personality, Introduction to Theories of Personality, Learning and remembering: Meaning of learning - Types of learning, Learning Theories: Conditioning theory, operant conditioning theory.

**UNIT –IV**

Memory –Meaning, Types, Factors influencing of memory. Behavior: Meaning, Types of behavior, factors influencing behavior. Behavior modification: Definition and techniques.

**UNIT –V**

Intelligence: Meaning and definition of intelligence. Motivation - Meaning, Types of motives.- Introduction to psychological testing, Frustration - sources of frustration, Defense mechanisms – Meaning and types. Application of Psychology in various fields (Family, Educational settings, Industry).

**REFERENCES**

1. Morgan, Clifford (1986), *Introduction of Psychology*, New Delhi, Tata McGrawHill
2. Barron, Robert, A (2000), *Psychology 5<sup>th</sup> Edition*, Allyn & Bacon
3. Hurlock, Elizabeth, (2002), *Development Psychology*, New York, McGraw Hill.
4. Hilgard& Atkinson, (1998), *Introduction to Psychology*, New York, HCB & Word.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART IV : LIFE SKILL I</b>	<b>3 Hrs Per week</b>
<b>Semester – I</b>	<b>LIFE SKILL EDUCATION</b>	<b>Credit 2: MARKS:30</b>
<b>Code: PSY 1203</b>		

**OBJECTIVES:**

- To help the students to understand self.
- To help them to equip thinking skill, problem solving skill, coping skill
- To strengthen their Life skills.

**UNIT I:**

Life skills: importance, category of skills. Self awareness: concept of self, self awareness-Johari window, concept of ideal and real self, inferiority complex.

**UNIT II**

Relationship management: importance, expectations, conflicts, nurturing relationship. Communication: objectives, passive, aggressive and assertive communication.

**UNIT III**

Empathy: concept of empathy, importance, development of empathy. Thinking skills: creative and critical thinking, strategies to develop these skills.

**UNIT IV**

Coping skills: understanding emotions and stress, strategies to manage emotions and stress effectively. Stress Management techniques.

**UNIT V**

Problem solving: concept of problem, problem analysis, problem solving techniques. Decision making: problems in making decisions, decision making techniques.

**References:**

- Centre for Field Assistance and Applied Research (2001), **Life Skills Manual**, Washington, Peace Corps.
- WHO Report (1997), *Life Skill Education Guidelines*
- MS Chellamuthu Trust, *Life Skill Education Manual*.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-4</b>	<b>5 Hrs Per week</b>
<b>Semester – II</b>	<b>GENERAL PSYCHOLOGY II</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 1502</b>		

**OBJECTIVES:**

- To help the students to understand the little advanced concepts of Psychology.
- To facilitate their understanding application of the components of Psychology.

**UNIT I.**

**Intelligence** - Theories - Factor, Cognitive: measurement of Intelligence; Determinants; Testing for special aptitudes.

**UNITII.**

**Motivation** - Motives as inferences, explanations and predictors, Theories of motivation, Biological motivation, social motives, Motives to know and to be effective, Frustration and Conflicts of motives.

**UNITIII.**

**Emotions** - Components of Emotion, Characteristics & Functions of Emotion, Expression and Control of Emotions, Emotions & lie detectors, Facial feedback hypothesis, Theories of emotions, Measurement of Emotion, Culture and Emotion.

**UNITIV.**

**Personality** - Determinants of Personality (brief review), Theories Of personality - Psychodynamic, Trait, Type, Learning, Behavioural & Self: Measurement of personality

**UNITV.**

**Consciousness** - Fundamental processes, active and passive roles of consciousness; Sleep & dreams; Hypnosis.

**REFERENCE:**

1. Hilgard, Ernest R., Atkinson, Rita L., Atkinson, Richard, C.(1979) : *Introduction to Psychology*, Harcourt Brace Jovanovich. Inc
2. Rathus, Spencer A.(1996) : *Essentials of Psychology*, Wadsworth Publishing Co Inc
3. Marx, Melvin H.(1976) : *Introduction to Psychology-Problems, procedures & Principles* (for chapter V only)
4. Baron, R.A.(2013). *Psychology. India*: Dorling Kindersley.
5. Smith, E.E., Hoeksema, S.N., Fredrickson, B.,•& Loftus, G.R. (2006). *Introduction to Psychology. India* : Thomson learning Inc.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-5</b>	<b>4 Hrs Per week</b>
<b>Semester - II</b>	<b>DEVELOPMENTAL PSYCHOLOGY II</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1404</b>		

**OBJECTIVES:**

- To help the students to understand the little advanced concepts of Development Psychology.
- To make possible of their understanding in application of the components of Development Psychology.

**UNIT I:**

Adolescence(13-19 years): Physical Changes - adolescent growth spurt, Maturation in adolescence, psychological impact of physical Health concerns of adolescents; Intellectual development - Piaget's formal operational stage, home influences on achievement in schools, effect of cognitive growth on adolescent lives - social cognition.

**UNIT II:**

Influences on Vocational planning; Theoretical Perspectives on adolescence; Identity Formation- gender identity and sex role identity; Relationship with parents - roots of conflicts, how adolescents are affected by parents' life situation; relationship with peers - friendship.

**UNIT III:**

Young adulthood(20-39 years): Intellectual development; Vocational adjustment in young adulthood - stability of vocational choice; Work and gender influences; Health & fitness in young adulthood.

Young adulthood : Marriage and areas of marital adjustment; Parenthood; Factors influencing adjustment to parenthood; Alternate ways to parenthood; Divorce.

**UNIT IV:**

Middle Age(40-64 years): Physical changes and health in middle age; Adjustment to physical changes; Work in middle ages; Marital satisfaction in midlife; Relationship with maturing Children; Relationship with aging parents

**UNIT V:**

Late Adulthood (65 - death) - Physical and Cognitive Development -Aging, Physical Development, Cognitive Development. Psycho-Social Development-Social Development, Personal Development. Old Age - Social and family adjustments. - Violence and health problems, spirituality in later life.

**REFERENCE**

- Paplaia, Diane B., Olds, Sally, Wendkos(1992): *Human Development*, Tata McGraw Hill Publishing Co
- Shaffer, David R(1996): *Developmental Psychology*, IV Edition, Brooks/Cole Publishing Company
- Travers, D. (1999). *Human Development. Across the life span*. 4th ed. London: McGraw Hill.
- Hurlock, E. (1980): *Developmental Psychology*, Tata McGraw Hill
- Conger, John.J. and Galambos, Nancy. L. (1997): *Adolescence and Youth*, 5th edition, Longman, New York.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-3</b>	<b>4 Hrs Per week</b>
<b>Semester - II</b>	<b>STATISTICS FOR PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1406</b>		

**OBJECTIVE:**

- To learn the basics of statistics and how to apply the methods and techniques in statistics for data analysis.

**UNIT I:** Introduction - Meaning of statistics, Need and Importance of Statistics in psychology. Types of statistics – descriptive, inferential; Scales of measurement - Nominal, Ordinal, Interval & Ratio; Organization of data -Coding, Sorting, Editing, Data Entry, Data Verification, Tabulation.

**UNIT II:** Graphical Representation of data - One Dimensional, Two and Three Dimensional diagrams. Graphical representation of data - Frequency polygon, histogram, cumulative frequency graph and O give; computing percentiles.

**UNIT III:** Measures of Central Tendency - Mean, Median & Mode. Advantages and Limitations of different types of Central Tendencies. When to use the mean, median & mode.

**UNIT IV:** Measures of Variability - Range, Quartile deviation, Average Deviation & Standard deviation; coefficient of variation. Concept of Normal Distribution. Properties and applications of Normal Curve.

**Unit V:** Correlation - Meaning & Types; correlation & causation; coefficient of correlation and its interpretation. Karl Pearson's coefficient of Correlation. Edward Spearman's Rank Correlation. Introduction to Hypothesis Testing. (Usefulness of basic Parametric and Non Parametric Tests- *(only theory no problems)*)

**REFERENCE**

1. Garrett, Henry E.(1981): *Statistics in Psychology & Education*, Vakils, Feffer & Simons Ltd.
2. Gupta, S.P. (2015): *Statistical Methods*, New Delhi, Sultan & Chand.
3. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques*. New Delhi, New Age International Pvt. Ltd.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR:SUPPORTIVE PAPER-2</b>	<b>5 Hrs Per week</b>
<b>Semester - II</b>	<b>EDUCATIONAL PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 1408</b>		

**OBJECTIVES**

- To provide an understanding about the psychological elements in learning process and different views about learning.
- To familiarize students with various aspects related to the instructional process.
- To develop an overview of the importance of development in education
- To equip the students with the theoretical and practical know-how of how to work as a educational psychologist.

**Unit-I: Exploring Educational Psychology.**

Exploring Educational Psychology: Historical Background- Teaching: Art and Science- Effective Teaching: Professional knowledge and Skills-Goal Setting and Instructional planning Skills-Classroom Management Skills-Motivational Skills-Technological Skills. Research in Educational Psychology: The Scientific Research Approach – Research Methods.

**Unit II: Cognitive Development: Piaget's theory and Vygotsky's Theory.**

Cognitive Development: Piaget's theory: Cognitive Processes-Piagetian Stages-Evaluating Piaget's Theory: Contributions and Criticisms. Vygotsky's Theory-Assumptions- Zone of Proximal Development-Scaffolding- Language and Thought.

**Unit III: Language Developments and Intelligence .**

Language Development: Language-Morphology-Syntax- Semantics-How Language Develops-Biological and Environmental Influence. Memory: Encoding-Storage-Retrieval and Forgetting. Intelligence: Intelligence Tests- Theories of Multiple Intelligence- Information- Processing Approach

**Unit IV: Learning and Motivation .**

Learning: Behavioral Approach to Learning-Classical Conditioning- Operant Conditioning. Increasing Desirable Behaviors- Decreasing Undesirable Behavior. Bandura's Social Cognitive Theory- Observational Learning. Teaching Techniques: Description-Demonstration- Lecture Method- Discussion Method- Dramatization- Explanation- Aptitude Treatment Interaction –Mastery Learning –Teaching through Multimedia.

**Unit V: Special Education.**

Children with Disabilities- Learning Disabilities- ADHD- Mental Retardation- Physical Disorders- Sensory Disorders- Speech and Language Disorders- Autism Spectrum Disorders- Emotional and Behavioural Disorders of Children who are gifted- Characteristics and educating children who are gifted.

**REFERENCE**

1. Santrock, J. W. (2006), *Educational Psychology*, 2nd Edition, New Delhi, Tata McGraw Hill.
2. Corno, Lyn & Anderman, Eric M (2012), [\*Handbook of Educational Psychology\* \(2nd edition\)](#) Routledge
3. Misra, Girishwar & Woolfolk, Anita (2012), *Fundamentals of Educational Psychology*, Pearson India

<b>B.Sc. PSYCHOLOGY</b>	<b>PART IV :Non Major Elective (NME) PAPER-2</b>	<b>3 Hrs Per week</b>
<b>Semester – II</b>	<b>COUNSELLING AND GUIDANCE</b>	<b>Credit 2: MARKS:30</b>
<b>Code: PSY 1202</b>		

**OBJECTIVES:**

- To enable the students to understand the concept of Counselling in different perspectives.
- To help them understand the importance of counselling in the process of recovery.
- To strengthen their skills that would enable them to perform their role effectively.

**UNIT I:**

What is Counseling? Conceptual clarification of related terms - Guidance & Counseling , Advice & Counseling, Education & Counseling characteristics & attitudes; Need for Counseling.

**UNIT II:**

Direction & Counseling; Instruction & Counseling The effective counselor - Counseling approaches and practices - Directive, non directive, Existential, Eclectic.

**UNIT III:**

Group Counseling & Guidance - Aims, Appeal, Types of groups.

**UNIT IV**

Counseling Interview - Nature and significant features, setting And types of counseling interviews, Organization & Development And guidelines.

**UNIT V:**

Tools & Techniques used in counseling and guidance - Testing & non testing devices, Tools and techniques for environmental information; Tools used in assisting individuals towards self discovery Some guidelines.

**REFERENCE**

- John Antony, D OFM Cap.(2015), *Counselling Made Easy*, Dindugal, Guru Publications.
- Pasricha, Prem (1976) : *Guidance and Counselling In Indian education*
- Rao, Narayan (1984): *Counselling Psychology*
- Dave, Indu (1992): *Basic Essentials of Counselling*



<b>B.Sc. PSYCHOLOGY</b>	<b>PART IV : LIFE SKILL II</b>	<b>3 Hrs Per week</b>
<b>Semester – II</b>	<b>IT SKILLS FOR PSYCHOLOGISTS</b>	<b>Credit 2: MARKS:30</b>
<b>Code: PSY 1204</b>		

**OBJECTIVES**

- To understand the basics of computer.
- To acquire knowledge of MS word, Excel, Power Point and SPSS
- To learn the usages of computer in social work profession.

**UNIT I**

Introduction to computers – Generations of computers – Classification of computers – application of computers. Computer Architecture – personal computer – Hardware / Software– operating systems – computer languages.

**UNIT II**

Starting Windows – desktop – mouse – window maximizing, minimizing, restoring & closing a window. Using the start menu – control panel – windows explorer – copying, moving files –finding files or folders.

**UNIT III**

Starting word – creating a document – saving, printing, resaving and closing a document.Editing a document – move and copy text – Formatting Text and paragraph – finding andreplacing text and checking spelling – mail merge.

**UNIT IV**

Worksheet - Excel – getting started with Excel. Entering numbers – entering formula –editing cells and using commands and functions – moving and copying. Inserting and deletingrows and columns – creating charts – Data base in a Worksheet.

**UNITV**

Power point – slides – inserting new slides – clip arts – power point views – running a slideshow – printing a presentations – format options – editing features. Internet – web browsers – email – search engines – chatting. Introduction to data analysis – analysis of data throughcomputer software – introduction to SPSS – variable list – variable code - value code – cross tabulation – simple statistical analysis.

**REFERENCES**

1. RituChoudhary (2011) *Operating systems*. Centrum Press, New Delhi.
2. VasanthiRamanathan (2007) *Computer application in Business*,Meenakshipathipagam.
3. The Institute of Chartered Accountants in India (2015) *Information Technology Training*

*Programme Module 1*, New Delhi

4. Taxali R.K (2005) *PC Software for Windows*, New Delhi, McGraw Company.
5. Jeff Walden ,*More File Formats for Popular PC Software*, New Delhi,Wiley.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-1</b>	<b>5 Hrs Per week</b>
<b>Semester – III</b>	<b>SOCIAL PSYCHOLOGY - I</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2501</b>		

### Objectives

- To enable students to appreciate the influence of social and cultural factors on individual behaviour.
- To understand the social problems in terms of various social psychological theories

### Unit 1 Introduction

Social Psychology: Definition, Goal, Scope, Origin and Development. Major Theoretical Perspectives of Social Psychology - Cognitive dissonance theory and Drive theory. Social Psychology in relation to Educational psychology, social work, and counselling.

### Unit 2 Social perception

**Perceiving Self-** Self-concept – Beginnings, Formation. Contribution of Carl roger’s theory – Real self & Ideal self. Self- presentation – Nature of self-presentation, false modesty. Self-esteem - Development and Consequences.

**Perceiving Others-** Non-Verbal Communication, Impression Formation, Impression, Management.

### Unit 3 Social Cognition

Goals of social cognition, Attribution theories & error, Self-fulfilling prophecy, Heuristics and Automatic Processing, Potential Sources of Error in Social Cognition, Affect and Cognition, Cognitive strategies for enhancing and protecting the self

### Unit 4 Social Influence

Goals of social influence, Conformity –Definition, Asch’s Research on Group Influence Compliance –Definition, the Foot-in-the- Door Tactic, Obedience - Definition, Milgram’s Electric Shock Procedure, Social Norms – descriptive and injunctive norms, norms of reciprocity and obligation, collectivism, rebelliousness

### Unit 5 Prosocial behavior

Definition, Types of Prosocial Behavior, Goals of Prosocial Action, Just world hypothesis, Social responsibility norm, Bystander-calculus model, Empathy arousal hypothesis, Pluralistic ignorance

### Reference:

1. Baron, R. A., & Byrne, D. (2003). Social Psychology, 10th ed. New Delhi: Prentice Hall.
2. Myers, D. G. (2002). Social Psychology, 7th ed. Int. Education: McGraw Hill.
3. David Krech, Richard S. Crutchfield, Egerton L. Ballachey, Individual in Society, McGraw-Hill; International Ed edition (April 1, 1964), New York City.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>5 Hrs Per week</b>
<b>Semester – III</b>	<b>EXPERIMENTAL PSYCHOLOGY - I</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2503</b>		

**Objectives:**

- Conduct experiments and administer psychological scales to a subject
- Write a report which reflects the details of the experiment/ test, the aim, applications procedure of administration and subject results
- Using simple statistical techniques for carrying out group based small quantitative research projects.

(Minimum of three experiments in each unit.)

**Unit 1 Experiments on Memory**

1. Effect of cueing on recall
2. Test on working memory
3. Effect of serial position on recall
4. Chunking on recall
5. Paired associate learning

**Unit 2 Experiments on Perception and cognition**

1. Muller Lyer illusion
2. Stroop effect
3. Signal detection
4. Problem solving

**Unit 3 Experiments on Learning**

1. Bilateral transfer
2. Habit interference
3. Maze learning
4. Test on schedules of reinforcement
5. Test of learning curve
6. Retro achievement in Habituation

**Unit 4 Tests on Personality**

1. Rotter's Locus of Control Scale
2. Eysenck's Personality Inventory
3. 16 Personality Factor Questionnaire
4. Myers Briggs Type Indicator Scale

**Unit 5 Experiments on Motivation**

1. Achievement motivation quiz
2. Work motivation scale
3. Level of aspiration and achievement

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-3</b>	<b>4 Hrs Per week</b>
<b>Semester – III</b>	<b>REHABILITATION PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 2405</b>		

**Objectives:**

- To create a knowledge about Rehabilitation Psychology.
- To strengthen the students in the field to qualify as Rehabilitation Psychologist.

**Unit: 1 Introduction**

Concept and definition of disability, Concept of impairment, Nature and needs of persons with disabilities, Concept of rehabilitation; Rehabilitation Psychology: Definition, historical perspective, scope and methods. Functions of Rehabilitation Psychology.

**Unit: 2 Types of Disability I**

Definition, nature, types and characteristics of various disabilities as per PWD Act including: Mental Retardation, Learning disabilities, Visual disabilities, Hearing and speech disabilities, Orthopedic and neuromuscular disability, Cerebral Palsy,

**Unit: 3 Types of Disability II**

Definition, nature, types and characteristics of various disabilities as per PWD Act including: Multiple Disabilities, Autism, Hanson’s disease, Mental illness, Cardiac rehabilitation, Coping with cancer, HIV / AIDS. Incidence, prevalence, causes and prevention of above mentioned various disabilities.

**Unit: 4 Personality Development**

Personality development of persons with disabilities, Lifespan development of persons with disabilities, Personality traits

**Unit: 5 Legislations related to PWD’s**

Mental Health Act, Persons with Disability Act, Rehabilitation Council of India Act, and National Trust Act

**References**

1. Robert G. Frank, Mitchell Rosenthal, Bruce Caplan, (2009), Handbook of Rehabilitation Psychology, American Psychological Association, Washington, D.C., United States.
2. Golden C.J., 1984. Current Topics in Rehabilitation Psychology: Grune & Stratton, London.
3. Government of India (1995). The persons with Disabilities (Equal opportunities, Protection of Rights, and Full Participation) Act, New Delhi: Ministry of Social Justice and Empowerment.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER - 4</b>	<b>5 Hrs Per week</b>
<b>Semester – III</b>	<b>ABNORMAL PSYCHOLOGY - I</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2507</b>		

**Objectives:**

- To make the students to understand about the concept of psycho pathology.
- To know the treatment and management of mental disorders.

**Unit: 1 Ways of thinking about abnormality:**

**Historical Conceptions of Abnormal Behaviour:** The Supernatural Tradition, the Biological Tradition, the Psychological Tradition. Concept of normality and abnormality. Systems of classification (DSM 5 and ICD 10); clinical case formulation; Principles and provisional diagnosis.

**Unit: 2 Anxiety - related disorders**

Clinical characteristics, etiology and treatment of Generalized Anxiety Disorder (GAD), Panic Disorder, Phobias, Obsessive Compulsive Disorder (OCD), Post Traumatic Stress Disorder (PTSD).

**Unit: 3 Psychopathology of Neurocognitive disorder:**

Clinical characteristics, etiology and treatment of Dementia, delirium, head injury, epilepsy, other amnesic syndromes; Clinical characteristics and etiology and treatment.

**Unit: 4 Somatoform Disorders:**

Clinical characteristics, etiology and treatment of Pain Disorders, Somatization Disorders, Conversion Disorders, Hypochondriasis, Body Dysmorphic Disorders.

**Unit: 5 Psychopathology of eating disorders and sleeping disorder:**

Clinical characteristics, etiology and treatment of Eating disorders- Anorexia and Bulimia, Binge eating disorder. Sleep Disorders: Insomnia, Narcolepsy, Somnambulism.

**Reference:**

1. World Health Organization. (1992). The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization.
2. Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Publishing.
3. Barlow, D. H., & Durand, V. M.. (1995). Abnormal psychology: An integrative approach. Fort Worth, TX: Harcourt Brace College Publishers.
4. Mangal.S.K.,(2008) Abnormal Psychology, Sterling Publishers Pvt.Ltd; UK.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: SUPPORTIVE PAPER-2</b>	<b>5 Hrs Per week</b>
<b>Semester – III</b>	<b>GERIATRIC PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 2409</b>		

**Objectives:**

- Opportunity to explore the area of Gerontology
- Identify the unique health needs of older adults;
- Explore the importance of families and other social supports;

**Unit: 1 Introduction**

Field and Scope of Geropsychology; Demographics & Aging: birth & death rates, sex ratio, life expectancy, impact of population aging in India and the world - Implications; A brief overview of the theories of aging - Wear and tear theory, Rate of living theory, Cross-linking theory.

**Unit: 2 Approaches and Attitude**

Approaches to successful aging; patterns of aging. Attitude towards the aged and aging in the community and attitude of self towards aging.

**Unit: 3 Elderly Diseases I**

Clinical symptoms & Management of elderly diseases: Loss of memory, Respiratory disease, Heart disease, musculoskeletal disorder.

**Unit: 4 Elderly Diseases II**

Clinical symptoms & Management of elderly diseases: CNS related health Problem, Digestive problem, Vision, Hearing, Sleep disturbances.

**Unit: 5 Organization of Elder care Services**

Organization of Elder care Services: Community and social supports in the care of the elderly. NGOs in elder Care, Living in institutions, improving the Quality Of life, Welfare programmes for the aged- An integrated Programme for older persons, Indira Gandhi National Old Age Pension Scheme, National Social Assistance Scheme.

**Reference:**

1. Rao, A. Venkoba (1989), Psychiatry of Old Age in India, Published by Torrent Laboratories Private Limited, Ahmedabad
2. Biswas, S.K. (1987) Aging in contemporary India, The Indian Anthropological Society, Calcutta
3. Gokhale, S.D., Ramamurti, P.V., Pandit, N. & Pandal, B. (1999) Ageing in India, Murnbai, Somaiga Pubs Pvt Ltd
4. Birren, J.E. & Schaie, W. (1996) Handbook of Psychology of Aging, New York: Academic Press

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-1</b>	<b>5 Hrs Per week</b>
<b>Semester – IV</b>	<b>SOCIAL PSYCHOLOGY - II</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2502</b>		

### Objectives

- To enable students to understand behaviour in groups and dynamics of interpersonal relationships
- To understand the issues and difficulties that are caused by prejudice, discrimination and stereotypes
- To expose students to various techniques that reduce negative social relations

### Unit 1 Group Processes

Nature of groups, Social facilitation, Social Loafing, Group formation stages, Group structure – role, status, communication structure, effects of groups on individuals.

### Unit 2 Interpersonal attraction and close relationships

Determinants of Interpersonal Attraction- proximity, similarity, physical attractiveness. Theories of attraction, formation of intimate relationships. Love- Definition and types - Love for people, Caretaking love, Platonic love, Deep connection, Passionate love.

### Unit 3 Attitudes

Definition, structure, implicit and explicit attitudes, Formation of attitudes, Attitudes and Behavior Attitude Change- Persuasion process. Cognitive approaches to Persuasion- Elaboration Likelihood Model, Cognitive Dissonance theory.

### Unit 4 Negative Social Relations

Prejudice and discrimination- Definition, Components, Types – sexism, racism, ageism; Social and cognitive roots of prejudice, Reducing prejudice. Stereotypes – Definition, Cognitive foundations, Effects: stereotypes & distort perceptions.

### Unit 5 Aggression

Aggression: Definition, types, gender differences. Biological explanation for aggression, frustration-aggression hypothesis, social learning theory of aggression, Influences - Social and Situational, reducing aggression.

### Reference:

1. Baron, R. A., & Byrne, D. (2003). *Social Psychology*, 10th ed. New Delhi: Prentice Hall.
2. Myers, D. G. (2002). *Social Psychology*, 7th ed. Education: McGraw Hill.
3. Baumeister, R.F. and Bushman, B.J. (2008). *Social Psychology and Human nature*. Belmont, CA: Thomson Wadsworth
4. Taylor, S. E., Peplau, L.A and Sears, D.O. (2006) *Social Psychology*, 12th edition. New Delhi: Pearson Prentice-Hall of India Pvt Ltd.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>4 Hrs Per week</b>
<b>Semester – IV</b>	<b>RESEARCH METHODS IN PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 2404</b>		

**Objectives:**

- To inform students about the basics of scientific research in applied psychology.
- To make them learn the statistical rigours in designing research and processing data.

**Course Contents:**

**Unit 1 Introduction to research**

Research: Meaning, Definition and types. Paradigms of research: Qualitative and Quantitative. Introduction to Psychological research – Objectives and goals, ethical problems and principles. Research process. Research Problem: meaning, types and selection. Review of literature.

**Unit 2 Sampling and Research Design**

Sampling: definition, Probability & Non-Probability. Research design: Definition, Purpose, types and selection. Randomized experimental and quasi-experimental approaches, Group vs. single-subject designs.

**Unit 3 Variables and Hypothesis**

Variables: Meaning and Classification, Levels of Measurement. Hypothesis: Definition, Characteristics, Functions, and types. Nature of data, testing the normality and hypothesis testing.

**Unit 4 Methods of data collection**

Observation, Interview, Questionnaire and Case study: Definition, Characteristics and types.

**Unit 5 Psychological testing and report writing**

Test construction: Steps in test development and standardization, Types and uses of psychological testing. Applications of psychological testing in various settings: (Clinical, Organizational and business, Education, Counseling, Military and Career guidance); Ethical issues in psychological testing. Report writing: purpose, format for report in psychology and citations methods as per APA.

**References:**

1. Methodology of Research in Social Sciences by O. R. Krishnaswamy and M. Rangnatham Himalaya publication House, 2005, ISBN: 8184880936
2. Research Methodology: Methods and Techniques by C. R. Kothari, New Age International Publishers, ISBN:81-224-1522-9
3. Kerlinger, F. N. (1973). *Foundations of behavioural research*. USA: Holt, Rinehart & Winston.
4. Concise Rules of APA Style, Sixth Edition (Concise Rules of the American Psychological Association (APA) Style) 6 Spi Edition, by American Psychological Association
5. A.K.Singh, (2017), Tests, Measurements and Research Methods in Behavioural Sciences, Bharati Bhawan Publishers & Distributors; Fifth edition, New Delhi.



<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER - 3</b>	<b>5 Hrs Per week</b>
<b>Semester – IV</b>	<b>ABNORMAL PSYCHOLOGY - II</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2506</b>		

**Objectives:**

- To make the students to understand about the concept of psycho pathology.
- To know the treatment and management of mental disorders.

**Unit: 1Personality Disorders, sexual dysfunctions**

Clinical characteristics, etiology and theories of cluster A, B and C personality disorders.  
Clinical characteristics, etiology of sexual dysfunctions and paraphilia's

**Unit: 2Psychoses:**

Etiology, Epidemiology, Diagnostic criteria of schizophrenia and its types (paranoid, hebephrenic, Catatonic and un-differential).

**Unit: 3Mood Disorders:**

Depression, Depressive Disorders, Dysthymic Disorder, Major Depressive Disorder. Bipolar I Disorder, Bipolar II Disorder, Cyclothymic Disorder

**Unit: 4Substance Related Disorders:**

Etiology, Epidemiology, Diagnostic criteria of Substance Dependence, Substance Abuse, Alcoholism, Drug Abuse, Different Drugs.

**Unit: 5 Psychiatric Emergencies & Treatment**

**Suicide:** Concept, Theories, Causes, Mental Illness and Suicide, Prevention of Suicide.

**Management of mental illness:** indigenous method of healing, physical treatment- ECT, Therapeutic interventions – Supportive psychotherapy, behaviour therapy, cognitive behaviour therapy, Psycho pharmaco treatment.

**Reference:**

1. World Health Organization. (1992). The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization.
2. Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Publishing.
3. Barlow, D. H., & Durand, V. M.. (1995). Abnormal psychology: An integrative approach. Fort Worth, TX: Harcourt Brace College Publishers.
4. Mangal.S.K.,(2008) Abnormal Psychology, Sterling Publishers Pvt.Ltd; UK.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-4</b>	<b>5 Hrs Per week</b>
<b>Semester – IV</b>	<b>EXPERIMENTAL PSYCHOLOGY - II</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 2508</b>		

**Objectives:**

1. Conduct experiments and administer psychological scales to a subject
2. Make interpretations and draw conclusions based on the norms given in the manual
3. Write a report which reflects the details of the experiment/ test, the aim, applications, procedure of administration and subject results
4. Using simple statistical techniques for carrying out group based small quantitative research projects.

**Unit 1 Experiments in Abnormal psychology**

1. General Health Questionnaire - 28
2. Beck's Depression Inventory / Hamilton Depression Inventory
3. Hamilton Anxiety rating scale

**Unit 2 Experiments in Social psychology**

1. Rosenberg Self-esteem scale
2. Assertiveness scale
3. Social Distance Scale

**Unit 3 Experiments on Intelligence**

1. Raven's progressive matrices
2. Bhatia's test of intelligence
3. WAIS – Wechsler's Adult Intelligence Scale

**Unit 4 Experiments/Psychological Tests on Emotion**

1. Test of Emotional Intelligence
2. Motiquiz inventory
3. Test of Emotional Maturity

**Unit 5 Psychological well-being tests**

1. Psychological wellbeing scale by Carl Rifles
2. Bells adjustment inventory
3. Life satisfaction scale

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>5 Hrs Per week</b>
<b>Semester – IV</b>	<b>INDUSTRIAL PSYCHOLOGY</b>	<b>Credit 4: MARKS:60</b>
<b>Code: PSY 2410</b>		

**Objectives:**

- Understand and apply the different concepts in industrial/organizational psychology.
- Think critically about concepts and issues in industrial/organizational psychology.

**Unit: 1 Introduction and motivation at work:**

Industrial Psychology: Meaning, Nature and Functions. Motivation & work behavior. (Theory X and Y, McClelland's, Need Theory, Herzberg's Two Factor Theory).

**Unit: 2 Decisions Making by Individuals & Groups**

Groups & work teams, Group Behavior, Group formation & development. Decision making process, individual influences, group decision process.

**Unit: 3 Organizational Design & Structure**

Organizational design process, Forces reshaping organizations. Leadership—Definition, Meaning, Styles & Theories - Trait Theory, Behavioural Theories, Emerging issues in Leadership

**Unit: 4 Job Analysis and Employee Engagement**

Job Analysis—Personnel Recruitment, Employee selection, Performance appraisal—Performance Management. Employee Engagement—Affect, Attitudes, and Behavior at work. Employee well-being at Work - Workplace Psychological Health.

**Unit: 5 Personality and Organization**

Meaning, Application of Personality theory in organization. Emerging Trends Complexity, challenges and choices in the future

**Reference:**

1. Luthans, Fred, Organizational Behaviour, McGraw Hill 2008
2. Robbins, Stephen, Organizational Behaviour, Prentice Hall, India
3. Udai Pareek, Understanding Organisational Behaviour, Oxford University press.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-1</b>	<b>6 Hrs Per week</b>
<b>Semester – V</b>	<b>COGNITIVE PSYCHOLOGY</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3601</b>		

**Objectives:**

1. Develop a core competency in the area of cognitive psychology, focusing on topics such as language, memory, problem solving, reasoning and decision making.
2. Understand human psychology from cognitive perspective and participate as an active recipient of cognitive phenomena around us.

**Unit 1 Introduction to Cognition**

Cognition- meaning, definition. Cognitive Psychology- concept and Emergence of Cognitive Science and current issues.

**UNIT 2 Cognitive Process**

**Attention:** definition, Characteristics, Selective attention, Divided attention, Thinking- Process of thinking, Image and thinking, Types of Thinking- Concept formation, Reasoning, Problem solving, Decision Making, Creative thinking

**Unit 3 Sensation & Perception**

Modularity of Perception: Visual perception (Form and pattern perception); Space perception and cognition, Auditory Perception, Multimodal Perception; Synesthesia; Perception and Action.

**Unit 4 Positive Cognitive States and Processes**

Resilience: Developmental and clinical perspectives; Sources of resilience in children, adulthood and later life; Optimism- Concept and meaning; variation of optimism and pessimism; Spirituality: the search for meaning; Spirituality and well-being; Forgiveness and gratitude, Mental well-being.

**Unit 5 Mental Imagery and Cognitive Map**

Mental Imagery- Meaning, characteristic of mental image and cognitive neuroscience. Cognitive Map- Concept, Background information on CM, Cognitive map in relation to Distance, Shape and relative position.

**Reference:**

1. Eysenck M.W. and Keane M.T. (2015) Cognitive Psychology: A Student's Handbook. 7th Edition. Psychology Press.
2. Goldstein B E and Brockmole J.R. (2016). Sensation and Perception (8th Edition) Cengage Learning Inc.
3. Smith, E. E. & Kosslyn, S (2007). Cognitive Psychology: Mind and Brain. Prentice Hall.
4. Goldstein B.E.(2008). *Cognitive Psychology*. 2<sup>nd</sup> Edition, London: Wadsworth
5. Kellogg, R.T. (2007) Fundamentals of Cognitive Psychology. Sage Publications.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>6 Hrs Per week</b>
<b>Semester – V</b>	<b>HEALTH PSYCHOLOGY</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3603</b>		

**Objectives:**

- Understand the psychological aspects of terminal and chronic illness.
- Understand the importance of patient -provider relationships
- Demonstrate a range of health care interventions

**UNIT 1 Introduction**

Health: Definition, determinants, need, models- The Mind-Body Connection, The stages of change model, The Health belief model. role of lifestyle changes in illness. Health psychology – Need – Role of Psychology in Health.

**Unit 2 Stress & Coping**

Stress -Definition, factors influencing stress, Categories of stressors, Effects, Type A behaviour and Stress. Adjustment disorders, Burnout. Coping with stress and burnout, general principles of coping, Techniques of coping.

**Unit 3 Chronic and Terminal Illness**

Nature, Psychosocial factors, impact and Management of Chronic Illness -Pain, Coronary heart disease, Hypertension, Diabetes, Cancer, HIV/AIDS. Role of Health Psychology.

**Unit 4 Prevention of disease**

Prevention of Diseases-Primary Prevention- Safety restraints, Immunization, Safe-Sex, Nutrition and Diet, Obesity and Weight Control, Exercise, Sleep, Substance use. Secondary Prevention and tertiary prevention and its behavioral outcomes- components of interventions, Individual differences and personal characteristics.

**Unit 5 Health Care Interventions and Health Promotion**

Health awareness programmes: Health Education – Meaning, concept, techniques. Relaxation Training, Meditation, Biofeedback, Behaviour Modification, Cognitive Behavioural techniques.

**Reference:**

1. Health psychology, 7<sup>th</sup> edition, Shelly E. Taylor, TATA McGraw-Hill, New Delhi, 2012
2. An introduction to health psychology, 2<sup>nd</sup> edition, Robert J. Gatchel, Andrew Baum and David S. Krantz, McGraw Hill, NY, 1989
3. Abound F.E. (1998). Health Psychology in Global Perspectives. Thousand Oaks, CA: Sage Publications
4. Dimatteo, Robin, M., Martin, Leslie, R. (2007). Health Psychology. New Delhi: Pearson Education
5. Kuppaswamy, B. (2001). Elements of Ancient Indian Psychology. New Delhi:

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-3</b>	<b>6 Hrs Per week</b>
<b>Semester – V</b>	<b>PRINCIPLES OF COUNSELLING</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3605</b>		

**Objectives:**

- To acquaint the students with the nature, process, theories and techniques of counselling.
- To enable them to understand different fields of application of counseling and to develop knowledge and skills required in counselling.

**UNIT 1 Introduction to Counselling**

Counselling – Definition, meaning, objectives. Difference between counselling, Guidance and Psychotherapy. Counselling Process: Pre-helping phase – Acquainting, Diagnosing. Helping Phase – Pacing, Reframing, Initiating and Evaluating.

**UNIT 2 Areas of Counselling**

Individual Counselling, Group Counselling, directive, non directive, eclectic counselling. Counselling Families, Child Counselling, Counselling the Delinquent, Marriage Counselling, Pre-marital Counselling, Counselling Drug Addicts, Crisis Intervention Counselling, Career Counselling and Trauma Counselling.

**UNIT 3 Counselling Relationships and Skills**

Building Counselling relationships, working in a counselling relationship – Transference and counter transference, Termination of Counselling relationships. Basic skills for Counselling, communication and relationship skills.

**UNIT 4 Therapeutic Interventions:**

Psychotherapy – Definition, meaning, history and objectives. Rational Emotive Behaviour Therapy, Cognitive therapy, Transactional Analysis, Gestalt therapy, Family Therapy, Marital therapy, Group Therapy, Art therapy and relaxation therapy and Integrative approach.

**UNIT 5 Case History and Reporting**

Case history – Format- (Myer gross case study format), Preparation, merits and limitations. Code of Ethics. Case Report Writing and Case Presentation.

**Reference:**

1. Prasantham B J (1987) Therapeutic Counselling, Vellore, CCC.
2. Narayana Rao, S. (2002). *Counselling and Guidance*. 2nd ed. New Delhi: Tata Mc Graw Hill.
3. Belkin, G. S. (1988). *Introduction to Counselling*. W. G.: Brown Publishers.
4. Antony, John (2003) Skills of Counselling, Dindugal, Anugraha Publications.
5. Antony, John (2001) Dynamics of Counselling, Dindugal, Anugraha Publications.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-4</b>	<b>5Hrs Per week</b>
<b>Semester – V</b>	<b>DISASTER MANAGEMENT</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 3507</b>		

## Objectives

- The students will gain an understanding of concepts and nature of disaster, stages of crisis and trauma.
- The students will be familiar with skills and techniques for crisis management at personal, interpersonal and community levels.

### Unit 1 Understanding Disasters

Disasters - Meaning, nature, Causes and effects. Disaster: A Global View, Disaster Profile of India, The Disaster Management cycle. Crisis Phases; Models of Crisis Assessment & Intervention Trauma. Trauma- Nature and effects.

### Unit 2 Types of Disaster

Geological and Mountain Area Disasters- Earthquakes, Volcanic Eruption, Landslides, Snow Avalanches

Wind and Water Related Natural Disaster- Floods and Flash Floods, Droughts, Cyclones, Tsunamis

Man Made Disasters- Understanding Man-Made Disasters, Fires and Forest Fires, Nuclear, Biological and Chemical disaster, Road Accidents

### Unit 3 Disaster Preparedness

Disaster Preparedness: Concept & Nature. Disaster Preparedness Plan, Community based Disaster Preparedness Plan. Disaster Preparedness for People and Infrastructure, Role and Responsibilities of Central, State, District and local administration. Use and Application of Emerging Technologies.

### Unit 4 Disaster Mitigation

Disaster Mitigation: meaning and concept; Disaster Mitigation Strategies, Emerging Trends in Disaster Mitigation, Mitigation management, Role of Team and Coordination

### Unit 5 Rehabilitation, Reconstruction & Recovery and therapeutic interventions

Rehabilitation – Meaning and concept. Education and Awareness, the Philosophy of Coping with Disasters, Dealing with Victim's Psychology, Risk Assessment and Vulnerability Analysis. Psychological Response and Psychological Rehabilitation. Rumour and Panic Management, Medical and Health Response to Different Disasters

### Reference:

1. Briere, J. & Scott, C. (2006). *Principles of Trauma Therapy: A Guide to Symptoms, Evaluation, and Treatment*. USA: Sage Publications.
2. Dass-Brailsford, P. (2007). *A Practical Approach to Trauma: Empowering Interventions*. USA: Sage Publications.
3. Johnson, K. (2000). *School Crisis Management: a hands - on guide to training crisis response teams* (2nd ed.) Alamea, CA: Hunter House.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-1</b>	<b>6 Hrs Per week</b>
<b>Semester – VI</b>	<b>POSITIVE PSYCHOLOGY</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3602</b>		

**Objectives:**

- To orient students to the positive perspective of Psychology.
- To develop their understanding and practice of pro social behaviours.

**Unit: 1 Introduction**

Positive psychology- Meaning, Concept and Importance, Building human strength- Classification and Measures of Human strengths. The Pursuit of Happiness - The Happiness System, The Secret of Smiling, Positive Feelings as a Compass. Maslow's Toward a Psychology of Being.

**Unit: 2 Habits of Happiness**

Resilience- Concept and Importance, Resiliency Skills, Protective and Risk Factors, Strategies To Foster Resilience. Emotional Intelligence- Meaning, Concept and Importance.

**Unit: 3 Prosocial behaviour**

Pro Social Behaviour – Altruism, Empathy, Social Intelligence, Gratitude, Optimism, Modesty and Forgiveness. Love and Kindness- Triangular Theory of Love, Love Language.

**Unit: 4 Positive Emotional States and Processes**

The Principles of Pleasure: Understanding Positive Affect/Positive Emotions, Positive Environments, Positive Relationships, Positive Parenting, Positive Discipline, Positive Schooling, Positive Communities and Me/We Balance.

**Unit: 5 Self and Positive Psychology**

Self Esteem: The Immune System of Consciousness, Self-Regulation. Enhancing mental health, Positive Youth Development, Future of positive psychology.

**Reference:**

1. Snyder, C.R. et al, (2011), Positive Psychology, New Delhi, Sage Publications India Private Limited.
2. Snyder, C.R. ed., (2002), Handbook of Positive Psychology, New Delhi, Oxford University Press.
3. Seligman, M. E. (2004). Authentic happiness. (Paperback) New York: Free Press.



<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-2</b>	<b>6 Hrs Per week</b>
<b>Semester – VI</b>	<b>ORGANIZATIONAL BEHAVIOUR</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3604</b>		

### Objectives

- To provide information to students on compensation Management system and corporate quality
- To facilitate the students in bearing about Employee, Engagement Activities, Organizational culture and Training and Development

### UNIT.I Introduction to Organizational Behaviour:

Organization – Concept and Meaning. Concept of Organizational Behaviour (OB)- Importance of Organizational Behaviour. Key Elements of Organizational Behavior, Challenges and Opportunities for OB. Models of Organizational Behaviour - Autocratic Model, Custodial Model, Supportive Model, Collegial Model, System Model.

### UNIT. II Introduction to Interpersonal Behaviour and Learning:

Nature and meaning of Interpersonal Behaviour, Concept of Self, Transaction Analysis (TA), Benefits and uses of Transactional Analysis, Johari Window Model. Learning and Learning Cycle, Components of Learning.

### UNIT.III Organizational Culture:

Organizational Culture- concept, factors and impact- Developing sound organizational culture; Organizational change and Development- definition, concept- Organizational development approaches and techniques. Team Building. Concepts- Team effectiveness, significance of team working,

### UNIT.IV Employee Engagement:

Employee Engagement Activities, HR Audit, HRD Climate, Knowledge Management, Business Process Outsourcing, Corporate Social Responsibility: Concepts, Objectives, role of HR, significance of CSR, Social Accountability System.

### UNIT.V Organization Change and Development:

Organization Change and Development: Definition, Meaning and Need for Change, Strategies to Overcome Resistance, Process of Change. Training and Development: Definition, need and Scope of Training, Training Need Analysis, Methods of training, On-the-Job Training, Coaching, Mentoring, Management Games, Case Study, Role Plays, Job Rotation, Simulation Training, Training for workers, supervisors and managers. Evaluation of Training.

### Reference:

1. Luthans, F. (2010). *Organizational behaviour*. 12<sup>th</sup> ed. Boston: McGraw Hill International Edition.
2. Robbins, S.P. & Judge, T.A. (2016). *Organizational behaviour*. 16<sup>th</sup> Ed. New Delhi: Prentice- Hall of India Private Limited.
3. Pareek, U. (2007). *Understanding organizational behaviour*. 2<sup>nd</sup>. Ed. New Delhi: Oxford University Press.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-3</b>	<b>6 Hrs Per week</b>
<b>Semester – VI</b>	<b>RESEARCH PROJECT</b>	<b>Credit 6: MARKS:90</b>
<b>Code: PSY 3606</b>		

**Objectives:**

**On completing this course, one will have:**

- Developed the research competence.
- Each student is expected to complete research in a topic of his/her interest.
- They will carry out this project under faculty supervision.
- Project Vivo Voce will be conducted to evaluate their research project.

<b>B.Sc. PSYCHOLOGY</b>	<b>PART III MAJOR: CORE PAPER-4</b>	<b>5Hrs Per week</b>
<b>Semester – VI</b>	<b>SPORTS PSYCHOLOGY</b>	<b>Credit 5: MARKS:75</b>
<b>Code: PSY 3509</b>		

**Objectives:**

1. To enable the students to have knowledge on the sports psychology.
2. To enable students to understand the basic principles that governs sports psychology
3. To enable students to practice and guide the sports personnel's.

**Unit-1 Introduction to Sports Psychology**

Sports Psychology- Nature, Meaning, History and Scope. Present and future of sports psychology. Development of sports psychology in India, Role of sport and exercise psychologists.

**Unit-2 Motivation in Sports Psychology**

Motivation in sports psychology - Views and definitions of motivation, Guidelines for building motivation, Developing realistic view of motivation, Motivating sportspersons and building team morale, Developing achievement motivation and competitiveness in sports. Introduction to effective goal settings in sports.

**Unit-3 Competition and Cooperation**

Defining competition and cooperation, Enhancing Cooperation. Character development and sportspersonship, Moral reasoning and moral behavior, Guiding practice in character development, Effective coaching for young athletes.

**Unit-4 Personality and Sport**

Personality and sport - Measuring personality in sport and exercise. Anxiety and arousal regulation. Stress-Sources of stress, how arousal and anxiety affect performance, Imagery-Factors affecting imagery effectiveness, Keys to effective imagery, Self-confidence- Building self-confidence.

**Unit-5 Outcomes of Exercise**

Psychological well-being, Motivation, Achievement, Reduction of anxiety and depression, Mood changes, Personality and Cognitive functioning, quality of life and adherence.

**Reference:**

1. Burton, D., & Raedeke, T. (2008). Introduction to mental skills training. *Sport psychology for coaches*. Champaign, IL: Human Kinetics.
2. Weinberg, R.S., & Gould, D. (2011). *Foundations of sport and exercise psychology* (5th Ed.). Champaign, IL: Human Kinetics

**Department of Commerce**  
**THE AMERICAN COLLEGE**

**COURSE STRUCTURE – B.Com (Professional Accounting) 2018-19 onwards**

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
1	Part-I	CPA 1201	FRS/HIS/ செயலர் பணிமுறை	3	2	30
	Part-II	ENS 1201	Conversational Skills	3	2	30
	Major	CPA 1501	Financial Accounting-I	5	5	75
	Major	CPA 1403	Business Communication	4	4	60
	Major	CPA 1405	Business Economics	4	4	60
	LS	CPA 1207	Corporate Social Responsibility	3	2	30
	NME	CPA 1209	Practical Auditing	3	2	30
Supportive	MAS xxxx	Business Statistics	5	4	60	
<b>TOTAL</b>				<b>30</b>	<b>25</b>	<b>375</b>

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
2	Part-I	CPA 1202	FRS/HIS/ மேலாண்மைத் தத்துவங்கள்.	3	2	30
	Part-II	ENS 1202	Reading and Writing Skills	3	2	30
	Major	CPA 1502	Financial Accounting-II	5	5	75
	Major	CPA 1404	Business Law	4	4	60
	Major	CPA 1406	Business Environment	4	4	60
	LS	CPA 1208	Enterprise Resource Planning	3	2	30
	NME	CPA 1210	Customer Relationship Management	3	2	30
	Supportive	MAS xxxx	Business Mathematics	5	4	60
	Part-V	xxx 0000	NSS/PED/SLP	1	1	30
	<b>TOTAL</b>				<b>30 + 1</b>	<b>25 + 1</b>

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
3	Part-I	CPA 2201	FRS/HIS/ வாங்கியியல் சட்டம் மற்றும் நடைமுறைகள்.	3	2	30
	Part-II	ENS 2201	Study Skills	3	2	30
	Major	CPA 2501	Costing I	5	5	75
	Major	CPA 2603	Corporate Accounting I	6	6	90
	Major	CPA 2405	Income Tax I	4	4	60
	Major	CPA 2407	Company Law I	4	4	60
	Supportive	CPA 2409	Auditing and Assurance I	5	4	60
<b>TOTAL</b>				<b>30</b>	<b>27</b>	<b>405</b>

CPA 2

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
4	Part-I	CPA 2202	FRS/HIS/ காப்பீடு கோட்பாடுகளும் நடைமுறைகளும்	3	2	30
	Part-II	ENS 2202	Career Skills	3	2	30
	Major	CPA 2502	Costing II	5	5	75
	Major	CPA 2604	Corporate Accounting II	6	6	90
	Major	CPA 2406	Income Tax II	4	4	60
	Major	CPA 2408	Company Law II	4	4	60
	Supportive	CPA 2410	Auditing and Assurance II	5	4	60
	Part-V	xxx 0000	NSS/PED/ SLP	1	1	30
			<b>TOTAL</b>	<b>30 + 1</b>	<b>27 + 1</b>	<b>405/435</b>

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
5	LS	CPA 3201	Corporate Governance	3	2	30
	VAL	HVS 3200	Human Value Development	4	2	30
	Major	CPA 3601	Indirect Taxes	6	6	90
	Major	CPA 3603	Management Accounting	6	6	90
	Major	CPA 3605	Enterprise Information Systems	6	6	90
	Major	CPA 3507	Financial Markets and Services	5	5	75
			<b>TOTAL</b>	<b>30</b>	<b>27</b>	<b>405</b>

Semester	Course	Subject Code	Subject title	Hours	Credit	Marks
6	LS	CPA 3202	Accounting for Decision Making	3	2	30
	EVS	CPA 3200	Environmental Studies	4	2	30
	Major	CPA 3602	Financial Management	6	6	90
	Major	CPA 3604	Investment Management	6	6	90
	Major	CPA 3606	Strategic Management	6	6	90
	Major	CPA 3508	Operations Management	5	5	75
		<b>TOTAL</b>	<b>30</b>	<b>27</b>	<b>405</b>	

**SUPPORTIVE**

<b>Semester</b>	<b>Course Code</b>	<b>Subject Title</b>	<b>Hours</b>	<b>Credit</b>
1	MAS xxxx	Business Statistics	5	4
2	MAS xxxx	Business Mathematics	5	4
3	CPA 2409	Auditing and Assurance I	5	4
4	CPA 2410	Auditing and Assurance II	5	4

**NON – MAJOR ELECTIVE**

<b>Semester</b>	<b>Course Code</b>	<b>Subject Title</b>	<b>Hours</b>	<b>Credit</b>
1	CPA 1211	Practical Auditing	3	2
2	CPA 1212	Customer Relationship Management	3	2

**LIFE SKILL COURSES**

<b>Semester</b>	<b>Course Code</b>	<b>Subject Title</b>	<b>Hours</b>	<b>Credit</b>
1	CPA 1209	Corporate Social Responsibility	3	2
2	CPA 1210	Enterprise Resource Planning	3	2
5	CPA 3201	Corporate Governance	3	2
6	CPA 3202	Accounting for Decision Making	3	2

CPA 1201

செயலர் பணிமுறை

3 Hrs / 2 Cr

நோக்கம் :

செயலர் பணிமுறை படிப்பதன் மூலம் மாணவர்கள் நிறுமச்செயலரின் இலக்கணம் பணிகள் மற்றும் புதிய நிறுமம் தோற்றுவித்தல், பதிவு செய்தல், நிறுமச் சட்டம் நிறும மேலாண்மை மற்றும் நிர்வாகத்தைப் பற்றி அறிந்து கொள்ள முடியும்.

**அலகு I**

நிறுமமும் நிறுமச் செயலரும் : நிறுமம் - இலக்கணம் - தன்மைகள் - வகைகள் - நன்மைகள் மற்றும் தீமைகள் - நிறுமச்செயலர் - இலக்கணம் - தகுதி நிலை - நியமனம் - நீக்கம் - உரிமைகள் - கடமைகள் - பொறுப்புகள்.

**அலகு II**

நிறுமத்தை தோற்றுவித்தலும் நிறுமச்செயலரும் : நிறுமத்தை அமைப்பதற்கான முறைகள் - தோற்றுவித்தல் - பதிவு செய்தல் - மூலதனம் திரட்டுதல் - தொழிலைத் தொடங்குதல் - நிறுமத்தைத் தோற்றுவித்தலில் நிறுமச் செயலரின் கடமைகள் மற்றும் பொறுப்புகள்.

**அலகு III**

நிறுமத்திட்டங்களும் தீர்மானங்களும் : நிறுமக் கூட்டங்கள் - வகைகள் - இயக்குநரவைக் கூட்டம் - பங்குதாரர்களின் கூட்டம் - சட்டமுறைக் கூட்டம் - ஆண்டுப்பொதுக் கூட்டம் - அசாதாரணப் பொதுக்கூட்டம் - வகையினர் கூட்டம் - கூட்ட அழைப்பு - கூட்டம் நடத்தும் முறை - கூட்டம் நடத்தும் முறையில் செயலரின் பங்கு - கூட்டத்தலைவர் - நிகழ்ச்சி நிரல் - குறைவெண் - பதிலாள் - தீர்மானம் - வகைகள் - நிறைவேற்றும் விதம் - நிகழ்ச்சிக்கூறிப்பு ஆவணங்கள் மற்றும் அறிக்கைகள் தயார் செய்தல் - செயலரின் கடமைகள் .

**அலகு IV**

நிறும மேலாண்மையும் நிர்வாகமும் : இயக்குநர்கள் அவை - இயக்குநர்கள் நியமனம் - அதிகாரங்களும் பணிகளும் - கடமைகள் - பொறுப்புகள் - பதவி நீக்கம் - நிர்வாக இயக்குநர் — உரிமைகள், அதிகாரங்கள் மற்றும் கடமைகள் - தணிக்கையாளர் - கணக்காளர் - சட்ட ஆலோசகர் - தகுதிகள் - நியமனம் - நீக்கம் - அதிகாரங்கள் - கடமைகள் மற்றும் பொறுப்புகள் - செயலரின் கடமைகள்.

**அலகு V**

நிறுமக் கலைப்பு : பொருள் - நிறுமக் கலைப்பு முறைகள் - நிறுமக் கலைப்பு முறையின் படிநிலைகள் - கலைப்பாளர் - அதிகாரங்கள் - கடமைகள் - நிறுமக் கலைப்பும் நிறுமம் மூடப்படுதலும் - செயலரின் கடமைகள் .

**TEXT BOOK**

1. சரவணவேல் பி., கம்பெனிச்சட்டமும் செயலர் பணியும் தமிழ்நாட்டுப் பாடநூல் நிறுவனம், 2016

**REFERENCE BOOKS**

1. முத்தையன் இராம் ., செயலர் பணிமுறைகள் , தமிழ்நாட்டுப் பாடநூல் நிறுவனம், 2016
2. [Chandratte](#) K.R., Company Secretarial Practice Manual Hardcover, Lexis Nexis Publisher , 41, Radhakrishnan Salai, Mylapore, Chennai, 2016
3. Bhandari M.C., Guide to Company Law Procedure, Wadhwa and Company, Agra & Nagpur, 2015
4. Shanbhogue K.V., Company Law Procedure, Bharat Law House, New Delhi, 2014
5. Sharma M.L., Company Procedures and Registrar of Companies, Tax Publishers, Delhi, 2016

CPA 1501

FINANCIAL ACCOUNTING – I

5 Hrs / 5 Cr

**Objective:**

The objective of this course is to acquaint the students with Accounting Concepts, Tools and Techniques used in business organizations.

**UNIT I**

Financial Accounting – Double Entry System – Definition – Accounting Principles, Concepts and Conventions – Rules – Accounting Equation – Advantages of Double Entry System- Bank Reconciliation Statement - Preparation of Final Accounts- Trading, Profit and Loss Account and Balance Sheet – Adjustments.

**UNIT II**

Bills of Exchange and Promissory Notes- Features-Types of Bills-Trade Bills-Accommodation Bills-Accounting for Bills of Exchange-Retiring Bills Under Rebate-Dishonor of Bills- Renewal of Bills and Insolvency of Drawee- Sale of Goods on Approval or Return Basis-Methods

**UNIT III**

Depreciation: Meaning – Causes –Methods, Computation and Accounting Treatment of Depreciation- Change in Depreciation Methods

**UNIT IV**

Accounting for Non-Profit Organization- Receipts and Payments Account- Income and Expenditure account- Preparation of Income and Expenditure and Balance Sheet- Receipts and Payments Account and Balance sheet – Preparation of Opening and Closing Balance Sheet.

**UNIT V**

Inventories- Basis of Inventory Valuation and Record keeping- Rectification of Errors – Effects- Types- Suspense Account

**TEXT BOOK**

1. Shukla M. C., Grewal T.S. Gupta S.C., Advanced Accounts (Volume - 1), S.Chand Publications, New Delhi, 2014.

**REFERENCE BOOKS**

1. Gupta R.L., Radhaswamy M., Advanced Accountancy, Volume I, Sultan & Sons Publications, New Delhi, 2015
2. Reddy T.S. &Murthy A., Advanced Accountancy – Volume I, Margham Publications, Chennai, 2014.
3. Jain & Narang, Financial Accounting, Kalyani Publishers, Punjab, 2012.

**Objective:**

This course provides the students with an elaborate knowledge of office Management, Business Communication and Report writing. It also develops their learning, reading, listening, and writing skills and ability to communicate on their respective fields of business.

**UNIT I**

Essential of Communication: Introduction- Objectives-Communication- Media –Types - Barriers to Communication- Non-verbal Communication-Principles of Effective Communication.

**UNIT II**

Enquires: Need- Functions and Kinds of a Business Letter -Lay-Out- Enquires and Replies - Orders and their Execution- Credit and Status Enquires-Complaints and Adjustments- Collection Letters- Circular Letters and Sales Letters

**UNIT III**

Business Correspondence: Bank Correspondence, Insurance correspondence – Fire – Marine – Life Insurance; Import – Export Correspondence- Agency Correspondence.

**UNIT VI**

Employment Communication: Job Application Letters and Resume, Interview Letter, References, Testimonials, Letters of Appointment, Confirmation, Promotion, Retrenchment and Resignation. Characteristics of a Good Speech; Interview Techniques; Group Discussions and Presentation Skills

**UNIT V**

Reports: Introduction – Importance – Oral and Written Reports – Functional Areas – Special Features – Types – Short and Long Report – Characteristics of a Good Report; Proposals, Agenda, Minutes. Correspondence with Public Authority: Electronic Media – Internet – Email – Telecom Technology

**TEXT BOOK**

1. Rajendra Pal and Korlahalli, Essentials of Business Communication, Sultan Chand & Sons, New Delhi, 2016.

**REFERENCE BOOKS**

1. Rodriguez M.V., Effective Business Communication Concept, Vikas Publishing Company, New Delhi, 2013.
2. Sinha K.K., Business Communication, Galgotia Publishing Co, New Delhi, 2015.
3. Pillai.R.S.N.,Bagavathi, Business Communication, S.Chand, New Delhi, 2011.



CPA 1405

BUSINESS ECONOMICS

4 Hrs / 4 Cr

**Objective:**

To acquire knowledge and understanding of various economic principles and its applications in the real life of business

**UNIT I**

Introduction: Meaning and Definition of Business Economics - Scope and Nature of Economics – Methods of Economic Study – Basic Economic Concepts - Utility, Value, Cost, Price, Scarcity, firm, industry, supply, demand, production, consumption and market - Central Problem of an Economy – Production Possibility Curve – Objectives of Business Firm.

**UNIT II**

Demand and Supply Analysis: Demand: Meaning – Determinants of Demand – Laws of Demand – Elasticity of Demand : Types and Measurement – Consumer Equilibrium : Marginal Utility Theory – Indifference Curve Analysis – Demand Forecasting : Methods – Criteria for Good Forecasting Method – Supply: Meaning – Determinants – Law of Supply – Elasticity of Supply –Types - Market Equilibrium - Changes in Demand and Supply.

**UNIT III**

Production, Cost and Revenue Analysis: Production Analysis: Production Function- Factors of Production – Features – Laws of Production : Law of Variable Proportions – Law of Returns to Scale –Scale of Production - Economies and Diseconomies of Scale – Cost Analysis: Cost Concepts - Types of Costs - Short and Long Run Cost Curves – Relationship Between Average and Marginal Cost Curves and Total, Fixed and Variable Costs. Revenue Analysis: Revenue Concepts - Total Revenue, Average Revenue- Marginal Revenue - Revenue Curves – Relationship between Average and Marginal Revenue - Break-Even Analysis

**UNIT IV**

Pricing and Market Analysis: Pricing: Definition - Pricing of Products: Meaning - Methods - Factor Pricing - Meaning - Marginal Productivity Theory of Distribution - Modern Theory of Distribution - Market Analysis: Meaning of Market - Classifications - Market Structure: Perfect Competition : Features – Price, Output and Profit Determination in Short and Long Run – Monopoly : Features – Price, Output and Profit Determination in Short and Long Run – Types of Monopoly - Price Discrimination - Dumping – Monopolistic Competition : Features – Product Differentiation - Oligopoly : Features – Types.

**UNIT V**

Macro Economic Analysis: National Income: Basic Concepts - Methods of Measurement - Problems of National Income Analysis - Business Cycle: Meaning – Features – Phases of Business Cycle – Causes – Measures to Control Business Cycle. Inflation: Meaning - Types - Causes - Control Measures- Economic Reforms: Meaning - LPG Strategy - Reform Initiatives

**TEXT BOOK**

1. Varshney R.L and Maheswari K.L., Managerial Economics, Sultan Chand & Sons, New Delhi, 2014.

**REFERENCE BOOKS**

1. Sankaran S., Managerial Economics, Margham Publications, Chennai, 2015.
2. Sankar VG, Business Economics, Macmillan India Ltd, Chennai, 2008
3. Samuelson P. A, Business Economics, Macgraw Hill-Kgakwsia Co. London, 1999
4. Mankar, G. Business Economics, Vikas Publishing House, Mumbai, 2013.
5. Sundaram KPM, Business Economics, Sultan Chand & Sons, New Delhi, 2014.
6. Seth ML, Lakshmi Narain, Principles of Economics, Agarwal Education Publishers, Agra, 2008
7. Dwivedi D N, Managerial Economics, Vikas Publishing House Pvt, Ltd., New Delhi 2012
8. Jhingan ML and J K Stephen, Managerial Economics, Vrinda Publications (P) Ltd, New Delhi 2014.

**CPA 1207**

**CORPORATE SOCIAL RESPONSIBILITY**

**3 Hrs / 2 Cr**

**Objective:**

To provide perspective knowledge on Corporate Social Responsibility and its best practices in different kinds of business

**UNIT I**

Meaning and Definition of Corporate Social responsibility (CSR) - History and Evolution of CSR- Concept of Charity-Corporate Philanthropy-Corporate Citizenship-Concept of Sustainability and Stakeholder Management

**UNIT II**

CSR -Legislation in India - Section 135 of Companies Act 2013-Scope for CSR Activities under Schedule VII-Appointment of Independent Directors - Computation of Net Profit and Implementation Process in India.

**UNIT III**

Drivers of CSR in India-Market based Pressure and Incentives Civil Society Pressure-Regulatory Environment in India - Counter Trends- Performance in Major Business and Programs- Voluntarism Judicial Activism.

**UNIT IV**

Stakeholders of CSR – Role of Stakeholders- Role of Public Sector in CSR -Government Programs on CSR - Role of Non-Profit and Local Self Governance on CSR.

**UNIT V**

Global Compact Self Assessment Tool - National Voluntary Guidelines of Government of India - Roles and Responsibilities of Corporate Foundations.

**TEXT BOOK**

1. Sharma, J.P, Corporate Governance and Social Responsibility of Business, Ane Books Pvt. Ltd, New Delhi, 2012

**REFERENCE BOOKS**

1. Baxi, Ajit Prasad C. V., Corporate Social Responsibility: Concepts and Cases: The Indian, Excel Books, New Delhi, 2005.
2. Madumitha Chatterji, Corporate Social Responsibility, oxford university Press, UK, 2014

CPA 1209

PRACTICAL AUDITING

3 Hrs /2 Cr

**Objective:**

The objective of this course is to gain knowledge in auditing principles, procedures, techniques and skills needed in the field of auditing.

**UNIT I**

Auditing – Meaning – Definition- Features- Objectives- Advantages- Disadvantages - Qualification of an Auditor – Duties and Responsibilities of an Auditor.

**UNIT II**

Audit - Classifications-Statutory Audit-External and Internal Audit- Continuous Audit - Interim Audit- Financial Audit- Management Audit - Cost Audit - Balance sheet Audit

**UNIT III**

Audit Programme – Contents of Audit Programme - Types of Audit Programme -Audit Note Book - Audit Working Papers – Audit Planning - Audit Manual – Audit Memorandum- Audit Report.

**UNIT IV**

Internal Control – Definition – Features – Objectives – Advantages of Internal Control System – Internal Check - Definition – Features- Criteria - Vouching- Meaning – Definition – Objectives- Types of Vouchers.

**UNIT V**

Auditors of Limited Companies – Appointment - Remuneration – Removal - Rights and Powers - Liabilities of an Auditor under the Companies Act.

**TEXT BOOK**

1. Tandon B.N, A Handbook of Practical Auditing, S.Chand publishers, New Delhi, 2003.

**REFERENCE BOOKS**

1. Dinkar Pagre, Principles of Auditing, Sulthan Chand & Sons, New Delhi, 2002
2. Saxena and Saravanavel, Practical Auditing,, Himalaya Publishing House, New Delhi, 2004.
3. Khanna Pandey and Ahuja, Practical Auditing, S Chand & Co Ltd, New Delhi, 2002.
4. Sundar K., Paari., Practical Auditing, Vijay Nicole Imprints Private Limited, Chennai, 2014

CPA 1202

மேலாண்மைத் தத்துவங்கள்

3 Hrs / 2 Cr

நோக்கம் :

மேலாண்மைத் தத்துவங்களை படிப்பதன் மூலம் மாணவர்கள் மேலாண்மையின் பொருள், மேலாண்மையின் முக்கியத்துவம், பணிகள், கோட்பாடுகள், நிலைகள் மற்றும் மேலாண்மையின் இயல்பையும் சிறப்புத் தன்மைகளையும் அறிந்து கொள்ள முடியும்.

**அலகு I**

மேலாண்மை அறிமுகம்: தோற்றம் - அறிமுகம் - மேலாண்மை பொருள் - இலக்கணம் - சிறப்புத் தன்மைகள் - முக்கியத்துவம் - நிலைகள் - பணிகள் - கோட்பாடுகள் - நிர்வாகம் மற்றும் மேலாண்மைக்கான வேறுபாடுகள்

**அலகு II**

திட்டமிருதலும் முடிவெடுத்தலும்: திட்டமிருதல் - பொருள் - வரைவிலக்கணம் - இயல்பு - நன்மைகள் மற்றும் முக்கியத்துவம் - குறைபாடுகள்- படிநிலைகள் - திட்டத்தின் செயல் கூறுகள் - திட்டமிருதலின் வகைகள் - முடிவெடுத்தல் - பொருள் - வரைவிலக்கணம் - இயல்புகள் - வகைகள்- படிநிலைகள் - நன்மைகள் - குறைபாடுகள்

**அலகு III**

ஒழுங்கமைத்தலும் அதிகார ஒப்படைத்தலும்: ஒழுங்கமைப்பு - பொருள் - வரைவிலக்கணம் - இயல்புகள் - கோட்பாடுகள் - நன்மைகள் - நடைமுறை ஒழுங்கமைப்பின் வகைகள் - முறையான ஒழுங்கமைப்புக்கும் முறையற்ற ஒழுங்கமைப்புக்கும் உள்ள வேறுபாடுகள் - அதிகார ஒப்படைத்தல் - பொருள் - வரைவிலக்கணம் - தன்மைகள்- படிநிலைகள்- கோட்பாடுகள் - நன்மைகள்- குறைபாடுகள்.

**அலகு IV**

இயக்குதலும் கட்டுப்படுத்துதலும்: இயக்குதல் - பொருள் - வரைவிலக்கணம்- கூறுகள் - தத்துவங்கள் - தன்மைகள்- முக்கியத்துவம் - இயக்குதலின் வழிகள். கட்டுப்படுத்துதல்- பொருள் - வரைவிலக்கணம் - சிறப்பியல்புகள் - நடைமுறை- நன்மைகள்- கட்டுப்படுத்துதலில் எழும் பிரச்சனைகள்.

**அலகு V**

செயல் ஊக்கமளித்தல்: பொருள் -வரைவிலக்கணம் - சிறப்பியல்புகள் - தகவல் நடைமுறை - நன்மைகள்- வகைகள் - தகவல் தொடர்பின் தடைகள் - தகவல் தொடர்பின் தடைகளை அகற்றும் முயற்சிகள் - செயல் ஊக்கமளித்தல் - பொருள் - சிறப்பியல்புகள் - நடைமுறைகள் - முக்கியத்துவம் - கோட்பாடுகள் .

**TEXT BOOK**

1. ராதா V, மேலாண்மைத் தத்துவங்கள், பிரசன்னா பப்ளிசர்ஸ், திருவல்லிக்கேணி , சென்னை - 600 005.

**REFERENCE BOOKS**

1. Lallan Prasad, Principles of Management, S. Chand Publishers, New Delhi, 2010
2. Prasad L M, Principles of Management, S. Chand Publishers, New Delhi, 2010
3. Mamoria C B, Personnel Management, Kitab Mahal, Kolkatta, 2008
4. Gupta C B, Human Resource Management, Sultan Chand, New Delhi, 2010.

**Objective:**

To impart fundamental knowledge of accounting and introduce the accounting procedure applicable to various forms of organizations

**UNIT I**

Single Entry System - Concept of Single Entry System-Computation of Profit Under Statement of Affairs Method- Conversion of Single Entry System Into Double Entry System of Accounting.

**UNIT II**

Consignment Accounts- Features – Distinction between Sale and Consignment –Account Sales- Recurring and Non - Recurring Expenses-Accounting Treatment of Consignment Transaction.

**UNIT III**

Joint ventures- Features-Joint Venture Vs Partnership-When Separate Books are Kept-When Separate Books are not Kept- Memorandum Joint Venture.

**UNIT IV**

Partnership Accounts- Deed-Profit and Loss Appropriation Accounts- Final Accounts of Partnership Firms – Basic Concepts of Admission- Calculation of Ratios-Adjustments on Reserves- Goodwill- Accumulated Profit- Problems

**UNIT V**

Retirement and Death of a Partner Including Treatment of Goodwill- Profit Sharing Ratio- Memorandum of Revaluation Account- Joint Life Policy- Accounting Treatment.

**TEXT BOOK**

3. Shukla M. C., Grewal T.S., Gupta S.C., Advanced Accounts (Volume - 1) S.Chand Publications, New Delhi, 2014.

**REFERENCE BOOKS**

1. Gupta R.L., Radhaswamy M., Advanced Accountancy, Volume I, Sultan & Sons Publications, New Delhi 2015
2. Reddy T.S. & Murthy A., Advanced Accountancy – Volume I, Margham Publications, Chennai, 2014.
3. Jain & Narang, Financial Accounting, Kalyani Publishers, Punjab, 2012.

**CPA 1404****BUSINESS LAW****4 Hrs / 4 Cr****Objective:**

To enable the students to understand the fundamentals of law relating to commercial activities.

**UNIT I**

Indian Contract Act 1872 – Contract – Definition – Obligation and Agreement – Nature of Contract and Classification – Components of Valid contract – Offer and Acceptance – Consideration- Capacity – Free consent – Unlawful Agreements – Quasi Contracts.

**UNIT II**

Different Modes of Discharge of Contract – Remedies for Breach – Principle for Awarding Damages. Contract of Indemnity and Guarantee – Rights of Surety – Discharge of Surety – Pawn or Pledge – Rights of Pawnee – Rights and Liabilities of Finder of Lost Goods.

**UNIT III**

Law of Agency – Kinds of Agency – Export Facto Agency Requirements – Rights and Liabilities of Principals and Agents.

## CPA 12

### UNIT IV

Indian Partnership Act 1932 – Definition and Tests of Partnership –Implied Authority of Partners – Limitations - Firm’s Debts and Private Debts – Priority in Discharge- Rights and Liabilities of Partners – Dissolution of Partnership firm. The Limited Liability Partnership (LLP) Act, 2008 - Definitions – Origin – LLP in India - Salient features of LLP - Difference between LLP and Partnership - LLP Versus Company - LLP agreement - Nature of LLP - Partners and Designated Partners – Partners and Their Relations -Incorporation Document - Incorporation - Registered Office of LLP – Advantages and Disadvantages of LLP.

### UNIT V:

Rights and Duties of Common Carriers – Contract of Carriage of Goods by Sea – Bill of Lading and Charter Party- Distinction. Sale of Goods Act 1930 – Definition of Sale – Sale and Agreement to Sell – Rules Regarding Passing of Property in Goods. Condition and Warranties – Actual and Implied – Principle of “Caveat Emptor” and its Limitations - Rights of Unpaid

### TEXT BOOK

1. Kapoor N.D., Business Laws, Sultan Chand & Sons, New Delhi, 2013

### REFERENCE BOOKS

1. Tuteja S.K, Business Law for Managers, Sultan Chand & Sons, New Delhi, 2006.
2. Kapoor G.K, Lectures on Business and Corporate Laws, Sultan Chand & Sons, New Delhi, 2005.
3. Kuchhal M C, Mercantile Law, Vikas Publishing House Pvt. Ltd, New Delhi, 2004.
4. Agarwal, Indian Business Laws, Galgotra Publications, 2006.

## CPA 1406

## BUSINESS ENVIRONMENT

4 Hrs/ 4 Cr

### Objective:

To impart basic knowledge of common business and commercial concepts and to inculcate a habit to remain updated about developments in the business and commercial world.

### UNIT I

Introduction to Business - Nature of Business, Profession and Employment - Objectives of Business - Business and Commercial Knowledge- Economic and Non-Economic Activities.

### UNIT II

Business Environment - Micro and Macro Environment, Elements of Micro Environment – Consumers/Customers, Competitors, Organization, Market, Suppliers, Intermediaries, Elements of Macro Environment – Demographic, Economic, Political-Legal, Socio Cultural, Technological and Global Environment.

### UNIT III

Business Organizations - Top Indian and Global Companies - Government Policies for Business Growth - Policies Creating Conducive Business Environment – Start-ups- E-Commerce. Liberalization, Privatization, Foreign Direct Investment.

**UNIT IV**

Organizations Facilitating Business - Indian Regulatory Bodies – SEBI, RBI, IRDA, CCI, FMC, CBDT, CBEC Indian Development Banks – IFCI, IDBI, SIDBI, EXIM Bank, NABARD - Global Organizations and World Trade Bodies – IMF, ADB, WTO, OECD, SAARC, ASEAN, OPEC.

**UNIT V**

Accounting Bodies – IFAC, IASB, IESB, CAPA, SAFA, and AOSSG - Common Business and Commercial Terminologies - Finance, Marketing and other Business terms - Stock Market Terminology

**TEXT BOOK**

1. Francis Cherunilam, Business Environment, Himalaya Publishing House Pvt Ltd, Chennai. 2017

**REFERENCE BOOKS**

1. Aswathappa K, Essentials of Business Environment, Himalaya Publishing House, New Delhi, 2003.
2. Raj Aggrawal, Business Environment, Tamilnadu Book House, Chennai, 2005.
3. Gupta C B, Business Environment, Sultan Chand & Sons, New Delhi, 2005.
4. Bhatia B.S, Globalization and Business Management, Tamilnadu Book House, Chennai, 2005.

**CPA 1208****ENTERPRISE RESOURCE PLANNING****3 Hrs / 2 Cr****Objective:**

To comprehend the technical aspects of Enterprise Resource Planning systems, to be able to map business processes using mapping techniques and to understand the steps and describe typical functionality in an ERP system

**UNIT I**

**Introduction:** Enterprise Resource Planning – Origin – Need for an ERP System - Risks And Benefits – Reason for the growth of ERP Market - Issues to be Consider in Planning Design and implementation of Cross Functional Integrated ERP Systems.

**UNIT II**

ERP Solutions and Functional Modules: Overview of ERP Software Solutions- Small, Medium and Large Enterprise Vendor Solutions, BPR, and Best Business Practices- Business Process Management - Functional Modules- Information system: Components of an information system- Different types of information system

**UNIT III**

ERP Implementation: Planning Evaluation and Selection of ERP Systems - Implementation Life Cycle – ERP Implementation, Methodology and Frame Work- Training – ERP Selection Methods and Criteria – Process - Data Migration - People Organization in implementation Consultants, Vendors and Employees – Pros and Cons of ERP Implementation – Factors for the Success of an ERP Implementation

## **CPA 14**

### **UNIT IV**

ERP Market: Introduction - Systems, Applications and Products in Data Processing (SAPAG)- Baan Company - Oracle Corporation - People Soft - JD Edwards World Solutions Company - System Software Associates, Inc. (SSA); QAD; A Comparative Assessment and Selection of ERP Packages and Modules.

### **UNIT V**

Future Directions in ERP: New Markets - New Channels - Faster Implementation Methodologies - Business Modules and BAPIs - Convergence on Windows NT; - Application Platform - New Business Segments; More Features - Web Enabling - Market Snapshot.

### **TEXT BOOK**

1. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice Prentice Hall of India, 2006.

### **REFERENCE BOOKS**

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Sinha P. Magal and Jeffery Word, Essentials of Business Process and Information System, Wiley India, 2012
3. Mahadeo Jaiswal and Ganesh Vanapalli, Enterprise Resource Planning, Macmillan India, 2009
4. Summer, Enterprise Resource Planning, Pearson Education, 2008
5. Alexis Leon, Enterprise Resource Planning, Second edition, Tata McGraw-Hill, 2008.

## **CPA 1210                      CUSTOMER RELATIONSHIP MANAGEMENT                      3 Hrs / 2 Cr**

### **Objective:**

The objective of this course is to make the students to understand the need and importance of maintaining a good relationship with the customer in promoting the business.

### **UNIT 1**

Introduction -Definitions - Concepts and Context of Relationship Management – Evolution - Transactional Vs Relationship Approach – CRM as a Strategic Marketing Tool – CRM Significance to the Stakeholders

### **UNIT II**

Customer Information Database – Customer Profile Analysis - Customer Perception, Expectations Analysis – Customer behavior in Relationship Perspectives; Individual and Group Customers - Customer Life Time Value – Selection of Profitable Customer Segments

### **UNIT III**

Elements of CRM – CRM Process – Strategies for Customer Acquisition – Retention and Prevention of Defection – Models of CRM – CRM Road Map for Business Applications

### **UNIT IV**

Strategic CRM Planning Process – Implementation Issues – CRM Tools- Analytical CRM – Operational CRM – Call Center Management – Role of CRM Managers



**UNIT V**

E- CRM Solutions – Data Warehousing – Data Mining for CRM – An Introduction to CRM Software Packages

**TEXTBOOK**

1. Shainesh G., Jagdish, Sheth N., Customer Relationships Management -Strategic Perspective, Macmillan India , Chennai, 2005.

**REFERENCES**

1. John Anton, Customer Relationship Management, Prentice Hall India, 2013.
2. Jim Catheart, Eight Competencies of Relationship Selling, Macmillan India, Chennai, 2005.

## Department of Visual Communication

### The American College, Madurai

#### Diploma courses

Course No	Course Title	Hrs/wk	Credits
<b>DIPLOMA IN PHOTOGRAPHY</b>			
DVP 1501	Basics of Photography	6	5
DVP1503	Techniques in Photography	6	5
DVP1505	Contemporary trends in Photography	6	5
	Total	18/wk	15
<b>DIPLOMA IN VIDEO EDITING</b>			
DVE1501	Basics of Non linear Editing	6	5
DVE 1503	Effects and Transitions in Video Editing	6	5
DVE 1505	Post production stages	6	5
	Total	18/wk	15
<b>DIPLOMA IN SOUND RECORDING</b>			
DSR1501	Introduction to Sound and Music	6	5
DSR 1503	Digital Audio Workstations	6	5
DSR1505	Audio Recording and Mastering	6	5
	Total	18/wk	15
<b>DIPLOMA IN GRAPHICS &amp; ANIMATION</b>			
DGA 1501	Introduction to Drawing	6	5
DGA 1503	2D Animation	6	5
DGA 1505	3D Modeling	6	5
	Total	18/wk	15

## DIPLOMA IN PHOTOGRAPHY

**Course Duration** : 6 months

**Course Eligibility** : Pass in Higher Secondary Examination

**Total no of contact hours** : 270 Hrs

### Course Objective

To enable the learners to be acquainted with basics in photography and helps the students to develop the photography skills in digital era.

Sl. No	COURSE CODE	Paper Name
1	DVP 1501	Basics of Photography
2	DVP 1503	Techniques in Photography
3	DVP 1505	Contemporary trends in Photography

### Learning Outcome:

Diploma in Photography is a course designed to teach and train the participants to become professional photographers. The course comprises theory and practical sessions to orient the students towards creativity involved in photography. The sessions are devised not only to provide knowledge, understanding and skills but also to provide experience and expertise in photography.

At the end of the course, students shall be able to

- i. Know the basics of photography.
- ii. Understand the different types of photography and appreciate the usage of lighting and
- iii. Develop image editing skills.

At the end of the course, the trained participants shall find placement in industry or work as freelancers.

**Software** : Adobe Photoshop

DVP1501

**BASICS OF PHOTOGRAPHY****6 Hrs/week – 5 Credits****Course Objective:**

- To enable the learners to be acquainted with basics in photography shots, camera angles and types of lens.
- To enable the learners to understand the concepts of colours in photography.

**Unit I**

Basics of camera – Components of camera - Camera Vs Eye – Basic types of Shots

**Unit II**

Types of camera – Lens – Types of lens – Prime lens – Normal Lens – Wide angle lens – Telephoto lens - Fish eye lens – Micro lens – Macro lens

**Unit III**

Image – Pixels – Resolution - Aperture - Shutter speed – ISO – Depth of Field – Camera controls – White balance

**Unit IV**

Composition: Rule of third – Headroom – Nose room – Lead room - CCD – CMOS - Handling DSLR Camera and its techniques

**Unit V**

Color in photography – RGB Color – CMYK Color – Focal length - Depth of focus

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Ashok Dilwali (2013), ‘*All About Photography*’, National Book Trust, NewDelhi,

**Reference Books**

- Chris Gatcurn (2013), “*The Beginner’s of Photography guide*”, DK; 2<sup>nd</sup> Edition, South Chind Printing Company
- Rajkumar. C.J, (2014), “*Pixel*”, Discovery Book Palace
- Bryan Peterson (2010), “*Understanding Exposure*”,

**DVP 1503**

**TECHNIQUES IN PHOTOGRAPHY**

**6hrs/week – 5 credits**

**Course Objectives:**

- To enable the learners to understand the significance of technical aspects in photography
- To enable the learners to know about the types of filters and types of photography

**Unit I**

Lighting - Three point lighting - Types of lighting: Indoor lighting - Outdoor lighting – Advantages of lighting

**Unit-II**

Exposure – Under exposure – Over exposure - Sources to control the exposure

**Unit-III**

Filters – Usage of filters in camera – Advantages of filters - Types of filters – Polarizing filters – UV Filters – ND Filters

**Unit IV**

High speed photography - Motion Blur – Monochromatic Color photography – Smoke Art photography – Macro photography

**Unit V**

Long Exposure Photography – Multiple exposures – Manual focus

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

1. Ashok Dilwali, All About Photography, National Book Trust, NewDelhi, 2013

**Reference Books**

- Chris Gatcurn (2013), *“The Beginner’s of Photography guide”*, DK; 2<sup>nd</sup> Edition, South Chind Printing Company
- Rajkumar. C.J, (2014), *“Pixel”*, Discovery Book Palace
- Bryan Peterson (2010), *“Understanding Exposure”*,

**DVP 1505 CONTEMPORARY TRENDS IN PHOTOGRAPHY**

**6hrs/week – 5 credits**

**Course Objectives**

- To enable the learners to understand the types of photography in contemporary era
- To enable the students to know about the role of photography in various media

**Unit I**

Portrait - Event photography -Table Top photography - AD photography – Candid photography – Night light photography – Street photography

**Unit II**

Photography in various fields – Product photography - Landscape photography - Wild life photography – Sports photography

**Unit III**

Photo Journalism – Basics, Goals and applications of photo journalism – Photo journalism as a profession

**Unit IV**

Digital photography - Image Technique – Photo Manipulation

**Unit V**

Usage of Adobe Photoshop for editing the photographs

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Ashok Dilwali (2013), ‘ ‘ *All About Photography*’, National Book Trust, NewDelhi,

**Reference Books**

- Chris Gatcurn (2013), “*The Beginner’s of Photography guide*”, DK; 2<sup>nd</sup> Edition, South Chind Printing Company
- Rajkumar. C.J, (2014), “*Pixel*”, Discovery Book Palace
- Bryan Peterson (2010), “*Understanding Exposure*”,

## DIPLOMA IN VIDEO EDITING

**Course Duration** : 6months

**Course Eligibility** : Pass in Higher Secondary Examination

**Total no of contact hours** : 270 Hrs

### Course Objective

To enable the learners to be acquainted with basics, developments and applications of Video Editing in digital age.

S. No	COURSE CODE	Paper Name
1	DVE 1501	Basics of Non linear Editing
2	DVE 1503	Effects and Transitions
3	DVE 1505	Post production stages

### Learning Outcome:

Diploma in Video Editing is a course designed to teach and train the students for becoming trained technicians and also professionals in the field of Video Editing. The course comprises theory and practical sessions and these sessions shall provide not only Knowledge, understanding and skills but also exposure, experience and expertise in Video Editing.

At the end of the course, students shall be able to

- i. Know and understand the usage of editing in film making
- ii. Appreciate the visual grammar and visual aesthetics
- iii. Develop skills to edit both fiction and nonfiction by using the state-of-the-art facilities

At the end of the course, the trained students shall have the opportunities to work as freelancers and team workers in industries.

**Soft ware:** Final Cut Pro, Adobe Premiere

**DVE 1501                      BASICS OF NON LINEAR EDITING**

**6hrs/week – 5 credits**

**Course Objective**

- To understand about the basics of editing and its techniques.
- To know about the importance and application of editing software and storyboard.

**Unit I**

Fundamentals of NLE, capturing, mastering, import and export footages, EDL

**Unit II**

Shots, sequence, Framing, montage - Timeline, Footages, Techniques of software

**Unit III**

Rough cut, Final cut, Color correction, Match cut, Insert time, Space and Time

**Unit IV**

Intermediate shot sequences, storyboarding and script writing

**Unit V**

Adobe After effects: Introduction and its basics

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Robert M. Goodman & Patrick Mc Grath (2003), *“Editing Digital Video: The complete Creative and technical guide”*:1<sup>st</sup> edition, Mc Graw Hill,

**Reference Books**

- Aaron Goold, (2017), *“The Video Editing Handbook”*
- Michael Wohl, (2001), *“Editing Techniques with Final Cut Pro”*
- Gael Chandler (2006), *“Cut by Cut: Editing your Film or Video”*, Michael Wiese Productions,



**DVE 1503                      EFFECTS AND TRANSITIONS**

**6hrs/week – 5 credits**

**Course Objectives**

- To understand the techniques of editing and postproduction stages
- To know about the conventional and contemporary techniques in editing

**Unit I**

Principles of editing techniques, time code, timeline, Rhythmic editing

**Unit II**

Editing in software, basic effects and transitions, VFX, SFX

**Unit III**

Editing- Online editing, Offline editing, real time, Dubbing

**Unit IV**

Timeline for video and audio tracks- Edit tracks in the time line – Create consequences and nested sequences

**Unit V**

Add transitions – Use the color correction tools – Sync clips from multiple cameras – Add shapes, texts and logos

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Robert M. Goodman & Patrick Mc Grath (2003), “*Editing Digital Video: The complete Creative and technical guide*”:1<sup>st</sup> edition, Mc Graw Hill,

**Reference Books**

- Aaron Goold, (2017), “*The Video Editing Handbook*”
- Michael Wohl, (2001), “*Editing Techniques with Final Cut Pro*”
- Gael Chandler (2006), ‘*Cut by Cut: Editing your Film or Video*’, Michael Wiese Productions,

**DVE 1505 POST PRODUCTION STAGES**

**6hrs/week – 5 credits**

**Course Objectives**

- To understand about the post production techniques
- To know about the formats of editing

**Unit I**

Post production, color correction techniques & Effects

**Unit II**

Compression and editing - synchronization, output techniques, stabilization

**Unit III**

Output formats to media, Video file Output formats, HD output formats

**Unit IV**

Insert and Assemble editing - Limitation of analogue signal – Time code and editing – Record run – Free run

**Unit V**

Continuity Editing - Cut aways and cut-in – Perennial Techniques – Screen direction - Matching visual design

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Robert M. Goodman & Patrick Mc Grath (2003), ‘*Editing Digital Video: The complete Creative and technical guide*’:1<sup>st</sup> edition, Mc Graw Hill,

**Reference Books**

- Aaron Goold, (2017), ‘*The Video Editing Handbook*’
- Michael Wohl, (2001), ‘*Editing Techniques with Final Cut Pro*’
- Gael Chandler (2006), ‘*Cut by Cut: Editing your Film or Video*’, Michael Wiese Productions,

## DIPLOMA IN SOUND RECORDING

**Course Duration:** 6 months

**Course Eligibility:** Pass in Higher Secondary Examination

**Total no of contact hours** : 270 Hrs

### Course Objective

To enable the learners to be acquainted with basics, developments and applications of Sound Recording in digital age.

Sl. No	COURSE CODE	Paper Name
1	DSR 1501	Introduction to Sound and Music
2	DSR 1503	Digital Audio Workstations
3	DSR 1505	Audio Recording and Mastering

### Learning Outcome:

Diploma in Sound Recording is a course designed to teach and train the students for becoming trained technicians and also professionals in the field of Sound Recording. The course comprises theory and practical sessions and these sessions shall provide not only knowledge, understanding and skills but also exposure, experience and expertise in Sound Recording.

At the end of the course, students shall be able to

- i. Know the musical styles and musical genres
- ii. Understand the live recording and studio recording.
- iii. Develop skills to compose music and dubbing using sound effects

At the end of the course, the trained students shall find placement in radio, television and film industry.

**Software:** Cubase

**DSR 1501                    INTRODUCTION TO SOUND & MUSIC**

**6hrs/week – 5 credits**

**Course Objectives**

- To know about the basic of sound techniques
- To understand about the formats of music and its genres

**Unit I**

Nature of Sound – Properties of Sound Waves – Amplitude – Frequency and Phase - Noise

**Unit II**

Music basics - Perception of loudness, pitch and direction – Sound and Texture

**Unit III**

Music and its elements – Pitch – Melody – Harmony – Scale – Rhythm – Dynamics - Musical Form - Voices

**Unit IV**

Musical styles and Genres – Contemporary Styles – Pop – Rock – Jazz – Hip Hop - Mash up

**Unit V**

Introduction to music production: Recording - Editing - mixing and mastering - Studio equipments - Acoustics.

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Francis Rumsey and Tim Mc Cormick (2009), “*Sound and Recording : An Introduction*”, 5<sup>th</sup> edition, Focal Press UK,

**Reference Books:**

- Francis Rumsey & Tim Mc Cormic (2013), “*Sound and Recording*” (6<sup>th</sup> Edition), Focal Press
- John Borwick (2001), “*Sound Recording Practice*”, 4<sup>th</sup> Edition, Oxford University Press
- David Miles Huber & Robert E Runstein, (2014) “*Modern Recording Techniques*”, Focal Press,

**DSR 1503                      DIGITAL AUDIO WORKSTATIONS**

**6hrs/week – 5 credits**

**Course Objectives**

- To know about the nuances of sound techniques
- To understand about the operating systems and types of microphone in sound recording

**Unit I**

Introduction to DAW – Computer configuration and specification – Recording, Editing, and mixing

**Unit II**

Introduction to microphones – Types of microphones: Large Diaphragm Condenser Mics – Small Diaphragm Condenser Mics – Dynamic Mics – Ribbon Mics – USB Mics – Boundary Mics

**Unit III**

Working in various operating systems - Effects and Signal Processors: Dynamic Processors, compressors

**Unit IV**

Reverberation - Delay – Phases and flingers - Analog to digital converters.

**Unit V**

Sound recording - Cylindrical phonograph – Gram phone – Magnetic tape – Stereo - Digital Recording

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Francis Runsey and Tim Mc Cormick (2009), ‘*Sound and Recording : An Introduction*’, 5<sup>th</sup> edition, Focal Press UK,

**Reference Books:**

- Francis Rumsey & Tim Mc Cormic (2013), “*Sound and Recording*” (6<sup>th</sup> Edition), Focal Press
- John Borwick (2001), “*Sound Recording Practice*”, 4<sup>th</sup> Edition, Oxford University Press
- David Miles Huber & Robert E Runstein, (2014) “*Modern Recording Techniques*”, Focal Press,

**DSR 1505                      AUDIO RECORDING AND MASTERING**

**6hrs/week – 5 credits**

**Course Objective**

- To understand the techniques of audio formats and instruments used in sound recording
- To know about the techniques of postproduction in sound recording.

**Unit I**

Audio Formats: Uncompressed audio format – Lossless Compressed audio format – Lossy Compressed audio format

**Unit II**

Basic music theory - MIDI – MIDI input – MIDI sequencer - Virtual instruments VST

**Unit III**

Editing Preproduction: Sound design and planning - Production: Location sound recording

**Unit IV**

Equipments and specifications - Daily logs - Post production: dubbing – background score

**Unit V**

SFX – Final mastering and audio balance – Sound design for various visual genres

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Francis Runsey and Tim Mc Cormick (2009), ‘*Sound and Recording : An Introduction*’, 5<sup>th</sup> edition, Focal Press UK,

**Reference Books:**

- Francis Rumsey & Tim Mc Cormic (2013), ‘*Sound and Recording*’ (6<sup>th</sup> Edition), Focal Press
- John Borwick (2001), ‘*Sound Recording Practice*’, 4<sup>th</sup> Edition, Oxford University Press
- David Miles Huber & Robert E Runstein, (2014) ‘*Modern Recording Techniques*’, Focal Press,

## DIPLOMA IN GRAPHICS & ANIMATION

**Course Duration** : 6months

**Course Eligibility** : Pass in Higher Secondary Examination

**Total no of contact hours** : 270 Hrs

### Course Objective

To enable the learners to be acquainted with basics, developments and applications of animation in digital age.

Sl. No	Course Code	Course Title
1	DGA 1501	Introduction to Drawing
2	DGA 1503	2D Animation
3	DGA 1505	3D Modeling

### Learning Outcome:

Diploma in Graphics and Animation is a course designed to teach and train the students for becoming trained technicians and also professionals in the field of Graphics and Animation. The course comprises theory and practical sessions and these sessions shall provide not only Knowledge, understanding and skills but also exposure, experience and expertise in Graphics and Animation.

At the end of the course, students shall be able to

- i. Know the fundamentals of graphics and animation
- ii. Understand the various tools of modeling
- iii. Get hands on training in 3D Modeling, Rigging an Animation

At the end of the course, the trained participants shall find placements in various areas including Television, film, advertisements and production houses for Animation

**Software: Maya, 3D Max, Flash**

**DGA 1501****INTRODUCTION TO DRAWING****6hrs/week – 5 credits****Course Objectives:**

- To understand the learners to know about the basics of drawing and its elements
- To understand about the types of drawing in contemporary trends

**Unit I**

Drawing basics - Dot, line, shape, form, texture

**Unit II**

Perspectives: One point, Two point, Three point

**Unit III**

Colors: Primary, Secondary, Tertiary, Warm, Cool – Color wheel

**Unit IV**

Water color – Oil color - Acrylic Color – Mixed media - Creative Composition

**Unit V**

Drawing tools in flash – Brushes in flash – Grouping and ungrouping – symbols and transform menu-  
Tracing bitmaps.

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Gioanni Civardi, (2010), *“Drawing: A Complete Guide (Art of Drawing)”*, Search Press Limited,

**Reference Books:**

- Rod Stephens (2000), *“Visual Basic Graphics Programming (2<sup>nd</sup> Edition)”*, Benchmark Production,
- Liz Blazer (2015), *“Animated Storytelling: Simple Steps for creating animation and Motion Graphics”*,
- Christian Vasile (2017) *“Learning the basic elements and principles of Graphic Design”*



DGA 1503

## 2-D ANIMATION

**6hrs/week –5 credits****Course Objectives**

- To enable the students to know about the various software in 2D animation
- To understand the properties and elements of 2D animation

**Unit I**

Introduction to 2-D animation: Introduction to Adobe flash - Frame-by-frame animation - Motion tweening - Shape tweening

**Unit II**

Creating mask – Static Mask and Text mask - Motion Guide - Creating a Button- Button Action Script- Storyboard creation.

**Unit III**

Editing layer properties - Text more in flash – Breaking apart a text in flash – adding sound file to flash projects

**Unit IV**

Applying a filter effect on Graphics – Optimizing Flash Movie – Publishing Flash movies - Creating a flash project – basics of flash publishing.

**Unit V**

Basic HTML scripting – About the web colors – Web banner creation – Converting movie file to FLV

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Giovanni Civardi, (2010), *‘Drawing: A Complete Guide (Art of Drawing)’*, Search Press Limited,

**Reference Books:**

- Rod Stephens (2000), *‘Visual Basic Graphics Programming (2<sup>nd</sup> Edition)’*, Benchmark Production,
- Liz Blazer (2015), *‘Animated Storytelling: Simple Steps for creating animation and Motion Graphics’*,
- Christian Vasile (2017) *‘Learning the basic elements and principles of Graphic Design’*

DGA 1505

**3-D MODELING****6hrs/week – 5 credits****Course Objectives**

- To know about the basics in 3D animation
- To understand about the lighting and texturing techniques in 3D animation

**Unit I**

Modeling – Introduction to MAYA – Tools for modeling – Create basic modeling - Poly Modeling

**Unit II**

Shading - Introduction to Hyper shade - Maya nodes – 2D &amp; 3D Textures for UV mapping

**Unit III**

Lighting and Texturing – Introduction to Maya lights - Working with the flash library – Working with video in flash - adding video to a flash document – Working with flash filters.

**Unit IV**

Introduction to Monterey - Caustics - Illumination – final gathering

**Unit V**

Rigging - Introduction for rigging - Skeleton - Creating two leg skeleton - Skimming - Introduction to Walk cycle – Camera rendering

**Evaluation Pattern:**

II Internal continuous Assessment will be conducted during the course period for 60 Marks (30+30), External Examinations will be conducted for 60 Marks at the end of the course. Practical exam will be conducted for 40marks

**Text Book**

- Gioanni Civardi, (2010), *“Drawing: A Complete Guide (Art of Drawing)”*, Search Press Limited,

**Reference Books:**

- Rod Stephens (2000), *“Visual Basic Graphics Programming (2<sup>nd</sup> Edition)”*, Benchmark Production,
- Liz Blazer (2015), *“Animated Storytelling: Simple Steps for creating animation and Motion Graphics”*,
- Christian Vasile (2017) *“Learning the basic elements and principles of Graphic Design”*

THE AMERICAN COLLEGE – COMMUNITY COLLEGE

Diploma in Aquaculture

Sem	Course No	Course Title	Hrs/wk	Cr.
I	<b>General Education</b>			
	ENC 1403	Conversational Skill	4	4
	CSD 1403	Fundamentals of Computers	4	4
	LSD 1403	Fundamentals of Life Coping Skills	4	4
	<b>Skill Component</b>			
	DAQ 1405	Basic of Aquaculture	4	4
	DAQ 1407	Fin fish and Shell Fish Culture	4	4
	DAQ 1903	Aquaculture Lab – I	10	10
	<b>Job Training</b>			
	DAQ 1409	Internship I	120/sem	4
	<b>Total</b>		<b>34</b>	
II	<b>General Education</b>			
	ENC 1404	Reading and writing skills	4	4
	CSD 1404	Office Automation tools	4	4
	LCD 1404	Performance and Life Coping Skills	4	4
	<b>Skill Component</b>			
	DAQ 1406	Ornamental Fish Culture	4	4
	DAQ 1408	Shrimp Farming	4	4
	DAQ 1904	Aquaculture Lab – II	10	10
	<b>Job Training</b>			
	DAQ 1410	Internship II	120/sem	4
	<b>Total</b>		<b>34</b>	

- Theory / Lab courses - 1 credit = 15 hours/Semester
- Internship – 1 credit = 30 hours/Semester

## DAQ 2

**ENC 1403**

**Conversational Skills**

**4Hrs/4 Cr.**

The Course aims at helping students converse in English on the matters that matter to them in daily life. It provides the learners with ample opportunities and social contexts through conversations so that they can freely and fluently use informal English. It also exposes them to the apt vocabulary of such informal conversations.

### **Specific Learning Outcome**

At the completion of this course the students shall be able to

- enhance their conversational fluency as well accuracy
- fine-tune their pronunciation and accent
- become familiar with and therefore effortlessly internalize the structures of English

**Unit 1:** Introducing oneself and introducing others

**Unit 2:** Conversation in contexts - Day-to-day matters like eating, emotions, fashion, health, friendship, money, housing, job, faith & hope, busy life, memory, shopping, time, Traffic, travelling, vacation, weather

**Unit 3:** Social expressions

**Unit 4:** Practice in formal conversation

**Unit 5:** Practice in informal conversation

### **Text Book:**

Sekar, J.J. 2014 *Conversational Skills*. Madurai. Department of English, The American College.

**CSD 1403**

**Fundamentals of Computers**

**4hrs/Wk – 4 credits**

### **Specific Learning Outcome:**

After completing this course students will be able to

- Understand the computer generations and components.
- Understand basic functionality of the computer.
- Understand the computer data representation.

**Unit I: Introduction to computers** Generations of computers –components of computer – hardware – software -classification of computers – advantages and limitations – applications of computer

**Unit II: Components of the Computer** CPU - I/O devices – Types and Features.

**Unit III: Computer Memory** Primary memory – secondary memory-auxiliary storage devices– cache memory CD – DVD –Pen drive – backup.

**Unit IV: Data representation** Data – Meaning - Information –Representation - files - Computer words.

**Unit V: Number Systems in computer** Decimal, Binary, Octal and Hexa Decimal - Representation–Conversions.

**Textbook:**

Alphonse X, ICRDCE publication, December 2011.

**Reference:**

Curtin, D. P. Foley, K.Kunalsen, Morin.C “Information Technology- The Breaking Wave”, TataMcGraw Hill, 2002.

**LSD 1403            FUNDAMENTALS OF LIFE COPING SKILLS            4 hrs/Wk–4 Cr**

This is a foundational course which elicits the necessity for every student to understand the areas of development in moulding their behavior, character and personality through various soft skill sets.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand the need for identifying and developing the skill
- Manage and adjust their characteristics of personality
- Understand the importance of learning communication skills and Self
- Appreciate the benefits of being assertive

**Unit 1: Introduction to Skills**

Introduction to skills – Definition of Coping - Social Skills – Four levels: Foundation, Interactive, Affective, Cognitive – Understanding Body Language

**Unit II: Personality Development**

Definition of Personality – Characteristics of Personality – Ways to develop personality – Personality types – Four basic temperament

**Unit III: Self Transformation**

Self Identity – Self Concept – Self acceptance – Self discovery – Self Esteem: High & Low Self esteem – Johari Window

**Unit IV: Communication Skills**

Understanding communication – Types of communication – Styles of communication – Patterns of communication – Importance of communication – Effective & Efficient communication

**Unit V: Assertive Skills**

Assertive Behaviour – Benefits of being Assertive – Types of Assertion – Assertion rights – Developing assertive skill

## DAQ 4

### References:

1. Alphonse, X. 2011, "We shall overcome" A Text book on Life coping skills", ICRDCE Publication, Chennai
2. AIACHE Publication 2014, New Delhi, "Human Values Development

### DAQ 1405

### Basics of Aquaculture

4h/wk-4cr

This theory course deals with the basic and applied aspects of nutritive values of fish, different types of aquaculture practices in India with special reference to exotic and major carps. Various ornamental fishes, shrimps and mollusc are also included. The physico-chemical analysis of water and their impact on aquatic systems are given importance. Emphasis is given to live feed, dry feed and their formulation to enhance production.

Specific learning out come at the end of the course students will be able to

- Understand the basic needs of proteins food.
- Explain the types of aquaculture practices.
- Differentiate different types of fishes and invertebrates.
- Describe the need for water quality management and nutrient requirement.
- Diagnose the aquatic pathogens and their control measures.

#### UNIT-I. Introduction

Food Security-protein crisis-PEM-nutritive value of fish and fishery products-need for aquaculture - culture Fisheries-selection of candidate species

#### UNIT-II. Types and practices of aquaculture

Types-Inland, brackish water, mariculture and metahaline aquaculture. Practices-culture in ponds, riverside, dams and lakes, temple and irrigation tanks and raceways-Integrated farming.

#### UNIT-III. Cultivable organisms

Indian major carps-exotic carps-air breathing fishes-cat fishes-ornamental fishes-shell fishes-crustaceans and molluscs.

#### UNIT-IV. Water quality and nutrition:

Ecosystem-lotic-lentic-brackish water-marine environment-water-physical, chemical and biological characteristics-fish nutrition-nutritional requirements-feed-formulation and preparation-supplementary feed.

#### UNIT-V Microbial infections and disease diagnosis and control measures

Microbial world and their structure characters- Bacteria, Viruses, fungi, algae-pathogenicity and virulence-source of infection- morphological, physiological and sociological diagnosis-microbiological water quality management- application of probiotics, drugs, chemicals and antibiotics.

#### Text book:

Gilbert. B. 1990: Aquaculture – Vol II. Horwood.

**References:**

1. Jingaran, V.G.1991 Fish and Fisheries of India. Hindustan Publ.Corporation (India).
2. Pillay, T.V.R., 1990: Aquaculture, Principles and practices. Fishing News books Ltd. Mpeda publication.
3. Aline.w.- Fish diseases.

**DAQ 1407****Fin fish and Shell fish culture****4h/wk-4cr**

This course is designed to introduce the various techniques involved in the construction of fish ponds and their management. The second section deals with the various techniques involved in fish seed production. The third section deals with seed collection, storing and rearing. The last unit is concerned with fresh water prawn culture and management.

Specific learning outcome- students will be able to

- Explain the designing and managing fish pond.
- Describe the procedure adopted for composite and integrated fish farming.
- Understand the techniques involved freshwater prawn culture.
- Design cages, pen for fish cultivation.

**UNIT-I. Construction of fish farm**

Site selection-fish pond structure – construction-types of fish ponds-pond community-control of aquatic weeds and predatory fishes.

**UNIT-II. Fish farm management**

Nursery, rearing and production ponds-Indian major carps, Chinese carps-induced breeding - jar hatchery- seed fish production-transport of breeders and seed fish.

**UNIT-III. Composite fish culture, integrated fish farming and composite fish culture**

Composite fish culture-Species-feeding-seed collection-feeding- pond rearing techniques-economics-pearl and edible oyster culture-mussel culture. Fish culture in rice fields-freshwater fish culture with pigs, chicks and ducks -waste by products used as in puts in fish farming- vegetables gardening and using vegetable waste as fish/ pig feed.

**UNIT-IV. Culture of fresh water prawn**

Characteristics and distribution-seed production, collection of seeds-management of production ponds-growth and production.

**Unit -V. Cage, pen culture and crab culture**

Rearing fish within fixed or floating net- construction of cage of bamboo, wood or metal for pond fish culture-Harvesting difficulties-designing pen with enclosures-Evection pen cages at fish pond/ reservoir bottom-pond crab *Scylla* Species culture with over hanging fencing-monoculture with intensive farming-Feeding commercial and fish wastes.

**Text book:**

Pillay T.V.R., (1990) Aquaculture: Principles and practices. Fishing news books. Cambridge university press, Cambridge.U.K.

Jhingran. V.G. and Talwar. S.K – Fisheries of India ( 161 1 & 2 )

## DAQ 6

### Reference:

1. Michael B. and somsakSingholka 2002 FAO, Manual on freshwater Prawn farming. UNDP –FAO, Rome
2. Midlen and T.A.Redding (1998) Environmental Management for Aquaculture. Kluwer academic publishers, London.
3. New, M.B. 2000. Fresh water prawn farming.CRC Publications.
4. Welcomme.R.L. 2001: Inland Fisheries: Ecology and Management, Fishing news Books.
5. Santhanam .S.Fisheries science.

## DAQ 1903

### Aquaculture Lab -- I

10h/wk-10cr

The laboratory component includes exercises for collection and identification of Fin fish and shell fish and their physiology. Maintenance of pond and culture techniques is studied. Specific learning outcome at the end of the course the students will be able to

- Identify the commercially important fishes.
  - Analyze the gut content, fecundity and GSI in fishes.
  - Examine the water quality parameters.
  - Perform hypophysation and learn induced breeding techniques.
1. Collection and identification of commercially important fresh water and marine fishes.
  2. Gut content analysis of fishes with different feeding habits
  3. Estimation of fecundity and gonad somatic index of commercially important fishes.
  4. Assessment of seed quality and feed ration calculation.
  5. Lime and fertilizer requirement calculations.
  6. Analysis of water: Turbidity, pH, Dissolved oxygen
  7. Primary productivity, estimation by Light and Dark bottle method.
  8. Preparation of pituitary extract.
  9. Visiting nearby aquaculture farms and dams

### Reference:

T.V.R.Pillay (1990) Aquaculture: Principles and practices. Fishing news books. Cambridge  
University press, Cambridge. U.K.



**ENC 1404****Reading and Writing Skills****4 Hrs./4 Cr.**

The Course aims at improving the learners' productive skills of English. It offers professional guidance on meaningful and aggressive reading experiences by familiarizing them with techniques and micro-skills of reading, comprehension abilities through literary and non-literary reading materials. It also strengthens their writing skills through the forms of writing that are useful to them academically and vocationally.

**Specific Learning Outcome:**

At the completion of this course the students shall be able to

- i. Get training in aggressive speed reading with different sub-skills
- ii. Improve their comprehension abilities
- iii. Learn the art and craft of paragraph and a five-paragraph essay writing

**Unit 1:** Reading at various speeds, skimming & scanning, inferring & interpreting, predicting

**Unit 2:** Reading practice

**Unit 3:** Writing leave letters, apology letters and permission letters

**Unit 4:** Paragraph writing

**Unit 5:** Five-paragraph essay writing

**Text Book:**

Sekar, JJ. 2014. *Reading and Writing Skills*. Madurai. Department of English, The American College.

**CSD 1404****Office Automation Tools****4hrs/Wk – 4 credits****Specific Learning Outcome:**

After completing this course students will be able to

- edit and format text data and tables to make a Document.
- design worksheet and manipulate data and represent through graphs
- design a Slide show presentation and show in Multimedia form.

**Unit I: Microsoft Word** Working with text - Formatting paragraph -Numbered and Bulleted lists -Working with Tables

## DAQ 8

**Unit II: Mail Merging and Graphics** - Spelling and Grammar Checking - Page format – Working with graphics

**Unit III: Microsoft Excel** Modifying a Worksheet -Formatting cells -Formula cells

**Unit IV: Functions and Charts** Formulae and Functions - Sorting and Filtering - Graphics – Charts.

**Unit V: Power-Point** Working with slides -Color Schemes – Graphics – Slide Effects – Master Slides – Presentations-Slide Shows–Animations.

### **Textbook:**

MS-Office 2003 Manual by Microsoft

### **Reference**

Curtin D.P, Kim Foley K, Kunalsen, Morin. C, “Information Technology- The Breaking Wave”, TataMcGraw Hill 2002.

## **LSD 1404 PERFORMANCE AND LIFE COPING SKILLS 4 hrs/Wk – 4 Cr**

This course aims at nurturing the students in their career development by way of inculcating a set of essential skills which will guide and shape them to grow as confident and successful individuals.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand goal setting and ways to manage their time
- Find out the ways to motivate themselves and others
- Appreciate the need for problem solving skill in everyone’s life
- Understand stress and how to cope up with stress
- Realize the importance of dealing with emotions for positive mental health

### **Unit I: GOAL SETTING**

Definition – Importance of Goals – SMART Goal & Time management – Types of Goals - Obstacles – Successful and Meaningful life

### **Unit II: MOTIVATION SKILL**

Introduction to Motivation & Inspiration – Internal and External motivation – Methods of Motivation – Effects of de motivation

### **Unit III: PROBLEM SOLVING SKILL**

Definition of problem – Reasons for problems – Stages of solving problems: Evaluation, Managing, Decision making, Resolving, Results

**Unit IV: STRESS MANAGEMENT**

Definition of Stress: Positive (Eustress), Negative (Distress) – Stressors: Internal, External – Causes of Stress – Types of Stress – Ways to manage stress

**Unit V: TIME MANAGEMENT**

Need for time management – Poor Time management – Saboteur Time styles – Techniques for managing time

**References:**

1. Alphonse, X. 2011, “We shall overcome” A Text book on Life coping skills”, ICRDCE Publication, Chennai

**DAQ 1406****Ornamental fish culture****4h/wk-4cr**

This course is designed to impart views and essential methods regarding various aspects of ornamental fish culture with practical approach. It introduces the types of aquaria, aquarium fishes and aquarium plants, breeding techniques and their transportation. Finally various diseases attacking the fishes and control measures are dealt with.

Specific learning of outcome at the end of this course student will able to

- Explain the methodology to keep an aquarium
- Describe the characters of ornamental fishes and plants
- Enlist the various feed and their impact on growth
- Understand the methods of rearing marine ornamental fish and invertebrates
- Explain the diagnostic methods for ornamental fish diseases

**UNIT-1: Aquarium****keeping**

History - kinds of aquaria - setting up of an aquarium - requirements for maintaining an aquarium - aquarium accessories - risk factors.

**UNIT-II : Popular ornamental fishes**

Life bearers, nest builders, mouth bearers, egg layers - life cycle and spawning - plants for aquarium -exotic and indigenous plants.

**Unit – III: Marine ornamental fishes in aquarium**

Marine ornamental fishes in aquarium – status and breeding – methods of collection and rearing of marine ornamental fishes - keeping marine invertebrate in aquarium

**UNIT-IV: Food, feeding, breeding and transport methods**

Importance live feed - induced maturation technique - Transport methods and preservation

**UNIT-V: Diseases and Economics**

Infections bacterial and viral diseases, parasitic any mycotic diseases. Diseases and non-infection diseases control and management - quarantine tanks - prophylaxis – vaccines, immune stimulants and probiotics - pet shops and fish dealers.

## DAQ 10

### Text book:

1. Carl, E. Bond. 1979. Biology of fishes, Saunders College publications.
2. Bijukumar. A – Rearing aquarium fishes

### References:

1. Yadav, B.N 2006. Fish and fisheries 4<sup>th</sup> edition. Daya publishing House.
2. Stickney, R.R. 1979 Principles of Aquaculture. John Wiley & Sons, NY
3. Axelrod, H.R., 1967. Breeding aquarium fishes. TFH publications Inc. England.
4. Srivastava, C.B.L., 1985. Textbook of fishery science and Indian Fisheries. Kutub Mahal Publications, Allahabad.
5. Thabrow De, W.V. 1981. Popular aquarium plants. Thornbill Press. UK.
6. Madhusoodana kurup. Et al, ornamental fish – breeding, farming and trade.

## DAQ 1408

### Shrimp farming

4h/wk-4credits

This course aims at providing students with a comprehensive knowledge on important aspects of the shrimp farming techniques. Basic concepts in shrimp biology, their culture methods including water quality maintenance in ponds and feeding will be thought. Special emphasis is given for disease prevention and various control measures. The harvesting techniques and grading the catch is discussed in the later part. Finally organizations involved in export and government schemes are dealt.

Specific learning outcome at the end of session students will be able to

- Explain the stages of growth in shrimps
- Describe different breeding techniques
- Understand the need to improve water quality during culture
- Explain the feeding schedule and diseases diagnosis in shrimp culture

### UNIT-I. Shrimp biology

Habit and habitat-life cycle of different Penaeids-culture based on economic and commercial considerations-developmental stages-culture based on types and designs of culture sites.

### UNIT-II. Seed collection and Induced breeding

Wild collection and breeding-hatchery practices-Nurseries-eye stalk ablation-reproduction hormone induction-use of growth promoters and probiotics

### UNIT-III. Culture methods

Monoculture-Polyculture-Grow out ponds-pre-treatment of inlet water-Water quality maintenance – water recycling – treatment of farm effluent and sediments.

### UNIT-IV: Feeding diseases diagnosis and treatment.

Natural and supplementary feed-feeding ratio-feeding device and methods - factors affecting digestibility -nutrition deficiency diseases -infectious diseases and diagnosis-antibodies, drugs and chemicals and their mode of action-methods of treatment.

**UNIT- V. Harvesting, preservation, mortality and Economics**

Harvesting methods-precautions observed during harvesting-preservation techniques-sorting and grading the catch-seafood export promotion and organizations involved-role of co-operatives in shrimp export.

**Text book:**

1. Kurien, C.V and Sebastian.V.O. 1976 Prawns and prawn Fisheries of India. Hindustan Pub.Co.
2. Chakra barty. C & Sadhu A.k. 2000 – Biology hatchers and culture technology of tiger Prawn and giant freshwater Prawn, Daya publication house.

**Reference:**

1. Chen, T.P. 1976 Aquaculture practices in Taiwan. Fishing News (Books) Ltd., England.
2. Pillay, T.V.R. and Dill.M.A. 1979 Advances in Aquaculture. Fishing News (Books) Ltd., England.
3. Bose, A.N. Gosh.C.T,Yong and A.Mitra, 1991 Coastal Aquaculture Engineering. Oxford & IBH Publishing company Pvt.Ltd.

**DAQ 1904****Aquaculture Lab -- II****10h/wk 10credits**

The laboratory component includes exercises for identification of various ornamental fishes and their breeding techniques. In Shrimp farming the large-scale cultivation techniques pond preparation work and its maintenance will be taught.

Specific learning outcome: at the end of the course students will able to

- Identify commercial ornamental fish and shrimp
  - Prepare feed with natural food ingredients
  - Analyze water quality parameters
  - Identify the diseases symptoms in shrimps
- 1) Collection and identification of commercially important ornamental fishes.
  - 2) Estimating the growth parameters
  - 3) Conditioning and packing of ornamental fishes
  - 4) Preparation of feed for ornamental fishes. Floating and sinking
  - 5) Identification of ornamental fish diseases and prophylactic measures.
  - 6) Collection and identification of commercially important shrimps.
  - 7) Types of fertilizers-pond preparation in shrimp culture.
  - 8) Analysis of Water quality parameters.
  - 9) Estimation of feed intake and growth monitoring.
  - 10) Study of disease causing microbes
  - 11) Estimation of bacterial population in water and shrimps.

**Text book:**

Srivastava, C.B.L., 1985.Textbook of fishery science and Indian Fisheries. KutubMahal Publications, Allahabad.

**References:**

1. Kurien, C.V and Sebastian.V.O. 1976 Prawns and Prawn Fisheries of India. Hindustan Pub. Co.
2. Boyd, C.E. 1982 Water quality Management for pond fish culture. Elsevier scientific Publishing Company.

## AMERICAN COLLEGE – COMMUNITY COLLEGE

## Advanced Diploma in Aquaculture

Sem	Course No	Course Title	Hrs/wk	Cr.
III	<b>General Education</b>			
	ENC 2403	Studies skills	4	4
	CSA 2403	Operating System	4	4
	LSA 2403	Coping with Psychological and Physical Issues	4	4
	<b>Skill Component</b>			
	AAQ 2405	Fish Seed Production	4	4
	AAQ 2407	Live Feed Production	4	4
	AAQ 2903	Aquaculture Lab – III	10	10
	<b>Job Training</b>			
	AAQ 2409	Internship III	120/sem	4
	<b>Total</b>		<b>34</b>	
IV	<b>General Education</b>			
	ENC 2404	Career skills	4	4
	CSA 2404	Programming Techniques using C	4	4
	LSA 2404	Coping with Social and Environmental Issues	4	4
	<b>Skill Component</b>			
	AAQ 2406	Fish Feed Technology	4	4
	AAQ 2408	Post harvest technology	4	4
	AAQ 2904	Aquaculture Lab – IV	10	10
	<b>Job Training</b>			
	AAQ 2410	Internship IV	120/sem	4
	<b>Total</b>		<b>34</b>	

- Theory / Lab courses - 1 credit = 15 hours/Semester
- Internship – 1 credit = 30 hours/Semester

## AAQ 2

**ENC 2403**

**Study Skills**

**4Hrs/4 Cr**

The third sequential General English Course aims at empowering Advance Diploma students with study skills necessary to continue their chosen major disciplines. The course will help students to develop study skills and strategies for academic success.

### **Specific Learning Outcome:**

At the end of the course, students shall be able to

- develop healthy study habits and improve homework habits
- fine tune their academic skills
- apply time management skills
- understand psychological traits
- use ICT skills

### **Unit 1 General**

Definition & scope of study skills, study habits, strategies to improve study skills

### **Unit 2 Academic Skills**

Effective reading strategies & essay writing, note taking & making, summarizing, paraphrasing, information transfer

### **Unit 3 Time Management**

Motivation & success, barrier to time management

### **Unit 4 Psychological Traits**

Concentration skills, memory, coping with test anxiety, critical thinking

### **Unit 5 ICT**

ICT skills

Textbook

Sekar, J.J. 2015. Study Skills. Madurai: Department of English, The American College

**CSA 2403**

**Operating Systems**

**4hrs/Wk. – 4 Cr**

### **Specific Learning Outcome:**

After completing this course students will be able to

- Understand the role of Operating system as an interface between user and computer.
- Understand the basic functionality of Operating system.
- Understand the operation of Mobile OS.

**Unit I: Introduction to operating system** BIOS – DOS – Windows - types of operating system – operating system services - desktop operating system

**Unit II: Network operating System** - Server operating system – mainframe operating system – embedded operating system.

**Unit III: Windows** - Features of Windows Operating system – Multiprogramming

**Unit IV: Process / Memory Scheduling** - Multitasking – Buffering – Spooling – Time sharing – Browser support.

**Unit V: Introduction to Android** Application of Android – Features of Android – Messaging -Voice based features- Multitasking-Screen Capture-Video Calling-Multiple Language support.

**Text books:**

1. Alphonse X, 2011 ICRDCE publication, December
2. Silberchatz, Galvin and Gagne, 1999. Operating system concepts, John Wiley and sons.

**References:**

1. Curtin D.P, Foley K, Kunalsen, Morin, C. 2002. Information Technology- The Breaking Wave, TataMcGraw Hill.
2. [http://en.wikipedia.org/wiki/List\\_of\\_features\\_in\\_Android](http://en.wikipedia.org/wiki/List_of_features_in_Android)

**LSA 2403**

**4 hrs/Wk – 4 Cr**

**COPING WITH PSYCHOLOGICAL AND PHYSICAL ISSUES**

This **course** aims at making the students understand the need for learning psychological and physical issues which pose as a challenge in the transforming societies. Also, it directs them to take charge of their lives through various ways and cope up with such issues.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand the types of fear and shyness and the ways of overcoming them
- Manage emotions and stress
- Appreciate the types and styles of communications
- Understand the ways of coping with addiction and sexuality

**Unit I: Coping with Fear and Shyness**

Understanding Fear - Types of Fear – Overcoming Fear – Shyness – Types – Managing Shyness

**Unit II: Coping with Emotions & Stress**

Types of Emotions – Managing Emotions – Stress – Types & Need for understanding stress –Ways to manage stress

**Unit III: Communication & Failure**

Communication – Types & Styles – Ways to improve communication – Failure – Managing Failures



## AAQ 4

### **Unit IV: Coping with Addictions**

Drug addictions – Causes of addiction – Physical & Societal implications – Internet Addiction – Cyber crime - Types and causes – Managing addictions

### **Unit V: Coping with Sexuality**

Sex and Gender – Understanding Gender discrimination – Coping with gender discrimination – Understanding Sexuality – Consequences of Premarital & extra martial sexual issues – Managing sexuality

#### **References:**

1. “We shall overcome - A Text book on Life coping skills”, Indian Centre for Research and Development of Community Education (ICRDCE) Publication, Alphonse, X. 2011, Chennai
2. “Living with Honour”, Macmillan Publishers India Ltd., Shiv Khera 2003
3. “Smart Guide to Relieving Stress”, Wiley, Carole Bodger, 1999
4. “Managing Stress”, National Press Publications, Kristine C. Brewer 1995

## AAQ 2405

### **Fish Seed production**

**4h/wk-4cr**

This course on fish seed production deals with various reproductive behaviors and breeding techniques. It also includes the hypophysation and using other ovulating agents in fish breeding. Various methods in transporting the seed fish and breeders are also discussed in detail.

Specific learning outcome at the end of the course students will be able to

- Explain the reproductive strategies in fishes
- Describe the artificial breeding techniques and problems
- Adopt themselves for proper transportation of live stock

#### **UNIT-I. Reproductive biology of carps, air breathing fishes breeding season**

Reproduction in carps-sexual dimorphism, maturation, spawning of fish-factors affecting reproduction of air breathing fishes - channa, clarius and anabas.

#### **UNIT-II. Natural and Induced breeding**

Survey of seed resources and requirements-carp and prawn wild seed resources in brackish water and major rivers-bundh breeding types, techniques and problems-fecundity and mortality.

#### **UNIT-III. Induced breeding**

Hypophysation of major carps and exotic carps-pituitary gland collection and preservation-other ovulating agents, their dosage for injections-precautions-water quality.

#### **UNIT IV. Seed production and hatchery:**

Criteria for site selection of hatchery and nursery-hatchery system design and operation-larval rearing stages, rearing technology-culture and use of different live feed in hatcheries.

**UNIT-V. Transport of seed fish and Breeders**

Transport methods in fish seed and brood fishes-causes of mortality during transport, open and closed system-use of anesthetics.

**Text book:**

Jhingaran, V.G.1991 Fish and Fisheries of India. Hindustan Publ. Corporation (India).

**References:**

1. John.E.Bardach John H.Ryther,William O.McLarney, 1972 Aquaculture-The Farming and Husbandry of Freshwater and Marine organisms. John Wiley& Sons, NY.
2. Pondey, A.C.1990 Air Breathing Fishes. Reliance Publishing House, New Delhi.
3. Chondar, C.L.1980 Hypophysation of Indian major carps, Satish Book Enterprise, Agra.
4. Thomas,P.C. .2003. Breeding and seed production of finfish and shell fish, Daya publishing house, New Delhi.
5. CMFRI Bulletin, 1987- national seminar on shell fish resources and farming.

**AAQ 2407****Live feed production****4h/wk-4credits**

Live feed production is emerging areas where the live organisms are cultivated in mass to fulfill the feed requirements. Emphasis is given to the cultivation of Diatoms, Rotifers, Artemia and Daphnia. Various techniques involved in their cultivation are discussed in detail.

Specific learning outcome at the end of the session students will be able to

- Explain the importance of life feed in aquaculture
- Describe the culture techniques for diatoms, rotifer, Artemia and daphnia.
- Emphasis the need for green algae and spirulina as supplementary feed.

**UNIT-I. Mass culture of Diatoms**

Methods of culture, maintenance of pure culture of diatoms-different media used for culture-batch culture, continuous culture and mass culture.

**UNIT-II. Culture of Rotifers**

Methods of collection, maintenance and rearing of rotifers-mass culture-harvest, storage and feeding.

**UNIT-III. Artemia culture**

Different strains of Artemia-Artemia culture, cyst production, enrichment of Artemia cyst and larvae - encapsulation of Artemia cyst, hatching, storage and feeding.

**UNIT-IV. Mass culture of Daphnia**

Construction and preparation of culture tanks-field collection and isolation-inoculation and water quality maintenance-harvesting and sampling.

## AAQ 6

### UNIT-V. Culture of green algae and spirulina

Algae as natural food source- collection and isolation enrichment and establishing unialgal culture-parameters regulating algal growth – procurement of spirulina seed and standardization development of inoculum- culturing –separation and washing of biomass-drying of biomass.

#### Textbook:

Lavens,P. and Sorgeloss,P. 1996.Manual on production and use of live food for aquaculture. FAO. Fisheries Technical paper,361, FAO,Rome.

#### References:

1. Santhanam, R., Ramanathan, M.Vekataramanujam.1997: A Manual of Methods in Plankton. Fisheries College, TNVAS.University, Tuticorin.
2. CIFE Publin. 1993.Training manual on culture of live food organisms for aqua hatcheries. Central Institute of Fisheries education, Versova, Mumbai, India.
3. Muthu, M.S., 1983. Culture of Live feed organisms. Tech. paper 14. Summer Institute in Hatchery production of prawn seeds. CMFRI, Cochin.

## AAQ 2903

### Aquaculture Lab - III

10h/wk-10credits

The laboratory component includes exercises for identification of sexually matured fish and shrimp and their breeding techniques. In live feed production large scale cultivation of various organisms will be taught.

Specific learning outcome at the end of the session students will be able to

- Analyze the sexual maturity in fish sample
  - Collect wild seeds from natural habit
  - Prepare culture media for live feed culture
  - Gain experience through visiting nearby aqua forms
- 1) Biological analysis of fish samples for maturity stages and fecundity.
  - 2) Standardization of commercial ovulating agents.
  - 3) Designing and estimation of area of construction for freshwater fish seed production.
  - 4) Wild seed collection from natural sources.
  - 5) Visiting aquaculture farms and finfish hatcheries.
  - 6) Collection, identification and isolation of live food organisms.
  - 7) Preparation of culture media.
  - 8) Identifying different strains of artemia and its culture.
  - 9) Collection of rotifers and rearing.
  - 10) Construction and preparation of Daphnia culture tanks.
  - 11) Mass culture of Cladocerans, copepods and rotifers.
  - 12) Culture of earthworms and chironomid larvae.
  - 13) Visit to Manimuthar and Bhavani sagar During breeding season
  - 14) Visit to Fresh water prawn farm

**Text book:**

Jingaran, V.G. 1982 Fish and Fisheries of India. Hindustan Publ. Corporation (India).

**Reference:**

Lavens,P. and Sorgeloss,P. 1996.Manual on production and use of live food for aquaculture. FAO.Fisheries Technical paper,361,FAO,Rome.

**ENC 2404****Career Skills****4 Hrs. / 4 Cr**

The fourth sequential General English Course aims at empowering Advance Diploma students with communication & cognitive skills and personality traits necessary to empower their career skills. The course will help students in developing career skills and strategies for successful profession.

**Specific Learning Outcome:**

At the end of the course students will be able to

- develop communication skills
- acquire the interview skills
- improve cognitive skills
- enhance thinking skills
- master personal traits

**Unit 1 Communication Skills**

Active Listening & speaking, written & oral communication

**Unit 2 Interview Skills**

Interview questions, job application, CV preparation, self-introduction,

**Unit 3 Cognitive Skills**

Self motivation, setting personal goals

**Unit 4 Thinking Skills**

Strategic thinking, organization

**Unit 5 Personal Traits Skills**

Personal development & empowerment, Self-esteem

Textbook

Sekar, J.J. 2015. Career Skills. Madurai: Department of English, The American College.

## AAQ 8

CSA 2404

Programming Techniques using C

4hrs/Wk – 4 Credits

### Specific Learning Outcome:

After completing this course students will be able to

- Understand the computer programming in problem solving.
- Understand basic programming techniques.
- write simple programs using numeric and non-numeric data.

**Unit I: Overview of C** Middle level language – compilers versus interpreter – the form of a C program – compiling a C program

**Unit II: Primitive Data types Operators:** Data types – type conversions – operators – formatted input/output functions.

**Unit III: Control statements** If, if-else, switch, for, while, do..while, break and continue.

**Unit IV: Aggregate Data Types** Arrays – strings – functions – call by values – call by reference – passing arrays as arguments – local, global static and external variables.

**Unit IV: Structure and Union** User defined data types – Structures - Union

### Textbook:

Balagurusamy.E, Programming in ANSI ‘C’, 4<sup>th</sup> edition, Tata McGrawHill, 2007.

### Reference:

Yashavant,K. Let Us C, 5<sup>th</sup> edition, BPB publications Nov 8 2011.

## LSA 2404 COPING WITH SOCIAL AND ENVIRONMENTAL ISSUES 4hrs/Wk– 4 Cr

This course brings out various sociological and environmental issues that plague the everyday life of people in this fast-growing society. The students will be enlightened to identify the issues that they encounter around them and different ways to manage them efficiently for a better living.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand the importance of relationships and need for coping with them
- Manage their time, money and inherent skills for a successful living
- Find ways to protect their environment and preserve the precious resources
- Realize the impact of globalization in our society and adjust their living conditions

### Unit I: Coping with Society

Family and Issues related to Marriage – Building relationships – Conflict management – Cultural alienation

**Unit II: Coping with Human Resources**

Time management – Money management – Skill management: Communication – Emotion – Social skills - Health management

**Unit III: Environmental Issues**

Environment Vs Ecology – Pollution: Air, Water, Soil, Sound – De forestation – Exploitation of natural resources – Environmental protection

**Unit IV: Coping with Globalization**

Globalization – Trends in Education, Employment, Consumerism, Alienation of culture – Merits and Demerits of Globalization

**Unit V: Coping with Technology**

Technological developments – Technology in day today life - Social Media – Impacts of technology in modern society – Managing life with technology

**References:**

1. Alphonse, X. 2011, “We shall overcome” A Text book on Life coping skills”, ICRDCE Publication, Chennai

**AAQ 2406****Fish Feed Technology****4h/wk-4credits**

This theory course deals with the basic and applied aspects of feed production. Basic nutrient requirement of fish and their role in physiology. Various types of food preparation are discussed in detail. Commercial feed formulation and their energetic are discussed at the last section in the feeding methods and schedules, various techniques and tools are included.

Specific learning outcome at the end of the session students will be able to

- Analyze the nutritional requirement for normal fish growth
- Explain the composition commercial feed ingredient
- Calculate the feeding ration to obtain a good FCR

**UNIT-I. Nutritional requirement**

Protein, carbohydrate and lipid requirement—amino acid, fatty acid and non protein sources—vitamins and minerals—food additives, immunostimulants, growth promoters and preservatives.

**UNIT-II. Feed ingredients**

Animal, plant and microbial origin, SCP, silages—nutritional factors, compound feed, pellets, scrambles and micro encapsulated feed.

**UNIT-III. Fish feed Formulation and preparation**

Feed formulation methods and square methods—On farm feed manufacture – commercial feed formulation—Food storage.

## AAQ 10

### **UNIT-V. Nutritional physiology and pathology**

Digestion and nutrient flow – factors affecting digestibility- anti nutritional factors and anti metabolites- microbial toxins- nutritional deficiency and symptoms.

### **UNIT-V. Fish Energetics**

Feeding practices—feeding methods and scheduling—ration size, feed performance and economics.

#### **Text book:**

Guillame.J. Kaushik.S. Berqot.P. and Metallier.R. 2001. Nutrition and feeding of fish and crustaceans, Springer.

#### **Reference:**

1. Halver.J. and Hardy R.W. 2002. Fish nutrition. Academic press, London.
2. Lovell.R.T. 1998. Nutrition and feeding of fishes, Chapman & Hall, New York.
3. Houlihan,D., Boujard,T. and Jobling, M. 2001. Food intake in fish. Blackwell Science Ltd, London.
4. Aquaculture development and co-ordination programme fish feed technology ADCP/REP/ 80/11 FAO. ROME ADCP: 1980.

## AAQ 2408

### **Post harvest technology**

**4h/wk-4credits**

The objective of this course is to motivate the learner on the preparation of various aquaculture products. Further the students will be trained in making the value-added products like fish and prawn pickles and marinated products. In the last section other value-added products like sea weed agar and carrageenan are discussed in detail.

Specific learning outcome at the end of the session students will be able to

- Describe the various value-added products from fish
- Prepare various fishery products with their recipes
- Explain the procedure various fishery by products

### **UNIT-I. Value Addition in sea food**

Different stages of value added products from fish and shell fish—advantages of value addition – Export value – supply and demand – marketing strategies.

### **UNIT-II. Fish mince-based products/coated fishery products**

Fish mince and surimi production – different types of batter and breading --- packaging and storing.

### **UNIT-III. Other Value-added products**

Preparation of fish/prawn pickles, fish wafers, fish protein hydrolysate, fish curry and mussel products and marinated products.

**UNIT-IV. Fishery by-products**

Fish meal, protein concentrate, shark fin rays, fish maws, fish liver oil, squalene, pearl essence, gelatin, beche-de-mer, fish silage, sea weed products like agar, alginic acid and carrageenan.

**UNIT-V. Infectious microbes and quality assurance of fish food products**

Sources and types of microbes in fish and fishery products-factor affecting microbial action in food- spoilage of fresh, semi processed and processed fish and fishery products-amrinr, scombroia and ciguatera toxins assessment of quality changes in fresh and iced fish – HACCP guideline for sea food industry.

**Text book:**

Srivastava.C.B.L. 1988, A Text book of Fishery science and Indian Fisheries. Kitab Mahal publications

**Reference:**

John.E.Bardach John H.Ryther,William O.McLarney, 1972 Aquaculture—The Farming and Husbandry of Freshwater and Marine organisms. John Wiley& Sons, NY.

**AAQ 2904****Aquaculture Lab - IV****10h/wk-10cr**

The laboratory component includes exercises for formulation and preparation of fish feed and feeding schedule. It will help to find the growth rate of fish and to prepare the value-added fishery products for commercial sales.

Specific learning outcome at the end of the session students will be able to

- Formulate and efficient fish feed
  - Identify the brooders maturity
  - Prepare different fishery recipes
  - Gain knowledge by visiting nearby aqua farm and fish product outlets
- 1) Formulation and Preparation of a balanced Fish feed.
  - 2) Estimation of FCR from feeding trails and preparation of feeding table.
  - 3) Estimation of growth parameters from feeding trails.
  - 4) Feeding schedule preparation.
  - 5) Identification of brooders maturity.
  - 6) Determination of moisture content in fish and fish products.
  - 7) Preparation of fishery byproducts.
  - 8) Fish pickling techniques.
  - 9) Value added fish product preparation like fish curry, cutlets and fish fingers.
  - 10) Preparation of Surimi.
  - 11) Visiting nearby fish products commercial outlets.

**Reference:**

Srivastava. C.B.L. 1985 Text book of Fishery science and Indian Fisheries. Kitab Mahal publications.



**THE AMERICAN COLLEGE – COMMUNITY COLLEGE  
MADURAI – 625 002  
Diploma in Medical Laboratory Technology**

Sem	Course No	Course Title	Hrs/wk	Cr.
I	<b>General Education</b>			
	END 1403	Conversational Skills	4	4
	CSD 1403	Fundamentals of Computers	4	4
	LSD 1403	Fundamentals of Life Coping Skills	4	4
	<b>Skill Component</b>			
	DML 1409	Human Anatomy, Physiology & Clinical Pathology	4	4
	DML 1411	Fundamentals of Medical Laboratory Technology	4	4
	DML 1113	Lab – I	10	10
	<b>Job Training</b>			
	DML 1415	Internship I	120/sem	4
	<b>Total</b>		<b>34</b>	
II	<b>General Education</b>			
	END 1404	Reading and Writing Skills	4	4
	CSD 1404	Office Automation Tools	4	4
	LSD 1404	Performance and Life Coping Skills	4	4
	<b>Skill Component</b>			
	DML 1410	Hematology & Blood Bank	4	4
	DML 1412	Clinical Biochemistry & Microbiology	4	4
	DML 1114	Lab – II	10	10
	<b>Job Training</b>			
	DML 1416	Internship II	120/sem	4
	<b>Total</b>		<b>34</b>	

- **Theory / Lab courses - 1 credit = 15 hours/Semester**
- **Internship – 1 credit = 30 hours/Semester**

**SEMESTER I  
END 1403**

**Conversational Skills**

**4Hrs/4Cr**

The course aims at helping students converse in English on the matters that matter to them in daily life. It provides the learners with ample opportunities and social contexts through conversations so that they can freely and fluently use informal English. It also exposes them to the apt vocabulary of such informal conversations.

**Specific Learning Outcome:**

At the completion of this course the students shall be able to

- enhance their conversational fluency as well accuracy
- fine-tune their pronunciation and accent
- become familiar with and therefore effortlessly internalize the structures of English

**Unit 1:** Introducing oneself and introducing others

**Unit 2:** Conversation in contexts: Day-to-day matters like eating, emotions, fashion, health, friendship, money, housing, job, faith & hope, busy life, memory, shopping, time, Traffic, travelling, vacation, weather

**Unit 3:** Social expressions

**Unit 4:** Practice in formal conversation

**Unit 5:** Practice in informal conversation

**Textbook:**

Sekar, J.J. (2014). *Conversational Skills*. Madurai. Department of English, The American College.

**CSD 1403**

**Fundamentals of Computers**

**4hrs/Wk – 4 credits**

**Specific Learning Outcome:**

After completing this course students will be able to

- Understand the computer generations and components.
- Understand basic functionality of the computer.
- Understand the computer data representation.

**Unit I: Introduction to computers** Generations of computers –components of computer – hardware – software -classification of computers – advantages and limitations – applications of computer

**Unit II: Components of the Computer** CPU - I/O devices – Types and Features.

**Unit III: Computer Memory** Primary memory – secondary memory-auxiliary storage devices– cache memory CD – DVD –Pen drive – backup.

**Unit IV: Data representation** Data – Meaning - Information –Representation - files - Computer words.

**Unit V: Number Systems in computer** Decimal, Binary, Octal and HexaDecimal - Representation–Conversions.

**Textbook:**

Alphonse X, ICRDCE publication, December 2011.

**Reference:**

Curtin, D. P. Foley, K.Kunalsen, Morin.C “Information Technology- The Breaking Wave”, TataMcGraw Hill, 2002.

**LSD 1403**

**Fundamentals of Life Coping Skills**

**4Hrs/4Cr**

This is a foundational course which elicits the necessity for every student to understand the areas of development in moulding their behavior, character and personality through various soft skill sets.

**Specific Learning Outcome:**

At the end of this course the student will be able to

- understand the need for identifying and developing the skill
- manage and adjust their characteristics of personality
- understand the importance of learning communication skills and self
- appreciate the benefits of being assertive

**Unit 1: Introduction to Skills:** Introduction to skills – Definition of Coping - Social Skills – Four levels: Foundation, Interactive, Affective, Cognitive – Understanding Body Language

**Unit II: Personality Development:** Definition of Personality – Characteristics of Personality – Ways to develop personality – Personality types – Four basic temperament

**Unit III: Self Transformation:** SelfIdentity – Self Concept – Self acceptance – Self-discovery – Self Esteem: High & Low Self-esteem – Johari Window

**Unit IV: Communication Skills:** Understanding communication – Types of communication – Styles of communication – Patterns of communication – Importance of communication – Effective & Efficient communication

## DML 4

**Unit V: Assertive Skills:** Assertive Behaviour – Benefits of being Assertive – Types of Assertion – Assertion rights – Developing assertive skill

### References:

1. Alphonse X. (2011). *We shall overcome: A Text book on Life coping skills*. ICRDCE Publication, Chennai
2. *Human Values Development*.(2014). AIACHE Publication.New Delhi

## DML 1409 Human Anatomy, Physiology and Clinical Pathology 4Hrs/4Cr

This course deals with the basic aspects of human anatomy and physiology of organ and systems like integumentary, digestive, respiratory, circulatory, nervous, endocrine, urinary and reproductive systems. This also deals with importance and methods of examining clinical specimens like urine, stool, sputum, semen and cavity fluids.

At the completion of this course student will be able to:

- understand the location, structure and functions of the organs present in the human body.
- acquire knowledge on pathological changes that can be noted in excretory waste products, expectorant, and various body fluids.
- appreciate the regulation of various hormones in the body.
- understand the principle and significance of urine, stool, sputum and semen analysis.

**Unit I: Digestive, circulatory and respiratory systems:** Digestive system – organs and digestion. Circulatory system- heart – circulation- Respiratory system – lungs – physiology of respiration.

**Unit II: Urinary and reproductive systems:** Urinary system - structure and function of kidney, nephron and urine formation. Reproduction – male and female reproductive organs – structure and functions.

**Unit III:Endocrine glands and sensory organs:** Endocrine glands, hormones and their regulation. Structure and function of eye, ear, nose, tongue and skin.

**Unit IV: Clinical Pathology:** Physical, Chemical and microscopic examination of urine, stool, sputum, semen and gastric juice.

**Unit V:Cavity Fluid Analysis:** Physical, chemical and microscopic examination of pleural, peritoneal, synovial, CSF and their clinical significances.

### Textbook

1. David N, Jackie S, Butler L, &R Lewis. (2006). *Hole's Human Anatomy and Physiology*. Martin J Lange.
2. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*.2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.

**Reference**

1. Graff KMV, and Fox SI. (1995). *Human Anatomy and Physiology*. WCB Publication, Toronto.
2. Davies A, Blakeley AGH and Kidd C. (2011), *Human Physiology*. Churchill Livingstone, Toronto.
3. Arora DR.(2010). *Medical Parasitology*. 3<sup>rd</sup> Ed. CBS Publishers Pvt Ltd, New-Delhi.
4. Cheesbrough M.(2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.

**DML 1411****Fundamentals of Medical Lab Technology****4Hrs/4Cr**

This course is meant for developing knowledge and skills necessary to collect and handle the clinical samples, chemicals, instruments used in the laboratories. This course also deals with basic sample processing techniques, disposal of clinical waste and sterilization techniques.

At the completion of this course student will be able to

- train themselves in the field of laboratory diagnosis.
- familiarize in handling glassware, chemicals and instruments used in routine laboratory.
- understand sample collection and processing techniques with universal precaution.
- acquire information required to practice some important disinfecting techniques and disposal of bio-hazardous materials in the laboratories.

**Unit I: Role of laboratory technologist and personal care:** Role of Laboratory technician in health care - code of conduct, personal health care - universal precautions - medical examination and immunization against infectious diseases.

**Unit II: Safety measures in the Laboratory:** Laboratory hazards - preventive and corrective measures- use of protective clothing and personal hygiene- accident factors – safety signs and their information - safe working environment practices - First-aid and fire management. Decontamination of infectious material, disposal of laboratory wastes and safety signs.

**Unit III: Working principle, handling of apparatus and instruments:** Use and handling of glassware and small equipments - microscopes – centrifuges – rotator - vortex - incubators - dry blocks - water bath - hot air oven – autoclaves - photo colorimeters and spectrophotometer - digital balance - pH meter and semi auto analyzer.

**Unit IV: Collection of clinical specimens:** Blood Collection: Finger prick - venous blood collection: single and double syringe techniques – Vacutainer - aseptic blood collection for blood culture - anti coagulants and their uses and various containers used for blood collection. Urine collection methods - use of urine preservatives. Sputum collection: for AFB. Stool and semen sample. Collection, labeling, handling and storage.

**Unit V: Recording and Processing of clinical samples:** master and section registers maintenance – collection and recording, preparation and dispatch of reports - processing of EDTA blood – thin and thick blood smear - serum and plasma separation and centrifugation of urine samples. Wet smear for urine, stool, sputum and semen.

## DML 6

### Text Book

Cheesbrough M. (2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.

### References:

1. Godkar PB and Godkar DP. (2002). *A Text Book for Medical Lab Technology*, 2<sup>nd</sup>Ed, Bhalami Publishing House, Mumbai.
2. Mukherjee KL. (2007). *Medical Laboratory Technology*. Vol.1. Tata McGraw hill, New-Delhi.
3. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
4. Fischbach. (2005). *Manual of Laboratory and Diagnostic Tests*. Lippincott Williams Wilkins, New York.

### Job Role

- Receptionist at the Laboratory services in Hospitals
- Phlebotomist
- Serum Separating technician
- Lab technician
- Laboratory store keeper

## DML 1113

### Lab – I

10Hrs/10Cr

This course is designed to introduce and train certain basic skills required to collect and process, various sample and handle instruments and to perform simple test in hematology and clinical pathology.

At the completion of this course student will be able to

- practice laboratory safety, disinfection and disinfecting techniques.
- practice clinical sample collection techniques.
- understand the mechanism of laboratory instruments and handle them in the laboratory.
- process samples and perform simple tests

### Part – 1

#### I. Safety in the Laboratory

- a. Using hand gloves, apron, masks and washing of hands.
- b. Universal precautions, preparation and use of disinfectants and discarding of biohazards.
- c. Handling of glassware, and small equipments and instruments.
- d. Sterilization techniques: chemical and autoclaving.

**II. Sample Collection and storage**

- a. Finger prick method, venous blood sample collection technique - vacutainer
- b. Blood samples: Use of anticoagulants and containers in collecting blood samples.
- c. Urine sample: Routine, early morning, twenty four hours sample and culture samples. Use of preservatives for analytes, 24 hrs Samples of biochemical tests and culture.
- d. Sputum: Random and early morning and culture sample.
- e. Stool Samples for microscopy and culture.
- f. Semen Collection - instruction to patient.

**III. Sample Processing and identification of blood cells**

- a. Processing of EDTA Blood - Handling of Shali pipette for making dilutions.
- b. Preparation of blood smear and staining techniques: - Leishman's staining.
- c. Fixing of thin blood film and Field A & B staining technique for Malarial parasites
- d. Identification of RBCs, WBCs and platelets.
- e. Serum Separation.
- f. Processing of urine.

**Part -2****I. Laboratory Instruments: Working Principle, handling and maintenance**

- a. Microscopes – Monocular and binocular microscopes
- b. Centrifuges - Angle head & Swing types – Serofugeand Microhematocrit.
- c. Bacteriological Incubators. Hot air oven. Water bath.
- d. Autoclaves - Vertical & Horizontal types
- e. Photo colorimeters and Spectrophotometer.
- f. Semi-automated biochemistry analyzer.
- g. Analytical Balance, Electrical Balance and Vortex mixer.
- h. pH meter.
- i. Laminar Air Flow and Colony counter.

**II. Handling of glassware and Preparation Reagents**

- a. Preparation of % solutions(w/v and v/v): Normal Saline - 3% Sulphosalicylic acid solution – 10% Barium chloride solution – 10% potassium Hydroxide - 28% Zinc sulphate solution - 5% Sulphuric acid – 5% Hydrochloric acid and 25% Sulphuric acid.
- b. Preparation of Molar and Equivalent Solutions: 10M NaOH and 0.1N HCl.
- c. Preparation of Buffer solution: pH 6.8 for Lieshman's staining.

### Part- 3

#### I. Urine Examination

- a. Physical examination of urine – using urinometer & pH Paper.
- b. Benedict qualitative test for reducing substances.
- c. Heat and acetic acid method, sulphosalicylic acid method for urine protein.
- d. Identification of Bence–Jones Protein and formaldehyde test.
- e. Strip Method: Urocolor -2 for urine Sugar(Glucose) and Protein.
- f. Urine acetone (Rothras Test)
- g. Urine bile pigments (Fouchet's Test), Urobilinogen and bile salts (Hay's Test).
- h. Urine Microscopy – processing and smear making and focusing under 10x and 45x objectives.
- i. Identification of organized and unorganized sediments in the urine.
- j. Urine Pregnancy Test(UPT).

#### II. Stool Examination

- a. Stool Physical, chemical and microscopic examination.
- b. Stool occult blood.
- c. Stool reducing sugar and fats.

#### III. Sputum Examination

- a. Sputum – physical and microscopy (Direct, Gram and AFB)

#### IV. Semen Analysis.

#### Textbooks:

Cheesbrough M.(2007).*District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.

#### References:

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore
3. Cruickshank. (1975). *Medical Microbiology*. Vol II. ELBS, Churchill Livingstone Pub.
4. Ananthanarayanan and Panikkar J. (2005). *Text book of Medical Microbiology*. 4<sup>th</sup>Ed. Orient Longman Ltd. Madras.

#### Job Role

Medical Laboratory Technician  
Phlebotomist



**DML 1415****Internship I****120Hrs/Sem-4Cr**

Job Training: A work-based learning experience that enables the student to apply specialized occupational theory, skills and concepts.

**SEMESTER II****END 1404****Reading and Writing Skills****4 Hrs/4Cr**

The course aims at improving the learners' productive skills of English. It offers professional guidance on meaningful and aggressive reading experiences by familiarizing them with techniques and micro-skills of reading, comprehension abilities through literary and non-literary reading materials. It also strengthens their writing skills through the forms of writing that are useful to them academically and vocationally.

**Specific Learning Outcome:**

At the completion of this course the students shall be able to

- get training in aggressive speed reading with different sub-skills
- improve their comprehension abilities
- learn the art and craft of paragraph and a five-paragraph essay writing

**Unit 1:** Reading at various speeds, skimming & scanning, inferring & interpreting, predicting

**Unit 2:** Reading practice

**Unit 3:** Writing leave letters, apology letters and permission letters

**Unit 4:** Paragraph writing

**Unit 5:** Five-paragraph essay writing

**Text Book:**

Sekar, JJ. 2014.*Reading and Writing Skills*. Madurai. Department of English, The American College.

**CSD 1404****Office Automation Tools****4hrs/Wk – 4 credits****Specific Learning Outcome:**

After completing this course students will be able to

- edit and format text data and tables to make a Document.
- design worksheet and manipulate data and represent through graphs
- design a Slide show presentation and show in Multimedia form.

**Unit I: Microsoft Word** Working with text - Formatting paragraph -Numbered and Bulleted lists -Working with Tables

**Unit II: Mail Merging and Graphics** - Spelling and Grammar Checking - Page format – Working with graphics

**Unit III: Microsoft Excel** Modifying a Worksheet -Formatting cells -Formula cells

## DML 10

**Unit IV: Functions and Charts** Formulae and Functions - Sorting and Filtering - Graphics – Charts.

**Unit V: Power-Point** Working with slides -Color Schemes – Graphics – Slide Effects – Master Slides – Presentations-Slide Shows–Animations.

### **Textbook:**

MS-Office 2003 Manual by Microsoft

### **Reference**

Curtin D.P, Kim Foley K, Kunalsen, Morin. C, “Information Technology- The Breaking Wave”, TataMcGraw Hill 2002.

### **LSD1404**

### **Performance and Life Coping Skills**

**4Hrs/4Cr**

This course aims at nurturing the students in their career development by way of inculcating a set of essential skills which will guide and shape them to grow as confident and successful individuals.

### **Specific Learning Outcome:**

At the end of this course the student will be able to

- Understand goal setting and ways to manage their time
- Find out the ways to motivate themselves and others
- Appreciate the need for problem solving skill in everyone’s life
- Understand stress and how to cope up with stress
- Realize the importance of dealing with emotions for positive mental health

**Unit I: Goal Setting:** Definition – Importance of Goals – SMART Goal & Time management – Types of Goals - Obstacles – Successful and Meaningful life

**Unit II: Motivation Skill:** Introduction to Motivation & Inspiration – Internal and External motivation – Methods of Motivation – Effects of de motivation

**Unit III: Problem Solving Skill:** Definition of problem – Reasons for problems – Stages of solving problems: Evaluation, Managing, Decision making, Resolving, Results

**Unit IV: Stress Management:** Definition of Stress: Positive (Eustress), Negative (Destress) – Stressors: Internal, External – Causes of Stress – Types of Stress – Ways to manage stress

**Unit V: Time Management:** Need for time management – Poor Time management – Saboteur Time styles – Techniques for managing time

### **References:**

Alphonse X. (2011). *We shall overcome: A Text book on Life coping skills*. ICRDCE Publication, Chennai

## DML 1410

## Haematology &amp; Blood Bank

4Hrs/4Cr

This course deals with the technology involved in the routine examination of blood cells, blood parasites and coagulation factors in the diagnosis of clinical conditions. This also deals with the blood bank techniques required for safe blood transfusion.

**Specific Learning Outcome:**

At the completion of this course student will be able to:

- understand the basic routine tests in hematology and coagulation studies.
- correlate test values of related parameters in the laboratory diagnosis of clinical conditions.
- know the significance of quality control and preparing reports.
- acquire basic information required to carry out some blood bank practices in clinical laboratory set-up.

**Unit I: Hematology:** Composition and formation of blood, morphology and functions of blood cells - staining of blood smear - enumeration of Total and Differential leukocyte count - Estimation of Hemoglobin with Sahli's and Cyanmethemoglobin methods - Erythrocyte Sedimentation Rate (ESR) - Packed Cell Volume - Calculation of erythrocyte indices - Reticulocyte, platelet and Eosinophil counts - L.E Cell preparation - Anisocytes and Poikilocytes - Hypo and polychromasia - Red cell inclusions - Grading of blood film - Anaemias and Leukaemias. Morphology, life cycle and investigation of blood parasites.

**Unit II: Blood Parasites and Coagulation Studies:** Introduction to blood parasites - Life cycle and morphology of different stages of *Plasmodium spp*, *Lieshmaniadonovani* - *Wuchereriabancrofti*. **Coagulation Studies:** Hemostasis - phases - coagulation factors - mechanism of blood coagulation - Regulators of blood coagulation. Bleeding time(Ivy method) - clotting time( Lee and White method) - prothrombin time - activated partial thromboplastin time - thrombin time - clot retraction and clot lysis tests. Laboratory findings in various bleeding disorders.

**Unit III: Blood bank techniques:** Blood group system - ABO and Rh - antigen and antibody reaction: Agglutination and Hemolysis - Rouleaux formation and Prozone reaction -factors influencing the rate of antigen antibody reaction - formation of blood groups - ABO grouping - sub group of A and Bombay group - Rh(D) Typing slide and tube technique - Rh(Du) testing. Compatibility testing - characteristics of ABO and Rh antibodies - Antibody titre. Coomb'sCroos match.

**Unit IV: Blood transfusion:** Donor selection, screening and bleeding techniques. Transfusion reactions and its investigation. Storage, separation techniques and use of blood products. Blood donation record book - recording of results - blood donor card - documentation in blood bank activities - blood transfusion request form - Record maintenance.

**Unit V: Hemolytic disease of the New Born and Hemoglobinopathies:**Definition and pathology of HDN babies - Laboratory Diagnosis of HDN. Coomb's reaction - Direct Coomb's test - Indirect Coomb's test - Coomb's Cross Match technique for Exchange Blood Transfusion in HDN babies - Sickle cell anemia and Thalassemia, Hereditary Sperocytosis and Ovalocytosis -Osmatic fragility test and Hb electrophoresis.

## DML 12

### Textbook:

Sood R. (1996). *Laboratory Technology (Methods and interpretation)*. 4<sup>th</sup> Ed. J.P. Bros, New Delhi

### References

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. Cheesbrough M.(2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
3. Godkar PB and Godkar DP. (2002). *A Text Book for Medical Lab Technology*. 2<sup>nd</sup> Ed, Bhalami Publishing House, Mumbai.
4. Mukherjee KL. (2007). *Medical Laboratory Technology*. Vol.1. Tata McGraw hill, New-Delhi.

### Job Role

- **Clinical Lab technician**
- **Serum separation technician**
- **Blood Bank technician and officer**
- **Hematology technician**

## DML 1412

## Clinical Biochemistry & Microbiology

4Hrs/4Cr

This course is designed to acquire knowledge on normal and abnormal metabolic reactions in human body; the principles and procedures involved in laboratory diagnosis of various clinical conditions. This also deals with pathogenicity and identification of microbes in clinical samples.

### Specific Learning Outcome:

At the completion of this course, student will be able to

- understand various biochemical changes that take place in metabolic and hormonal disorders.
- know the importance and methods of estimating analytes in blood, urine and cavity fluids.
- identify and understand the pathogenesis of various microbes in human.
- understand the mechanism of immunity to infection and method of detecting pathogens in clinical samples.

**Unit I: Biochemistry:** Introduction to biochemistry - contribution of biochemical studies on diagnosis - metabolism of carbohydrates, Lipids and bilirubin; Formation of urea, creatinine and uric acid; Laboratory diagnosis on lipid profile, renal, liver and thyroid function tests.

**Unit II: Estimation of analytes and interpretation:** End point methods: Serum glucose - glucose tolerance test – cholesterol - serum uric acid - total protein - serum albumin - serum total and direct bilirubins; Kinetic methods: Serum urea – creatinine – ALT - AST and ALP. Introduction to electrolytes - laboratory diagnosis and clinical conditions related to electrolyte imbalances.

**Unit III: Clinical Bacteriology:** Introduction to clinical bacteriology - classification of pathogenic and non-pathogenic bacteria. Bacteria in respiratory, blood, CSF, urinary, intestinal tracts and skin. Growth and colony morphology of bacteria on selective and differential media. Hanging drop, wet mount technique - Gram stain, AFB and Albert's staining techniques - Inoculation technique - Haemolysis - IMVic tests - Bile solubility test and Kirby Bauer antibiotic sensitivity test.

**Unit IV: Clinical Mycology and Parasitology:** Introduction to mycology - Morphological features of pathogenic fungi - KOH and LPCB and Grams morphology of clinically important fungi - collection of specimen and preparation of smear. Introduction to intestinal parasites - Protozoans: *Entamoeba histolytica* and *Entamoeba coli* - *Giardia lamblia* - *Ascaris lumbricoides*, *Trichuris trichura*, *Ancylostoma duodenale* and *Nicator americanus*, (*Strongyloides stercoralis*) - *Trematodes* (Ova of *Scistosomamansonali*, *S.japonicum cestodes*) - *Cestodes* (Adult worm and gravid segments of *Taenia solium*, *T.saginata*, *Diphyllobothrium latum* and *Hymanolepsis nana*) - Parasites found in urine and blood (*Trichomonas vaginalis*, Ova of *Schistosoma hematobium*).

**Unit V: Immunology and Serology:** Introduction to immunology - Type of immune responses to infection by microorganisms. Structure of immunoglobulin - Windows period - primary and secondary immune response types of viruses, mode of infection, pathogenesis and serological diagnosis of clinical conditions. Principle of Widal and VDRL (RPR) - HIV Tri Dot, HBsAg and HCV Rapid tests. Dengue IgM and IgG and Chikungunya IgM Rapid Tests - RA, ASO and CRP latex slide tests (semi quantitative).

#### **Textbook:**

Ananthanarayanan and Panikkar J. (2005). Text book of Medical Microbiology. 4th Ed. Orient Longman Ltd. Madras.

Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.

#### **References:**

1. Arora DR, & Arora B. (2005). *Medical parasitology*. CBS Publishers.
2. Ryan KJ, & Ray CG. (2014). *Sherris medical microbiology*. McGraw-Hill Education/Medical.
3. Cheesbrough M. (2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
4. Chatterjee MN, and R Shinde. (2005). *Textbook of Medical Biochemistry*, Jaypee Brothers, New Delhi.

#### **Job Role**

- **Biochemical Analyst in hospitals, research institutes and pharmaceutical companies**
- **Microbiologist in hospitals, research institutes and pharmaceutical companies**
- **Technician in soil and water testing laboratories.**

This lab course is designed to develop skills to perform routine clinical tests in Serology, Parasitology, Microbiology, hematology and Blood Bank and to run relevant quality control programs.

**Specific Learning Outcome:**

At the end of this course student will be able to

- perform and interpret routine laboratory tests in serology, microbiology, hematology, blood bank and biochemistry.
- calibrate instruments and equipments used in the laboratory.
- run quality control programs in hematology, biochemistry and microbiology and maintain accuracy and precision pre automated procedures.
- collect, compare, justify test value of individual patient and prepare reports to the physician.

**Part - 1****I. Serology**

- a. Widal Slide Test- semi-quantitative.
- b. VDRL (RPR) – Test & Syphicheckcard Test.
- c. HIV Tri Dot, HBsAg and HCV Rapid Tests
- d. Dengue IgM and IgG ,and Chikungunya IgM Rapid Tests
- e. RA, ASO and CRP Latex Slide Tests – semi-quantitative.
- f. Quantitative estimation of CRP, ASO and RA using semi auto-analyzer/ Nephelometry.

**II. Parasitology and Microbiology**

- a. Wet cover slip preparation with normal saline and Lugol's Iodine and identification of intestinal parasites.
- b. Preparation of smears from sputum, culture plates and swabs.
- c. Staining techniques: simple stain, KOH, Gram and Ziehl- Neelsen and AFB
- d. Urine AFB: Processing and staining and examining.
- e. Skin slit for Lepra bacilli and cold Staining and identification and grading of smear.
- f. Skin Scraping and KOH and LPCB staining.
- g. Gram stain morphology: *Candida albicans* and *Cryptococci neoformans*.
- h. Hanging Drop preparation.
- i. Inoculation techniques – Use and handling of culture plates, tubes, loops, needle and Swab.
- j. Preparation of Nutrient Agar, Blood Agar and MacConkey Agar media.
- k. Colony morphology of bacteria on Nutrient, Blood and MacConkey Agar plates.
- l. Performing and reading of Mannitol, TSI, Indol and Urease.

## Part – 2

### I. Routine Hematology and Blood Bank procedures

- a. Preparation of thin and thick smears, staining of blood smear with Lishman's stain and identification of blood cells.
- b. Fixing, staining of thin and thick smear with Field A&B stains for malarial parasites and identification of parasites.
- c. Differential WBC count with Lishman's stained smear.
- d. Estimation of Hemoglobin: Sahli's and Cynmethemoglobin method.
- e. Total WBC count: Micro and bulk dilution techniques.
- f. Erythrocyte Sedimentation Rate (ESR) – Westergren method.
- g. Packed Cell Volume (PCV)-Wintrob's tubes and microhematocrit methods.
- h. Reticulocyte count.
- i. Identification of Malarial Parasites using Field stain A & B and MP Card test.
- j. Examination of night blood for microfilaria on wet cover slip preparation and Lishman's stain smear and MF card Test.
- k. Spotters: Thrombocytosis, Thrombocytopenia, Platelet aggregation, Leukocytosis, Leukopenia, Eosinophilia, Neutrophilia, Toxic changes and microfilaria.
- l. Anaemias and Leukaemias: Iron deficiency anaemia, Megaloblastic anaemia, HDN, AML, CML, ALL, CLL, Monocytic and promyelocytic leukaemia.
- m. Clot retraction and clot lysis
- n. Bleeding Time (Duke and Ivy methods).
- o. Clotting Time (Capillary tube and Lee – White methods).
- p. Prothrombin Time (Uniplastin Kit method).
- q. Blood Grouping and Typing – Front and Back typing.
- r. Antibody titre.
- s. Saline cross match.
- t. Albumin cross match.
- u. Direct Coomb's test.
- v. Indirect Coomb's test.

## Part - 3

### I. Biochemistry: End-point Methods

- a. Estimation of Serum Glucose and Glucose Tolerance Test.
- b. Estimation of Total Cholesterol.
- c. Estimation of Serum Uric acid.
- d. Estimation of Serum Total Protein and albumin
- e. Estimation of Serum Total Bilirubin and Direct Bilirubin.
- f. Estimation of HDL, LDL cholesterol and CPK-MB.

#### Kinetic methods

- a. Estimation of Serum Creatinine and Urea.
- b. Estimation of Liver enzymes: ALT, AST, ALP and serum amylase

#### Textbook:

Cheesbrough M. (2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.

## DML 16

### References:

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore
3. Ananthanarayanan and Panikkar J. (2005). *Text book of Medical Microbiology*. 4<sup>th</sup> Ed. Orient Longman Ltd. Madras.

### Job Role

- Medical Laboratory Technician - Microbiology
- Hematologist | Biochemical Analyst

**DML 1416**

**Internship II**

**120Hrs/Sem-4Cr**

Job Training: A work-based learning experience that enables the student to apply specialized occupational theory, skills and concepts.



**THE AMERICAN COLLEGE – COMMUNITY COLLEGE  
MADURAI – 625 002**

**Advanced Diploma in Medical Laboratory Technology**

Sem	Course No	Course Title	Hrs/wk	Cr.
III	<b>General Education</b>			
	ENA 2403	Study Skills	4	4
	CSA 2403	Operating System	4	4
	LSA 2403	Coping with Psychological and Physical Issues	4	4
	<b>Skill Component</b>			
	AML 2409	Immunohematology & Transfusion Medicine	4	4
	AML 2411	Biomedical techniques, Automation & Quality Control Program	4	4
	AML 2113	Lab – III	10	10
	<b>Job Training</b>			
	AML 2415	Internship III	120	4
		<b>Total</b>		<b>34</b>
IV	<b>General Education</b>			
	ENA 2404	Career Skills	4	4
	CSA 2404	Programming Techniques using C	4	4
	LSA 2404	Coping with Social and Environmental Issues	4	4
	<b>Skill Component</b>			
	AML 2410	Body Fluid Analysis	4	4
	AML 2412	Histopathology & Cytology	4	4
	AML 2114	Lab – IV	10	10
	<b>Job Training</b>			
	AML 2416	Internship IV	120/sem	4
		<b>Total</b>		<b>34</b>

- **Theory / Lab courses - 1 credit = 15 hours/Semester**
- **Internship – 1 credit = 30 hours/Semester**

## AML 2

**ENA 2403**

**Study Skills**

**4Hrs/4Cr**

The third sequential General English course aims at empowering Advance Diploma students with study skills necessary to continue their chosen major disciplines. The course will help students to develop study skills and strategies for academic success.

### **Specific Learning Outcome:**

At the end of the course, students shall be able to

- develop healthy study habits and improve homework habits
- fine tune their academic skills
- apply time management skills
- understand psychological traits
- use ICT skills

**Unit-1 General:** Definition & scope of study skills, study habits, strategies to improve study skills

**Unit-2 Academic Skills:** Effective reading strategies & essay writing, note taking & making, summarizing, paraphrasing, information transfer

**Unit-3 Time Management:** Motivation & success, barrier to time management

**Unit-4 Psychological Traits:** Concentration skills, memory, coping with test anxiety, critical thinking

**Unit-5 ICT:** ICT skills

### **Textbook**

Sekar, J.J. (2015). *Study Skills*. Madurai: Department of English, The American College

**CSA 2403**

**Operating Systems**

**4hrs/Wk. – 4 Credits**

### **Specific Learning Outcome:**

After completing this course students will be able to

- Understand the role of Operating system as an interface between user and computer.
- Understand the basic functionality of Operating system.
- Understand the operation of Mobile OS.

**Unit I: Introduction to operating system** BIOS – DOS – Windows - types of operating system – operating system services - desktop operating system

**Unit II: Network operating System** - Server operating system – mainframe operating system – embedded operating system.

**Unit III: Windows** - Features of Windows Operating system – Multiprogramming

**Unit IV: Process / Memory Scheduling** - Multitasking – Buffering – Spooling – Time sharing – Browser support.

**Unit V: Introduction to Android** Application of Android – Features of Android – Messaging -Voice based features- Multitasking-Screen Capture-Video Calling-Multiple Language support.

**Text books:**

1. Alphonse X, 2011 ICRDCE publication, December
2. Silberchatz, Galvin and Gagne, 1999. Operating system concepts, John Wiley and sons.

**References:**

1. Curtin D.P, Foley K, Kunalsen, Morin, C. 2002. Information Technology- The Breaking Wave, TataMcGraw Hill.
2. [http://en.wikipedia.org/wiki/List\\_of\\_features\\_in\\_Android](http://en.wikipedia.org/wiki/List_of_features_in_Android)

**LSA 2403                      Coping with Psychological and Physical Issues                      4Hrs/4Cr**

This course aims at making the students understand the need for learning psychological and physical issues which pose as a challenge in the transforming societies. Also, it directs them to take charge of their lives through various ways and cope up with such issues.

**Specific Learning Outcome:**

At the end of this course, the student will be able to

- understand the types of fear and shyness and the ways of overcoming them
- manage emotions and stress
- appreciate the types and styles of communications
- understand the ways of coping with addiction and sexuality

**Unit I: Coping with Fear and Shyness:** Understanding fear - types of fear – overcoming fear – shyness – types – managing shyness

**Unit II: Coping with Emotions & Stress:** Types of emotions – managing emotions – stress types & need for understanding stress –ways to manage stress

**Unit III: Communication & Failure:** Communication – types & styles – ways to improve communication – failure – managing failures

**Unit IV: Coping with Addictions:**Drug addictions – causes of addiction – physical & societal implications – internet addiction – cybercrime - types and causes – managing addictions

**Unit V: Coping with Sexuality:** Sex and Gender – understanding gender discrimination – coping with gender discrimination – understanding sexuality – consequences of premarital & extra-marital sexual issues – managing sexuality

## AML 4

### References:

1. Alphonse X. (2011). *We shall overcome - A Textbook on Life coping skills*. Indian Centre for Research and Development of Community Education (ICRDCE) Publication, Chennai
2. Khera S. (2003). *Living with Honour*. Macmillan Publishers India Ltd.
3. Bodger C. (1999). *Smart Guide to Relieving Stress*. Wiley Publications.
4. Brewer CK. (1995). *Managing Stress*. National Press Publications.

## AML 2409

## Immunohematology & Transfusion Medicine 4Hrs/4Cr

This course is designed to give basic knowledge on blood cell antigens and to develop skills on blood bank procedures. This also deals with investigation of hemolytic diseases of newborn and blood transfusion medicine.

### Specific Learning Outcome:

At the end of this course, student will be able to

- understand the nature of blood cell antigen and antibody reactions
- appreciate grouping and typing of blood samples.
- acquire knowledge on compatibility testing for transfusion
- know the significance of HLA in transplantation

**Unit I: ABO system:** Historical context of A, B, AB, O groups, sub group of A. Kell, Duffy and Lewis system. Genetics and biochemical characteristics of blood groups - distribution of red cell antigen and antibody. Antigen-Antibody reaction -naturally occurring antibody and immune antibody reactions - front and back type - anti-H Lectin test - Lectin (A1) test.

**Unit II: Rh (D) System:**Historical context of D Antigen and its weak form (Du). Genetics and formation of Rh(D) antibodies. Rh (D) and Rh (Du) tests - characteristics of naturally occurring antibodies and antibodies - saline and Coomb's crossmatch. Allo-antibodies. Haemolytic diseases of new born, ABO and Rh incompatibility - Diagnosis of HDN. Crossmatch for neonatal - exchange transfusion. Direct and indirect Coomb's tests.

**Unit III: Blood transfusion and complication:** Clinical importance of blood transfusion, anticoagulants and storage. Donor selection and screening. Donor bleeding procedure and donor care -Transfusion reaction: Non Infectious Complication. Acute transfusion reaction and evaluation. Delayed consequences of transfusion. Infectious complication of Blood transfusion: Hepatitis, HIV, Human T-cell Lymphotropic Viruses and Cytomegalovirus.

**Unit IV: Transfusion medicine:** Haempheresis/Plasmapheresis:Separation devices. Blood component collection - clinical consideration in transfusion practices: RBC, Platelet, Granulocyte transfusion. Transfusion of fresh, frozen and cryoprecipitates, plasma derivatives -neonatal and paediatric transfusion practices.

**Unit V: The HLA System:** Major histocompatibility complex. Role and detection of HLA in organ and bone marrow transplantation: Autologous and Allogenic transplantation.

### Textbook

Sood R. (2006). *Laboratory Technology (Methods and interpretation)*. 4<sup>TH</sup> Ed. J.P. Bros, New Delhi

### References

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. Cheesbrough M.(2007).*District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
3. Godkar PB and Godkar DP. (2002). *A Text Book for Medical Lab Technology*, 2<sup>nd</sup> Ed, Bhalami Publishing House, Mumbai.
4. Mukherjee KL. (2007). *Medical Laboratory Technology*. Vol.1. Tata McGraw hill, New-Delhi.
5. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore

### Job Role

- **Blood Bank Technician**
- **Lab Technician**
- **Serum separation Technician**
- **Blood bank officer**

**AML 2406**

**Biomedical Techniques, Automation 4Hrs/4Cr  
And Quality Control Programme**

This course emphasizes on various types of advanced technology and instruments used in the clinical laboratory, their working principles, operation techniques, calibration and quality control. This is also designed to give some basic knowledge on instruments in clinician chambers.

### Specific Learning Outcome:

At the end of this course student will be able to

- understand the importance in calibrating manual and automated laboratory instruments.
- acquire knowledge on modern techniques in the diagnosis for various metabolic disorders.
- appreciate the mechanism of semi and auto analyzers.

**Unit I: Advanced technology in the diagnosis of infection:** Chromatography techniques. Partition and Adsorption chromatography. Immuno assay: Enzyme linked immunosorbent assay (ELISA) – Chemiluminescence immune assay (CLIA) - Auto analyzers based immunoassay – Microparticle Enzyme immune assay (MEIA) - Patented colorimetric detection technique in identification of bacteria - Radioimmunoassay (RIA).

**Unit II: Advanced biochemical technique:** Biosensors: Blood glucose and hemoglobinometer. Colorimeter and Spectrophotometer. Biochemical analyzers: Multiple and single channel continuous flow analyzers - discrete autoanalyzers - component steps in fully automated systems – Batch and static discrete autoanalyzers – centrifugal fast analyzers. Flame emission photometry (FEP) and Ion Selective Electrodes (ISE).

**Unit III: Automation in Hematology laboratory:** Blood cell counter analyzer: Electrical impedance technology – Flow cytometry technology – Fluorescent flow cytometry technology. Coagulation Analyzers: Mechanical and Photo optical mode. ESR Analyzers: Infrared detection.

**Unit IV: Quality management and Quality Control:** Introduction – General approach to quality control - Total Quality Management – Internal Quality Control – Two Phases of IQC - Reference Materials and Calibrating Definitive Methods – Quality Control Program – Methods of QC in Clinical Chemistry laboratory – Methods of QC in Hematology Laboratory and Blood Bank – Methods of QC in Microbiology and Serology Laboratory – Reference Range - Preparation of Quality control Chart.

**Unit V: ECG and Oximetry:** Normal ECG - ECG abnormalities, ECG recorder - single channel, multichannel, Tread mill ECG, ECG monitor - Cardiac defibrillator - Pacemaker, Digital subtraction angiography - Oximetry: transmission, reflection and fingertip pulse oximetry. Echo cardiography - colour doppler - Heart lung machine - Infusion pump - Blood gas analyzer.

### **Text Book**

Veerakumar L. (2015). *Bioinstrumentation*. MJP Publishers, Chennai.

### **References**

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. Cheesbrough M. (2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
3. Fischbach. (2005). *Manual Of Lab and Diagnostic Tests*. Lippincott Williams Wilkins, New York.
4. Gradwohl RBH, Sonnenwirth AC, & L Jarett. (1980). *Gradwohl's Clinical Laboratory Methods and Diagnosis*. Mosby
5. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore

### **Job Role**

**Medical Technologist – Immunology, Hematology and Biochemistry.  
Technician – ECG Lab**

This course is designed to develop skills in the laboratory diagnosis of clinical condition in the field of hematology, coagulation studies, blood bank, biochemistry, and microbiology. This also deals with quality control management and program in the laboratory.

**Specific Learning Outcome:**

At the end of this course student will be able to

- understand laboratory diagnosis of coagulation disorders.
- perform various cells counting technique for abnormal low and high count and peripheral smear study.
- examine peripheral smear and bone marrow for the diagnose of anaemias, leukaemias, hemoglobinopathies and parasites.
- carry out biochemical tests and blood bank procedures and quality control programs.

**Part -1**

**I. Advanced Hematology and Coagulation Studies.**

- a. Identification of immature WBCs and RBCs.
- b. Reticulocyte Count.
- c. Absolute Eosinophil Count.
- d. Platelet Count.
- e. Bleeding Time (Ivy Method) and Duke's Method.
- f. Clotting Time (Lee and White method) and Capillary tube method.
- g. Determination of Clot retraction and Lysis Time.
- h. Prothrombin Time.

**Spotters:**

- a. Leukocytosis, leukopaenia, eosinophilia, Lymphocytosis, monocytosis and basophilia
- b. Thrombocytosis, thrombocytopaenia and pancytopaenia.
- c. Anisocytosis, poikilocytosis, hypochromia and polychromasia
- d. Red Cell Inclusions: Basophilic stippling, Howell-jolly Bodies, Cabot Ring and Nucleated RBCs

**II. Anaemias and Leukaemias (Spotters)**

- a. Non-Hemolytic Anaemias:
  - i. Normochromic and Normocytic anaemia
  - ii. Iron Deficiency anaemia.
  - iii. MegloplasticAnaemia (Pernicious Anaemia)
  - iv. Aplastic Anaemia.
- b. Hemolytic anaemias:
  - i. Sickle Cell anaemia
  - ii.  $\alpha$  and  $\beta$ thallasaemia.
- c. Hereditary Spherocytosis.
- d. HereditaryOvelocytosis.
- e. Haemolytic Disease of the New born (HDN-ABO and Rh).

**III. Leukaemias - Spotters**

- a. Aleukaemic and Sub Leukemic Leukaemia.
- b. Acute and Chronic Myeloid Leukaemia.
- c. Acute and Chronic Lymphatic Leukaemia.
- d. Promyelocytic Leukaemia and Monocytic Leukaemia.
- e. Peripheral Smear Study.
- f. L. E Cell preparation.
- g. L.D Bodies in Bone marrow.

**Part – 2**

**I. Advanced Blood Bank Procedures.**

- a. ABO Grouping : Front type and Back typing
- b. Rh(D) typing and Rh(Du) testing.
- c. Agglutination, hemolysis, rouleaux formation and prozone reaction.
- d. Saline Cross Matching.
- e. Antibody Titre.
- f. Direct Coomb's Test
- g. Indirect Coomb's Test
- h. Coomb's Cross matching
- i. Cross match for exchange blood transfusion.

**II. Body Fluid Analysis**

- a. C. S. F Analysis.
- b. Peritoneal and pleural analysis.
- c. Synovial Fluid analysis.
- d. Semen analysis.
- e. Sputum Analysis.
- f. Gastric Juice analysis.

**Part - 3**

**I. Advanced Biochemistry and Microbiology**

- a. Use and handling of semi-automated biochemistry analyzer.
- b. Calibration of Micro pipettes and analyzers.
- c. Quality Control program.

**II. Estimation of analytes (End point methods)**

- a. Estimation of Glucose.
- b. Total cholesterol.
- c. Serum Uric acid.
- d. Serum Total Protein and 24 hrs protein.
- e. Serum Albumin.
- f. Serum Bilirubin (Total and Direct).

**III. Estimation of analytes (Kinetic Methods)**

- a. Estimation of Serum and Urine Creatinine and creatinine clearance test.
- b. Estimation of Serum Urea.
- c. Estimation of Aspartate aminotransferase (AST or SGOT).
- d. Estimation of Alanine aminotransferase (ALT or SGPT) .
- e. Estimation of Serum Alkaline phosphatase (ALP or ALK) .
- f. Detection of Total and Copro Porphyrins in Urine.
- g. Rapid Screening test of Urine, Blood and Stool for Porphyrins.
- h. Detection of Porphobilinogen.



- i. Detection of Urobilinogen and Bilirubin in Urine.
- j. Detection of Stercobilin in Urine.

#### IV. Diagnostic Microbiology

- a. Preparation of Culture media: Nutrient Agar and MacConkey Agar, Salmonella – Shigella Agar, Blood Agar, Chocolate Agar, Muller Hinton Agar, Nutrient Broth.
- b. Preparation smears from CSF swab and cavity fluids
- c. Inoculation techniques.
- d. Gram's staining and colony morphology
- e. Preparation of Mannitol, TSI and biochemical test media: Indole, Methyl Red, Citrase, Urease, Nitrate, Voges
- f. Biochemical Identification of urine gram negative bacteria: *Escherichia coli*, *Klebsiella*, *Proteus*, *Pseudomonas* sp.
- g. Urine culture and colony count
- h. Sensitivity Testing for Urine gram negative rods.
- i. Identification of clinically important gram positive cocci in cavity fluids and pus.
- j. Catalase, Coagulase and Hemolysis test.
- k. Preparation of bile infusion broth.
- l. Optocin tests and oxidase test.
- m. CSF and blood culture.
- n. Pus and cavity fluid culture.
- o. Stool Culture.
- p. Sputum and throat swab interpretation.
- q. **Mycology**
  - i. KOH, LPCB, India Ink staining techniques and identification of fungi from skin, nails and hairs.
  - ii. Gram morphology of *Cryptococcus neoformans* and *Candida albicans*.
  - iii. Preparation of Fungal Media – Sabouraud Dextrose Agar
- r. **Parasitology**
  - i. Microscopy: Direct smear - Saline and Lugol's iodine preparation.
  - ii. Zinc Sulphate concentration technique for ovas and cysts.
  - iii. Preparation of Schaudinn's Fixatives and fixation fecal smear technique.
  - iv. Preparation of Iron - Hematoxylin stain and staining technique for stool.
  - v. Stool occult blood test (Kit).

#### Handbook:

1. Cheesbrough M. (2007). *District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom
2. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.

#### References:

3. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore
4. Ananthanarayanan and Panikkar J. (2005). *Text book of Medical Microbiology*. 4<sup>th</sup> Ed. Orient Longman Ltd. Madras.

AML 10

AML 2415

Internship III

120Hrs/Sem-4Cr

Job Training: A work-based learning experience that enables the student to apply specialized occupational theory, skills and concepts.

ENA 2404

Career Skills

4 Hrs/4Cr

The fourth sequential General English Course aims at empowering Advance Diploma students with communication & cognitive skills and personality traits necessary to empower their career skills. The course will help students in developing career skills and strategies for successful profession.

**Specific Learning Outcome:**

At the end of the course students will be able to

- develop communication skills
- acquire the interview skills
- improve cognitive skills
- enhance thinking skills
- master personal traits

**Unit 1 Communication Skills:** Active Listening & speaking, written & oral communication

**Unit 2 Interview Skills:** Interview questions, job application, CV preparation, self-introduction

**Unit 3 Cognitive Skills:** Self-motivation, setting personal goals

**Unit 4 Thinking Skills:** Strategic thinking, organization

**Unit 5 Personal Traits Skills:** Personal development & empowerment, Self-esteem

**Textbook**

Sekar, J.J. (2015). *Career Skills*. Madurai: Department of English, The American College.

CSA 2404

Programming Techniques using C

4hrs/Wk – 4 Credits

**Specific Learning Outcome:**

After completing this course students will be able to

- Understand the computer programming in problem solving.
- Understand basic programming techniques.
- write simple programs using numeric and non-numeric data.

**Unit I: Overview of C** Middle level language – compilers versus interpreter – the form of a C program – compiling a C program

**Unit II: Primitive Data types Operators:** Data types – type conversions – operators – formatted input/output functions.

**Unit III: Control statements** If, if-else, switch, for, while, do..while, break and continue.

**Unit IV: Aggregate Data Types** Arrays – strings – functions – call by values – call by reference – passing arrays as arguments – local, global static and external variables.

**Unit IV: Structure and Union** User defined data types – Structures - Union

**Textbook:**

Balagurusamy.E, Programming in ANSI 'C', 4<sup>th</sup> edition, Tata McGrawHill, 2007.

**Reference:**

Yashavant,K. Let Us C, 5<sup>th</sup> edition, BPB publications Nov 8 2011.

LSA 2404

Coping with Social and Environmental Issues

4Hrs/4Cr

This course brings out various sociological and environmental issues that plague the everyday life of people in this fast-growing society. The students will be enlightened to identify the issues that they encounter around them and different ways to manage them efficiently for a better living.

**Specific Learning Outcome:**

At the end of this course the student will be able to,

- understand the importance of relationships and need for coping with them
- manage their time, money and inherent skills for a successful living
- find ways to protect their environment and preserve the precious resources
- realize the impact of globalization in our society and adjust their living conditions

## AML 12

**Unit I: Coping with Society:** Family and Issues related to Marriage – Building relationships – Conflict management – Cultural alienation

**Unit II: Coping with Human Resources:** Time management – Money management – Skill management: Communication – Emotion – - Social skills - Health management

**Unit III: Environmental Issues:** Environment Vs Ecology – Pollution: Air, Water, Soil, Sound  
– Deforestation – Exploitation of natural resources – Environmental protection

**Unit IV: Coping with Globalization:** Globalization – Trends in Education, Employment, Consumerism, Alienation of culture – Merits and Demerits of Globalization

**Unit V: Coping with Technology:** Technological developments – Technology in day today life - Social Media – Impacts of technology in modern society – Managing life with technology

### References:

Alphonse X. (2011). *We shall overcome: A Text book on Life coping skills*. ICRDCE Publication, Chennai

## AML 2405

### Body Fluids Analysis

4 Hrs/4Cr

This course is designed to impart knowledge on composition, testing procedures, and the clinical correlation of results for cerebrospinal, peritoneal, pleural, synovial and amniotic fluids.

### Specific Learning Outcome:

At the end of this course, student will be able to

- understand the facts on location and function of various body fluids.
- know the physical, chemical and microscopic properties of normal and abnormal fluids.
- gain knowledge on pathological changes in body cavities.
- appreciate the results in terms of diagnosis.

**Unit I: Introduction to body fluids:** Types of body fluids and compartments, regulation and functions. Solutes in body fluid. Clinical abnormalities – mechanism involved in the movement of body fluids.

**Unit II: Cerebrospinal fluid:** Assessment of the patient – preparation of patient for the procedure – Educating the patient for the sampling procedure. Cytological examination and clinical correlation. Procedure and measures for the prevention of infection. CSF formation - CSF pressure - specimen collection and processing – physical, chemical and microscopic examination - immunologic tests. Transudates and exudates.

**Unit III: Serous and other body fluids:** Formation, collection, physical, chemical and microscopic examination of peritoneal, pleural and gastric fluid. Biomarker evaluation in body fluids for specific therapeutic prognostic and /or diagnostic potential.

**Unit IV: Synovial fluid:** Formation, composition and function of synovial fluid. physical and microscopic examination. Disorders of joints – laboratory diagnosis and interpretation of Non-inflammatory joint diseases – Osteoarthritis, Traumatic arthritis, Neurogenic joint disease. Inflammatory joint disease – Rheumatoid arthritis and Lupus arthritis.

**Unit V: Amniotic fluid:** Formation and function of amniotic fluid, Chemical composition, Collection, Testing – Alpha fetoprotein, Acetyl cholinesterase, Neural tube defects, Chromosomal abnormalities, Haemolytic disease of newborn, gestation period and fetal maturation.

### Textbook

Elkinton D. (2002) *The Body Fluids*. Williams and Wilkins. Baltimore

### References

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. Cheesbrough M.(2007).*District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
3. Graff KMV, and Fox SI. (1995). *Human Anatomy and Physiology*. WCB Publication, Toronto.
4. Cella JH and J Watson. (2004).*Manual of Laboratory Tests*. Aitbs Publishers, New Delhi.
5. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore

### Job role

**Medical Technologist**

**Technician – Forensic Department**

**AML 2410**

**Histopathology & Cytology**

**4Hrs/4Cr**

The objective of this course is to provide basic knowledge of normal and abnormal cells in the tissue and to develop skills to carry out histopathological techniques in the laboratory diagnosis of carcinoma. This is also designed to develop skills to perform cytological studies on various clinical samples.

### Specific Learning Outcome:

At the end of this course, student will be able to

- understand the morphology, function and pathology of human cell.
- list out various devices used in histopathology and cytology.
- gain knowledge on various techniques used in histopathology and cytology.

- appreciate various instruments used in histopathology and to preserve the samples.

**Unit I: Introduction to histology and instruments:** Introduction to Histology, the cell, cell Organelles, nucleus, cell division, tissues, fresh & fixed tissues - Use and handling of Microtomes, Knives, embedding bath, tissue flotation bath, Automated tissue processor.

**Unit II: Histopathology Techniques:** Introduction - Tissue preparation – Fixation - Aims and function of a fixative – Classification. Dehydration, Embedding Media: Paraffin wax. Technique of impregnation – embedding -Blocking –Type of molds –technique of moulding. Decalcification: Decalcifying agents-Selection of the tissue - Determination of end point –neutralization of acids. Use of ion exchange resins –Electrophoretic decalcification –Treatment of hard tissues. Selection cutting: Technique of section cutting – Mounting of section – Automatic tissue processor(Vacuum) – Application of microwave technology to histology –principle and application.

**Unit III: Frozen Technique:** Introduction – Frozen section –Use of Freezing Microtome – Fixation: Fixing sections on slides – Staining of frozen sections(Rapid staining) –Advantages and Disadvantages – Frozen section using Cryostat - Uses - The Cryostat - LEICA CM 1850 Cryostat –component – Set up of instrument– Operation of Cryostat – Terminating work –Troubleshooting – Clearing, disinfecting, maintenance –Staining of Frozen section for Rapid diagnostic.

**Unit IV: Cytology:** Introduction – Specimen collection - Preparation of smears from the sediments of Cavity fluids (CSF, Pleural,Peritoneal,and Pericardial) - CSF Cytospin smear Preparation - Preparation of Fixatives and fixing for smears from body fluids - Fine Needle Aspiration Cytology: Procedure for doing FNAC, Differential Quik staining procedure, Guided FNAC, criteria for adequacy of cells - Preparation of Smears from Sputum, urine, Aspiration and Pus, Semen - Collection sample for Buccal Smears staining and examination for Sex Chromatin Bodies.

**Unit V: Preparation of fixatives and staining techniques;** Preparation of fixative and fixing for FNAC smears - Preparation of stock and working solution and staining procedure - May-Grunwald stain - Giemsa Stain - Rapid Hematoxylin and eosin, Papanicolaou stain. Preparation of buffer of pH 6.8-7.2. Preparation of bronchial lavage smears - preparation of Grads of Alcohol (50%, 70%, 80%) - Tissue AFB staining procedure - determination of fetal maturity by cytology- preparation of smear and stain for amniotic fluid - detection of Leukodystrophy metachromatic granules in urine.

### **Text Book**

Sood R. (2006). *Laboratory Technology (Methods and interpretation)*. 4<sup>th</sup> Ed. J.P. Bros, New Delhi

### **References**

1. Cheesbrough M.(2007).*District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.

2. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*. 2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
3. Godkar PB and Godkar DP. (2002). *A Text Book for Medical Lab Technology*, 2<sup>nd</sup> Ed, Bhalami Publishing House, Mumbai.
4. Mukherjee KL. (2007). *Medical Laboratory Technology*. Vol.1. Tata McGraw hill, New-Delhi.
5. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore

### Job Role

**Pathology Technician – Processor**

**Permanent slide preparation - Technician**

**AML 2114**

**Lab – IV**

**10Hrs/10Cr**

This course is designed to learn laboratory diagnosis of bone marrow related hematological diseases and hemoglobinopathies. This is also deal with techniques practiced in histopathology and cytotechnology in the laboratory diagnosis of carcinoma.

### Specific Learning Outcome:

At the end of this course, student will be able to

- Understand pathology of bone Marrow and tissue.
- Perform laboratory diagnosis of abnormal hemoglobins.
- Practice staining techniques of bone marrow, examine and report.
- Handle various instruments used in histopathology.

### Part – 1

#### I. Bone Marrow Studies

- a. Bone Marrow needle Aspiration biopsy and detection of Iron in prepared smear.
- b. Fixing , May-Grunewald and Giemsa Staining Techniques
- c. Bone Marrow Staining and Microscopy for Iron and fat.
- d. Peroxidase staining technique.
- e. LAF staining technique.
- f. PAS staining technique. Sudan Black B Staining technique.
- g. Iron Staining technique. Aspiration Special Staining technique.
- h. Bone Marrow Examination.
- i. Blood and Bone Marrow Parasites: *Plasmodium* Species, Microfilarias and Leishmania Donovan bodies.

#### II.

#### Special Hematological tests

- a. Sickling test
- b. Estimation of Fetal Hemoglobin (HbF)
- c. Agar Gel Electrophoresis
- d. CAM Paper Electrophoresis.
- e. Quantitative estimation (%) of Hb A, A2, F and S – UV Spectrophotometry
- f. Detection of genotype related to Sickle cell Patient and Sickle cell trait Cases.

- g. Determination of Osmotic Fragility of red blood cells.
- h. Preparation of Lupus Erythematosus (LE) cell.
- i. Preparation of Heinz Bodies.
- j. Detection of Malarial Parasites and Trepanosomes.
- k. Formal gel test for Kala Azar.
- l. Estimation of Glucose-6-Phosphate dehydrogenase
- m. Estimation of Iron and determination of Iron binding capacity.

### Part – 2

#### I. Histopathology

- a. Use and handling of Microtomes, Knives, embedding bath, tissue floatation bath, Automated tissue processor
- b. Preparation and use of Fixatives: Formalin, Zenker's fluid, Carnoy's fluid, Nitric acid solution.
- c. Preparation and Staining techniques: Harris Hematoxylin and Eosin stain, Wrisht's-Van Giesin stain, Von Kossa Silver Nitrate.
- d. Methods of decalcification.
- e. Processing the tissue for Paraffin section.
- f. Method of Honing and Stropping.
- g. Method of cutting of paraffin sections.
- h. Mounting of Stained slides.

### Part -3

#### I. Cytology

- a. Preparation of smears from the sediments of Cavity fluids (CSF, Pleural, Peritoneal, and Pericardial)
- b. CSF Cytospin smear Preparation.
- c. Preparation of Fixatives for cytotechniques and fixing for smears from body fluids.
- d. Fine Needle Aspiration Cytology: Procedure for doing FNAC, Differential Quik staining procedure, Guided FNAC, criteria for adequacy of cells
- e. Preparation of fixative and fixing for FNAC smears.
- f. Preparation of May-Grunwald stain-stock and working solution and staining technique.
- g. Preparation of Giemsa Stain –stock and working solution and staining technique.
- h. Preparation of Rapid Hematoxylin and eosin Stain and staining technique
- i. Preparation of Buffer water and solution of pH 6.8-7.2.
- j. Preparation of Bronchial lavage smears.
- k. Preparation of Bronchial washing Smears.
- l. Preparation of smears from sputum, urine, aspiration and pus, semen.
- m. Collection of sample for buccal smears staining and examination for Sex Chromatin Bodies.
- n. Preparation of Papanicolaou stain and procedure for automatic stainer for program -6.
- o. Papanicolaou staining procedure.
- p. Preparation of Harris Alum Hematoxylin Stock and Working Solution and staining technique.
- q. Preparation of 0.5 % HCL.



- r. Preparation of diluted Lithium Carbonate solution.
- s. Preparation of Grads of Alcohol(50%, 70%, 80% )
- t. Tissue AFB Staining procedure
- u. Determinaton of Foetal maturity by cytology-Preparation of smear and stain for amniotic fluid.
- v. Detection of Leukodystrophy metachromatic granules in urine – preparation of smears and staining technique.

**Textbook:**

1. Cheesbrough M.(2007).*District Laboratory Practice in Tropical Countries*. Part 1&2. Cambridge University Press, United Kingdom.
2. *Manual for Medical Laboratory Technology*. (2005). CMC Hospital Edition. Vellore

**References:**

1. Talib VH. (2015). *A Hand Book of Medical Laboratory Technology*.2<sup>nd</sup> Ed. CBS Publishers Pvt Ltd, New Delhi.
2. Godkar PB and Godkar DP. (2002). *A Text Book for Medical Lab Technology*, 2<sup>nd</sup> Ed, Bhalami Publishing House, Mumbai.

**Job:**

- **Medical laboratory technician**
- **Biopsy sample analyst**
- **Pathology technician**
- **Permanent slide preparation technician**

**AML 2416****Internship IV****120Hrs/Sem-4Cr**

Job Training: A work-based learning experience that enables the student to apply specialized occupational theory, skills and concepts.

**AMERICAN COLLEGE – COMMUNITY COLLEGE  
DEPARTMENT OF FOOD PROCESSING AND PRESERVATION  
MADURAI – 625 002**

**Diploma in Food Processing and Preservation**

<b>Semester</b>	<b>Course No</b>	<b>Course Title</b>	<b>Hrs/wk</b>	<b>Cr.</b>
<b>I</b>	<b>General Education</b>			
	ENC 1403	Conversational skills	4	4
	CSD 1403	Fundamentals of Computers	4	4
	LSD 1403	Fundamentals of Life Coping Skills	4	4
	<b>Skill Component</b>			
	DFP 1407	Fundamentals of Food Science	4	4
	DFP 1409	Food Processing and Preservation- I	4	4
	DFP 1111	Lab in Fundamentals of Food Science	10	10
	<b>Job Training</b>			
	DFP 1413	Internship I	120/sem	4
		<b>Total</b>		<b>34</b>
<b>II</b>	<b>General Education</b>			
	ENC 1404	Reading and Writing skills	4	4
	CSD 1404	Office Automation tools	4	4
	LSD 1404	Performance and Life Coping Skills	4	4
	<b>Skill Component</b>			
	DFP 1408	Food Processing and Preservation- II	4	4
	DFP 1410	Food Packaging	4	4
	DFP 1112	Lab in food Processing and Preservation	10	10
	<b>Job Training</b>			
	DFP 1414	Internship II	120/sem	4
		<b>Total</b>		<b>34</b>

ENC 1403

Conversational Skills

4Hrs/4 Cr.

The Course aims at helping students converse in English on the matters that matter to them in daily life. It provides the learners with ample opportunities and social contexts through conversations so that they can freely and fluently use informal English. It also exposes them to the apt vocabulary of such informal conversations.

### Specific Learning Outcome

At the completion of this course the students shall be able to

- enhance their conversational fluency as well accuracy
- fine-tune their pronunciation and accent
- become familiar with and therefore effortlessly internalize the structures of English

**Unit 1:** Introducing oneself and introducing others

**Unit 2:** Conversation in contexts - Day-to-day matters like eating, emotions, fashion, health, friendship, money, housing, job, faith & hope, busy life, memory, shopping time, Traffic, travelling, vacation, weather

**Unit 3:** Social expressions

**Unit 4:** Practice in formal conversation

**Unit 5:** Practice in informal conversation

### Text Book:

Sekar, J.J. 2014 *Conversational Skills*. Madurai. Department of English, The American College.

CSD 1403

Fundamentals of Computers

4hrs/Wk – 4 credits

### Specific Learning Outcome:

After completing this course students will able to

- Understand the computer generations and components.
- Understand basic functionality of the computer.
- Understand the computer data representation.

**Unit I: Introduction to computers** Generations of computers –components of computer – hardware – software -classification of computers – advantages and limitations – applications of computer

**Unit II: Components of the Computer** CPU - Input devices - Output devices.

**Unit III: Computer Memory** Primary memory – secondary memory-auxiliary storage devices– cache memory CD – DVD –Pen drive – backup.

**Unit IV: Data representation** Data – Meaning - Information –Representation - files - Computer words.

**Unit V: Number Systems in computer** Number systems - Representation–Conversions.

**Textbook:**

Alphonse X, ICRDCE publication, December 2011.

**Reference:**

Curtin, D. P. Foley, K.Kunalsen, Morin.C “Information Technology- The Breaking Wave”, TataMcGraw Hill, 2002.

**LSD 1403**

**Fundamentals of Life Coping Skills**

**4 hrs/Wk – 4 Credits**

This is a foundational course which elicits the necessity for every student to understand the areas of development in moulding their behavior, character and personality through various soft skill sets.

**Specific Learning Outcome:**

At the end of this course the student will be able to,

- Understand the need for identifying and developing the skill
- Manage and adjust their characteristics of personality
- Understand the importance of learning communication skills and Self
- Appreciate the benefits of being assertive

**Unit 1: Introduction to Skills**

Introduction to skills – Definition of Coping - Social Skills – Four levels: Foundation, Interactive, Affective, Cognitive – Understanding Body Language

**Unit II: Personality Development**

Definition of Personality – Characteristics of Personality – Ways to develop personality – Personality types – Four basic temperament

**Unit III: Self Transformation**

Self Identity – Self Concept – Self acceptance – Self discovery – Self Esteem: High & Low Self esteem – Johari Window

**Unit IV: Communication Skills**

Understanding communication – Types of communication – Styles of communication – Patterns of communication – Importance of communication – Effective & Efficient communication.

**Unit V: Assertive Skills**

Assertive Behaviour – Benefits of being Assertive – Types of Assertion – Assertion rights – Developing assertive skill

**References:**

1. Alphonse, X. 2011, “We shall overcome” A Text book on Life coping skills”, ICRDCE Publication, Chennai
2. AIACHE Publication 2014, New Delhi, “Human Values Development”

**DFP 1407****Fundamentals of Food Science****4Hrs/Wk. – 4Credits****Course Description:**

This course provides a basic understanding on cookery science. It includes basics of food Science, cereal & pulse cookery, milk cookery, meat, poultry & fish cookery and sugar cookery.

**Student Learning Outcome:**

After completion of this course, the student will be able to

- understand basics of food science
- gain knowledge in processing of cereals and pulses
- undertake processing of milk and milk products.
- gain knowledge in processing of meat, poultry and fish
- understand various aspects of sugar cookery

**Unit I: Basics of food science** Definition for Food, Food Science - Functions of Food- Food Groups – Food Guide Pyramid - objectives of cooking- Preliminary preparation (Cleaning, peeling, Stringing, Cutting, Grating, Sieving, Chopping, Soaking Coating, Blanching, Grinding, Marinating)- cooking methods.

**Unit II: Cereal & Pulse** Cereals- structure, composition and nutritive value, Processing methods- fermented, unfermented products and malted products, effect of cooking on nutritive Value. Role of cereal in Cookery

Processing of pulses, composition and nutritive value, Soaking, Germination, Fermentation - effect of cooking on nutritive value - Toxic constituents- Role of Pulse in Cookery.

**Unit III: Milk** Milk - composition, physical properties, nutritive value and effect of Cooking (salt, enzymes, acid and heat), Fermented and Non -fermented milk products. Role of Milk in Cookery.

**Unit IV: Meat, Poultry & Fish**

Meat and Poultry - (Curing, Marbling, Tendering), composition, nutritive value - Role of Meat in cookery, Role of egg in cookery.

Fish - Selection of Fish - composition, nutritive value and Role of Fish in cookery.

**Unit V: Sugars** Sugar - composition, nutritive value, Fondant, Fudge, caramel, Brittle, Crystallization, Role of Sugar Cookery.

**Text Book:**

1. Srilakshmi, B., (2001). Food Science, New Age International Pvt. Ltd., New Delhi.

**References:**

1. Potter, N.N. (2002). Food Science. CBS Publishers, New Delhi.
2. Kotschevir, L., Terril, M.E. (1971) Food Service Planning Layout and Equipment. John Wiley & Sons, US.
3. Mohini Sethi, Surjet Maihan. (.1987) Catering Management - An Integrated approach. Wiley Eastern Ltd., Noida.
4. Anderson, F. (1976). Home appliance Servicing. Tarapore-Wals sons & Co., India.

**DFP 1409                      Food Processing and Preservation- I                      4Hrs / Wk.- 4Credits**

**Course Description:**

This course deals with the techniques and principles involved in processing and preserving the food substances. The course is an important one and job orienting in nature that opens many career scopes after its completion.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- know the principles and methods involved in the processing of different foods.
- develop skills in the different food processing equipment.
- study the importance microorganisms in food preservation.
- introduce the basics of various food processing and preservation technologies.
- understand the functional aspects of food components and to study their role in food processing.

**Unit I: Cereal Processing and Preservation** Rice- Parboiling and milling methods, High-Pressure Processing, by products of rice milling and their utilization; Wheat- Milling, by-products of milling, Nutritional losses during processing: Methods of preservation - Conventional and nonconventional foods- Breakfast, Extruded products.

**Unit II: Millets Processing and Preservation** Major and minor millets- Types, Pre-Processing, Processing & methods to remove toxic factors; Nutritional losses during Processing.

**Unit III: Pulse Processing and Preservation** Types, Pre- Processing, milling (Dry, Wet, De husk), Anti nutritional Factors and methods of removal; Nutritional losses during Processing- Methods of preservation.

**Unit IV: Oil Seed Processing and Preservation** Types of oilseeds; Pre-Processing; Processing & Preservation- Extraction of oils- Types, meal concentrates (TVP) and Value Addition; Nutritional losses during Processing - Methods of preserving oils.

**Unit V: Spice Processing (Indian) and Preservation** Classification, Anti-Microbial & Antioxidant Properties, Processing, By-Products of Spices – Extraction of Oleoresin, Essential oil & Spice Blends, Medicinal Value of Spices; Nutritional losses during Processing - Methods of preservation.

**Text Book:**

1. Clark, S., Jung, S., Lamsal, B. (2014). Food Processing Principles and Applications. 2<sup>nd</sup> edition. Wiley Publishers, US.

**References:**

1. NIIR Board of Food and Technologist. (2005). Modern Technology of Food Processing and Agro based industries, National Institute of Industrial Research, Delhi.
2. Peter Zeuthen, Leif Bogh-Sorenson. (2005). Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England.
3. Bhatti,S, Uma Varma.(1995). Fruit and vegetable processing organizations and institutions. 1<sup>ST</sup> edition. CBS Publishing, New Delhi.
4. Mirdula Mirajkar, Sreelatha Menon. (2002). Food Science and Processing Technology - Commercial processing and packaging (Vol-2). Kanishka publishers, New Delhi.

**DFP 1111**

**Lab in Fundamentals of Food Science**

**10Hrs/Wk – 10Credits**

**Course Description**

This course is structured to teach the fundamental and basic concepts of culinary techniques and cookery to include the Brigade system, cooking techniques, heat transfer, sanitation, safety, equipment usage and maintenance, menu knowledge and professionalism.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- determine the different positions and function of kitchen production.
- identify and properly operate equipment & common culinary hand tools.
- productively apply appropriate cooking skills
- identify various cooking techniques.

- comply with and practice safe work habits, identify safety hazards, employ preventative safety measures.

### Laboratory Experiments

1. Preparation of Malting, Extrusion and Germination.
2. Preparation of Pasta, Sandwich and Burger.
3. Preparation of Cake and Puff.
4. Preparation of Nutritious Balls and Chikki.
5. Preparation of Khoa, Paneer, Rasagulla and Sandesh.
6. Preparation of Custard, Mutton Cullet, Fish Finger and Chicken Pie.
7. Preparation of Caramel, Burfi, Jalebi and Halwa.
8. Sensory Evaluation.
9. Visit to Food Processing units

### Text book:

1. Chakraverty, A. (1988). Post-harvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.

### References:

1. Girdhari Lal, Siddappa, G.S., Tandon, C.L. (1967). Preservation of Fruits and Vegetables. ICAR, New Delhi.
2. Potter. (1973). Food science, 2nd edition. AVI Publishing Company, US.
3. Norman, W., Desrosier, Donald, K., Tressler (1977). Fundamentals of food freezing. AVI publishing company, US.
4. Ranganna, S. (1986). Hand book of analysis of quality control for fruit and vegetable products. 2<sup>nd</sup> edition, Tata McGraw Hill Pub. Co., New Delhi.

### ENC 1404

### Reading and Writing Skills

4 Hrs./4 Cr.

The Course aims at improving the learners' productive skills of English. It offers professional guidance on meaningful and aggressive reading experiences by familiarizing them with techniques and micro-skills of reading, comprehension abilities through literary and non-literary reading materials. It also strengthens their writing skills through the forms of writing that are useful to them academically and vocationally.

### Specific Learning Outcome:

At the completion of this course the students shall be able to

- Get training in aggressive speed reading with different sub-skills
- Improve their comprehension abilities
- Learn the art and craft of paragraph and a five-paragraph essay writing

**Unit 1:** Reading at various speeds, skimming & scanning, inferring & interpreting, predicting



**Unit 2:** Reading practice

**Unit 3:** Writing leave letters, apology letters and permission letters

**Unit 4:** Paragraph writing

**Unit 5:** Five-paragraph essay writing

**Text Book:**

Sekar, JJ. 2014. *Reading and Writing Skills*. Madurai. Department of English, The American College.

**CSD 1404**

**Office Automation Tools**

**4hrs/Wk – 4 credits**

**Specific Learning Outcome:**

After completing this course students will able to

- To edit and format text data and tables to make a Document.
- To design worksheet and manipulate data and represent through graphs
- To design a Slide show presentation and show in Multimedia form.

**Unit I: Microsoft Word** Working with text - Formatting paragraph -Numbered and Bulleted lists -Working with Tables

**Unit II:** Working with graphics - Spelling and Grammar Checking - Page format

**Unit III: Microsoft Excel** Modifying a Worksheet -Formatting cells -Formula cells

**Unit IV:** Formulae and Functions - Sorting and Filtering - Graphics – Charts.

**Unit V: Power-Point** Working with slides -Color Schemes – Graphics – Slide Effects – Master Slides – Presentations-Slide Shows–Animations.

**Textbook:**

MS-Office 2003 Manual by Microsoft

**Reference**

Curtin D.P, Kim Foley K, Kunalsen, Morin. C, “Information Technology- The Breaking Wave”, TataMcGraw Hill 2002.

**LSD 1404****Performance and Life Coping Skills****4 hrs/Wk – 4 Credits**

This course aims at nurturing the students in their career development by way of inculcating a set of essential skills which will guide and shape them to grow as confident and successful individuals.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand goal setting and ways to manage their time
- Find out the ways to motivate themselves and others
- Appreciate the need for problem solving skill in everyone's life
- Understand stress and how to cope up with stress
- Realize the importance of dealing with emotions for positive mental health

### **Unit I: GOAL SETTING**

Definition – Importance of Goals – SMART Goal & Time management – Types of Goals - Obstacles – Successful and Meaningful life

### **Unit II: MOTIVATION SKILL**

Introduction to Motivation & Inspiration – Internal and External motivation – Methods of Motivation – Effects of de motivation

### **Unit III: PROBLEM SOLVING SKILL**

Definition of problem – Reasons for problems – Stages of solving problems: Evaluation, Managing, Decision making, Resolving, Results

### **Unit IV: STRESS MANAGEMENT**

Definition of Stress: Positive (Eustress), Negative (Destress) – Stressors: Internal, External – Causes of Stress – Types of Stress – Ways to manage stress

### **Unit V: TIME MANAGEMENT**

Need for time management – Poor Time management – Saboteur Time styles – Techniques for managing time

### **References:**

1. Alphonse, X. 2011, “We shall overcome” A Text book on Life coping skills”, ICRDCE Publication, Chennai

DFP 1408

Food Processing and Preservation- II

4Hrs / Wk.– 4Credits

**Course Description:**

This course deals with the techniques and principles involved in processing and preservation of food substances. The course is an important one and job orienting in nature that opens many career scopes after its completion. It includes processing and preservation of fruits & vegetables, milk & milk products, meat, poultry & egg, sea foods, perishable foods.

**Student Learning Outcome:**

After completion of this course, the student will be able to develop skills in processing & preservation of

- fruits and vegetables and the methodology involved.
- milk & milk products and the various types
- fleshy foods
- sea foods and perishable foods

**Unit I: Fruit & Vegetable Processing and Preservation** Classification, Pre-Processing, Processing & Preservation- Size reduction, Mixing, Separation, Concentration, Freezing & Refrigeration, Drying & Dehydration, Chemicals, Nutritional losses during Processing, Storage.

**Unit II: Dairy Processing and Preservation** Milk, Pre-Processing, Processing & Preservation - Separation, Homogenization, Pasteurization, Standardization, Sterilization (UHT), Evaporation (Spray Drying), Chilling, Freezing & Refrigeration; Nutritional losses during Processing; Milk Products & By Products; Storage.

**Unit III: Fleshy Food Processing and Preservation** Meat, Poultry & Egg - Pre-Processing; Processing & Preservation - Smoking, Canning, Drying, Cooling, Pulsed Electric Field processing; Nutritional losses during Processing; Storage.

**Unit IV: Sea Food Processing and Preservation** Types; Pre-Processing; Processing & Preservation- Dielectric, Ohmic and Infra-red heating- Nutritional losses during Processing; Storage.

**Unit V: Miscellaneous Perishable Food Processing** Confectionery- Types of Confectionery & Method of Preparation. Sugarcane & Sago Technology – By-Product & Its Utilization.

**Text Book:**

1. Clark, S., Jung, S., Lamsal, B. (2014). Food Processing Principles and Applications. 2<sup>nd</sup> Edition. Wiley Publishers, US.

**References:**

1. Fellows, P. J. (2002). Food Processing Technology - Principles and Practices. 2<sup>nd</sup> edition. Woodland Publishing Ltd, Cambridge, England.
2. Avantina Sharma. (2006). Text Book of Food Science and Technology. International Book Distributing Co. Lucknow, UP.

3. Siva Sankar. (2005). Food Processing and Preservation. Prentice hall of India Pvt Ltd, NewDelhi.
4. Peter Zeuthen, Leif Bogh-Sorenson. (2005). Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England.

**DFP 1410****Food Packaging****4Hrs/Wk. – 4Credits****Course Description:**

The main objective of this course is to impart knowledge and skills related to designing packaging system in food products and developing skills in handling of packaging equipment in the students

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- understand the various properties of food packaging materials.
- select suitable packaging material for different food substances.
- appreciate the packaging systems and method.
- gain knowledge in packaging aspects of fresh and processed foods
- understand the food quality changes in packaged foods

**Unit I: Introduction to food packaging** Packaging terminology - definition. Functions of food Packaging, Packaging environment. Characteristics of food stuff that influences packaging selection.

**Unit II: Packaging material and their properties** Glass, Paper and paper board, Metal containers: Tin and Aluminum, Composite containers, Co extruded films, Food Packaging Polymers.

**Unit III: Packaging Systems and methods** Vacuum Packaging, controlled atmospheric packaging, modified atmospheric packaging, Aseptic Packaging, Retort processing, Active Packaging, intelligent packaging, shrink and stretch packaging.

**Unit IV: Packaging aspects of fresh and processed foods** Packaging of cereals, pulses, dairy products, fruits and vegetables, fats and oils, spices, meat, poultry and sea foods, Dairy Products, Bakery, beverages, Dehydrated and frozen foods.

**Unit V: Food quality changes in packaged foods** Physiochemical, microbial and organoleptic changes - Deteriorative changes in packed foods – prevention and methods to extend shelf life -. Storage conditions for fresh and processed packed foods.

**Text Book:**

1. Robertson, GL. (2013). Food Packaging: Principles and Practice, 3rd edition. CRC Press, US.

**References:**

1. Mahadeviah, M., Gowramma, R.V. (1996). Packaging Technology. Tata McGraw – Hill Publishing Company, New Delhi.
2. Crosby, N.T. (1981). Food packaging materials - Aspects of analysis and migration of contaminants. Applied Science Publisher Ltd., UK.
3. Frank, A., Pain, Heather Y. (1983). Hand book of Food packaging. Leonard Hill publications, US.
4. Raja Ahvenainen. (2003). Novel Food Packaging Techniques. Wood Head Publishing Company Ltd., New Delhi.

**DFP 1112      Lab in Food Processing and Preservation    10 Hrs/Wk. –10 Credits****Course Description:**

The objective of this laboratory course is to provide hands on training of processing and preservation of various foods and food products. It includes processing and preservation of foods by sugar, by salt & acid by fermentation.

**Student Learning Outcome:**

1. After completion of this course, the student will be able to develop skills in processing and preservation of foods by
  - sugar such as jam, jelly etc.,
  - salt such as vathal, vadagam etc.,
  - fermentation such as wine.

**Laboratory Experiments:**

1. Preservation of foods by sugar
  - Preparation of Jam, Jelly.
  - Preparation of Marmalade, Cordial.
  - Preparation of Squash, Fruit bars.
  - Preparation of Preserves-Tuity Fruity (Papaya), Ginger Murabha, Amla Preserves.
2. Preservation of foods by salt and acid
  - Preparation of Vathal, Vadagam, Tomato ketchup and sauce.
  - Preparation of Chutneys.
  - Preparation of Pickles-Lemon, Mango, Garlic, Mixed vegetable.
3. Preservation by fermentation – Wine.
4. Visit to Food Processing Units – Cereal based, Pulse Based, Oil based and Spice Based.

**Text Book:**

1. Srilakshmi, B. (2002). Food science. New Age Publishers, New Delhi.

**References:**

1. Fellows, P.J. (2009). Food Processing Technology: Principles and Practice. 3<sup>rd</sup> edition. Woodhead publishing, India.
2. Heldman, D. R., Hartel, R.W. (1999). Principles of Food Processing. 2<sup>nd</sup> edition. Aspen Publication, US.
3. Singh, P. R., Heldman, D. R. (2009). Introduction to Food Engineering. 4<sup>th</sup> edition. Academic Press, US.

**AMERICAN COLLEGE – COMMUNITY COLLEGE  
DEPARTMENT OF FOOD PROCESSING AND PRESERVATION  
MADURAI – 625 002**

**Advanced Diploma in Food Processing and Preservation**

<b>Sem</b>	<b>Course No</b>	<b>Course Title</b>	<b>Hrs/ wk</b>	<b>Cr.</b>
<b>I</b>	<b>General Education</b>			
	ENA 2403	Study skills	4	4
	CSA 2403	Operating System	4	4
	LSA 2403	Coping with psychological and Physical Issues	4	4
	<b>Skill Component</b>			
	AFP 2407	Dairy Processing	4	4
	AFP 2409	Food Analysis	4	4
	AFP 2103	Lab in Dairy and Dairy products	10	10
	<b>Job Training</b>			
	AFP 2405	Internship III	120/sem	4
		<b>Total</b>		<b>34</b>
<b>II</b>	<b>General Education</b>			
	ENA 2404	Career Skills	4	4
	CSA 2404	Programming Techniques using C	4	4
	LSA 2404	Coping with Social and Environmental Issues	4	4
	<b>Skill Component</b>			
	AFP 2408	Processing and Preservation of Meat and Marine Products	4	4
	AFP 2410	Food Safety	4	4
	AFP 2104	Lab in Meat and Marine Products	10	10
	<b>Job Training</b>			
	AFP 2412	Internship II	120/sem	4
			<b>Total</b>	

ENA 2403

Study Skills

4Hrs/4 Cr

The third sequential General English Course aims at empowering Advance Diploma students with study skills necessary to continue their chosen major disciplines. The course will help students to develop study skills and strategies for academic success.

**Specific Learning Outcome:**

At the end of the course, students shall be able to

- develop healthy study habits and improve homework habits
- fine tune their academic skills
- apply time management skills
- understand psychological traits
- use ICT skills

**Unit 1 General** Definition & scope of study skills, study habits, strategies to improve study skills

**Unit 2 Academic Skills** Effective reading strategies & essay writing, note taking & making, summarizing, paraphrasing, information transfer

**Unit 3 Time Management** Motivation & success, barrier to time management

**Unit 4 Psychological** Traits Concentration skills, memory, coping with test anxiety, critical thinking

**Unit 5 ICT** ICT skills

Textbook

Sekar, J.J. 2015. Study Skills. Madurai: Department of English, The American College



CSA 2403

Operating Systems

4hrs/Wk. – 4 Credits

**Specific Learning Outcome:**

After completing this course students will be able to

- Understand the role of Operating system as an interface between user and computer.
- Understand the basic functionality of Operating system.
- Understand the operation of Mobile OS.

**Unit I: Introduction to operating system** BIOS – DOS – Windows - types of operating system – operating system services - desktop operating system

**Unit II:** Server operating system – mainframe operating system – embedded operating system.

**Unit III: Windows** Features of Windows Operating system – Multiprogramming

**Unit IV:** Multitasking – Buffering – Spooling – Time sharing – Browser support.

**Unit V: Introduction to Android** Application of Android – Features of Android – Messaging -Voice based features- Multitasking-Screen Capture-Video Calling-Multiple Language support.

**Text books:**

1. Alphonse X, 2011 ICRDCE publication, December
2. Silberchatz, Galvin and Gagne, 1999. Operating system concepts, John Wiley and sons.

**References:**

1. Curtin D.P, Foley K, Kunalsen, Morin, C. 2002. Information Technology- The Breaking Wave, TataMcGraw Hill.
2. [http://en.wikipedia.org/wiki/List\\_of\\_features\\_in\\_Android](http://en.wikipedia.org/wiki/List_of_features_in_Android)

**LSA 2403 Coping with Psychological and Physical Issues 4 hrs/Wk – 4 Credits**

This course aims at making the students understand the need for learning psychological and physical issues which pose as a challenge in the transforming societies. Also, it directs them to take charge of their lives through various ways and cope up with such issues.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand the types of fear and shyness and the ways of overcoming them
- Manage emotions and stress
- Appreciate the types and styles of communications
- Understand the ways of coping with addiction and sexuality

**Unit I: Coping with Fear and Shyness** Understanding Fear - Types of Fear – Overcoming Fear – Shyness – Types – Managing Shyness

**Unit II: Coping with Emotions & Stress** Types of Emotions – Managing Emotions – Stress – Types & Need for understanding stress – Ways to manage stress

**Unit III: Communication & Failure** Communication – Types & Styles – Ways to improve communication – Failure – Managing Failures

**Unit IV: Coping with Addictions** Drug addictions – Causes of addiction – Physical & Societal implications – Internet Addiction – Cyber crime - Types and causes – Managing addictions

**Unit V: Coping with Sexuality** Sex and Gender – Understanding Gender discrimination – Coping with gender discrimination – Understanding Sexuality – Consequences of Premarital & extra martial sexual issues – Managing sexuality

**References:**

1. “We shall overcome - A Text book on Life coping skills”, Indian Centre for Research and Development of Community Education (ICRDCE) Publication, Alphonse, X. 2011, Chennai
2. “Living with Honour”, Macmillan Publishers India Ltd., Shiv Khera 2003
3. “Smart Guide to Relieving Stress”, Wiley, Carole Bodger, 1999
4. “Managing Stress”, National Press Publications, Kristine C. Brewer 1995

AFP 2407

Dairy Processing

4 Hrs/Wk – 4 Credits

**Course Description:**

This course is structured to teach the fundamental and basic concepts of dairy processing and preparation of milk and milk products.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- introduce knowledge on dairy science.
- understand different methods in milk processing.
- know the preparation of different milk products
- inculcate techniques of packaging and storage.
- know cleaning practices of dairy practices.

**Unit I: Introduction** Chemical composition of milk, unit operations in dairy industry - Filtration, Clarification, Pasteurization, Homogenization and Sterilization

**Unit II: Processing of Milk** Types of processed milk: pasteurized, toned, flavored, fermented, powdered and infant formula milk.

**Unit III: Milk Products** Preparation methods and principles of paneer, cheddar cheese, curd, yoghurt, ice cream,

**Unit IV: Packaging, Storage and Quality Evaluation** Packaging and storage of milk and milk products, Quality evaluation. Food laws and standards of dairy products

**Unit V: Cleaning & Sanitation of Dairy equipment** Detergents, Ultrasonic techniques in Cleaning, Sanitizers, Mechanism of Fouling.

**Text book:**

1. Sukumar De, 1991, Outlines of Dairy Technology, Oxford Univ. Press, ND.

**References:**

1. Walstra, P., 2005, Dairy Technology, Oxford Univ. Press, ND. Milk & Milk Products, Tata McGraw Hill Publishers, USA.
2. Warner J.N., 1976, Principles of Dairy Processing, Wiley Science Publishers, USA.
3. Robinson, R.K., 1996, Modern Dairy Technology, Vol 1 & 2, Elsevier Applied Science Pub.
4. Herrington, B.L., 1948, Milk & Milk Processing, McGraw-Hill Book Company.
5. Lampert, L.H, 1970, Modern Dairy Products, Chemical Publishing Company.

AFP 2409

Food Analysis

4 Hrs/ Wk – 4 Credits

**Course Description**

The main objective of this course is to impart knowledge and skills related to analysis related to different food products.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- understand the quality aspects of food.
- gain the knowledge on food additives.
- formulate new strategies in formation of different tastes in food.
- inculcate instrumentation techniques in food analysis.
- know the laws related with food.

**Unit I: Sensory science** Introduction, panel section, methods in sensory analysis, recent development in sensory science.

**Unit II: Quality attributes of foods** Food size and shape, colour and gloss, texture – visual and objectively measurable attributes

**Unit III: Aroma of foods** Introductory ideas, formation and chemistry ideas on taste formation and chemistry -Food additives

**Unit IV: Instrumental techniques** Principles, working mechanism of GC-MS, HPLC, NMR, PCR.

**Unit V: Food laws** National and International Food Laws and Regulations - FSSAI -BIS, FPO, PFA and FDA.

**Text book:**

1. Pearson, D, “The Chemical Analysis of Foods”. Churchill Livingstone, New York 2002.

**References:**

1. Sharma, B.K, “Instrumental Methods of Chemical Analysis”. Goel Publishing House, New Delhi 2004.
2. Nielsen, S.S, “Introduction to the chemical analysis of foods”. Jones and Bartlett Publishers, Boston, London 2004.
3. Mahindru, S.N, “Food additives. Characteristics, detection and estimation”. Tata McGraw-Hill Publishing Company Limited, New Delhi 2000

**AFP 2103****Lab in Dairy processing****10 Hrs/Wk– 10 Credits****Course Description:**

The objective of this laboratory course is to provide hands on training on analysis of milk and preparation of milk products.

**Student Learning Outcome:**

After completion of this course, the student will be able to develop skills in laboratory techniques related with qualitative and quantitative aspects of milk.

**Laboratory Experiments**

1. Estimation of acidity in milk by Alizarin – Alcohol test.
2. Determination of specific gravity, SNF % and TS% in milk.
3. Estimation the milk fat by Gerber method.
4. Determination of Casein content in milk.
5. Evaluation of sterility of milk by Turbidity test.
6. Qualitative microbiological analysis of milk by MBRT.
7. Estimation of the purity of ghee by Baudouin test.
8. Preparation of curds, cream and butter milk
9. Preparation of Ghee
10. Preparation of ice cream
11. Preparation of a chart of physico – chemical properties and microbiological standards of milk and milk products.

**Reference:**

1. Sukumar De, Outlines of Dairy Technology, Oxford University Press-New Delhi

**ENA 2404****Career Skills****4 Hrs. / 4 Cr**

The fourth sequential General English Course aims at empowering Advance Diploma students with communication & cognitive skills and personality traits necessary to empower their career skills. The course will help students in developing career skills and strategies for successful profession.

**Specific Learning Outcome:**

At the end of the course students will be able to

- develop communication skills
- acquire the interview skills
- improve cognitive skills
- enhance thinking skills
- master personal traits

**Unit 1 Communication Skills** Active Listening & speaking, written & oral communication

**Unit 2 Interview Skills** Interview questions, job application, CV preparation, self-introduction,

**Unit 3 Cognitive Skills** Self-motivation, setting personal goals

**Unit 4 Thinking Skills** Strategic thinking, organization

**Unit 5 Personal Traits Skills** Personal development & empowerment, Self-esteem

Textbook

Sekar, J.J. 2015. Career Skills. Madurai: Department of English, The American College.

**CSA 2404                      Programming Techniques using C                      4hrs/Wk – 4 Credits**

**Specific Learning Outcome:**

After completing this course students will able to

- Understand the computer programming in problem solving.
- Understand basic programming techniques.
- To write simple programs using numeric and non-numeric data.

**Unit I: Overview of C** Middle level language – compilers versus interpreter – the form of a C program – compiling a C program

**Unit II:** Data types – type conversions – operators – formatted input/output functions.

**Unit III: Control statements** If, if-else, switch, for, while, do..while, break and continue.

**Unit IV: Aggregate Data Types** Arrays – strings – functions – call by values – call by reference – passing arrays as arguments – local, global static and external variables.

**Unit IV: Structures and Unions** User defined data types – Structures - Union

**Textbook:**

Balagurusamy.E, Programming in ANSI ‘C’, 4<sup>th</sup> edition, Tata McGrawHill, 2007.

**Reference:**

Yashavant,K. Let Us C, 5<sup>th</sup> edition, BPB publications Nov 8 2011.

**LSA 2404 Coping with Social and Environmental Issues 4 hrs/Wk – 4 Credits**

This course brings out various sociological and environmental issues that plague the everyday life of people in this fast-growing society. The students will be enlightened to identify the issues that they encounter around them and different ways to manage them efficiently for a better living.

**Specific Learning Outcome:** At the end of this course the student will be able to,

- Understand the importance of relationships and need for coping with them
- Manage their time, money and inherent skills for a successful living
- Find ways to protect their environment and preserve the precious resources
- Realize the impact of globalization in our society and adjust their living conditions

**Unit I: Coping with Society** Family and Issues related to Marriage – Building relationships –  
Conflict management – Cultural alienation

**Unit II: Coping with Human Resources** Time management – Money management – Skill management: Communication – Emotion – Social skills - Health management

**Unit III: Environmental Issues** Environment Vs Ecology – Pollution: Air, Water, Soil, Sound  
– De forestation – Exploitation of natural resources – Environmental protection

**Unit IV: Coping with Globalization** Globalization – Trends in Education, Employment, Consumerism, Alienation of culture – Merits and Demerits of Globalization

**Unit V: Coping with Technology** Technological developments – Technology in day today life - Social Media – Impacts of technology in modern society – Managing life with technology

**References:**

1. Alphonse, X. 2011, “We shall overcome” A Text book on Life coping skills”, ICRDCE Publication, Chennai



**AFP 2408 Processing and Preservation of Meat and Marine Products****4 Hrs/Wk – 4Credits****Course Description**

This course is structured to teach the methods in processing and preservation meat and marine products.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- know the processing of meat.
- understand methods involved in fish processing.
- know the processing in egg.
- understand the preservation strategies of meat.
- inculcate techniques of packaging and storage.

**Unit I: Meat Processing** Nutritional quality of meat and poultry, structure of muscles-factor affecting quality of fresh meat. Postmortem changes – *Rigor mortis*. Meat products – Ham and Bacon, sausage, quality standards for meat products.

**Unit II: Meat and poultry processing** Preservation of meat and poultry – freezing, smoking, drying, canning, HTST, fat imbedding, ironizing irradiation.

**Unit III: Fish Processing** Types of fish-shell fish-post fishing change- post – mortem changes in fish, handling, storage and transportation of fish. Low temperature, chilling and freezing, Thermal processing, dehydration, curing and smoking, preservation using antibiotics, preservation by irradiation.

**Unit IV: Egg Processing** Structure and composition of egg, processing of eggs, storage and transportation of egg products. Status of egg industries in Tamilnadu.

**Unit V: Packaging and Quality** Packaging of meat, poultry and fish products, quality factors during storage, additives used in meat and fish products, contaminants and naturally occurring poisons, byproducts and wastes of meat, fish, poultry.

**Text book:**

1. Richardson and Mead, 1999, Poultry meat science. CABI Publishing; First edition

**References:**

1. Pearson A.M. and R.B.Young, 1989, Muscle and Meat biochemistry.Academic press Inc
2. Pearson and Dutson,1994,Quality attributes and their measurement in meat poultry
3. Stadelman, W.J. and Cotterill, O.J., 2002, Egg Science and Technology, CBS Publishers, New Delhi.
4. Romans, J.R., Costllo, W,J. Carlson, W.C., Greaser, M.L. and Jones, K.W., 2004, The Meat We Eat, Interstate Publishers, USA

AFP 2410

Food Safety

4 Hrs/Wk – 4 Credits

**Course Description**

This course enables students to gain knowledge on food safety and food laws and study about quality control and common food standards.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- know the concept of food safety.
- understand the regulations of food laws
- know the principles and techniques of food instruments.
- understand the hygiene and sanitary practices.
- inculcate techniques of preventive measures.

**Unit I:** History of food regulations in India. Legislations. Prevention of Food Adulteration act (1954), Food product order (1955), Solvent Extracted Oil, De-oiled Meal and Edible flour(Control) Order (1967), Meat Food Products Order (1973) Edible Oils Packaging (1998) Edible Oils Packaging (1998), Vegetable Oil Products Order (1998), Milk & Milk Product Amendment Regulations (2009).

**Unit II:** Food Sanitation and Safety Factors contributing to Physical, Chemical and biological contamination in food chain, Prevention and control of food borne hazards, definition and regulation of food sanitation, sources of contaminations, personal hygiene-food handlers, cleaning compounds, sanitation methods, waste disposal strategy (solid and liquid waste) and pest control.

**Unit III: Food adulteration:** common adulterants, simple tests for detection of adulteration. Food additives classification, functional role and safety issues, types of adulteration and recent trends in food adulteration.

**Unit IV: Food Safety and Quality Assurance:** quality control of raw materials in process food control, quality control of finished products, quality assurance of therapeutic, functional, nutraceutical and novel foods.

**Unit V: Hygiene & Sanitary Practices** Insect growth regulators, biopesticides and grain protectants, Fumigants properties, application techniques, fumigation appliances, use of controlled atmosphere for insect control and food protection, control and preventive measures.

**Text book:**

1. Food safety and standards regulations, 2010. The Ministry of Health and Family Welfare, The Gazette of India: Extraordinary, Part- III, section

**References**

1. General requirements (Food Hygiene) of the Codex Alimentarius, Volume II. Food and Agriculture Organization of the United Nations.
2. Nijhawan, R., (2017). Food safety and standards, 17<sup>th</sup> Edition, ILBCO India.

**AFP 2412      Lab in Processing of Meat and Marine Products    10Hrs/Wk-10Credits****Course Description**

This course is structured to teach the methods in processing and preservation meat and marine products.

**Specific Learning Outcome:**

After completion of this course, the student will be able to

- know the processing of meat.
- understand methods involved in fish processing.
- know the processing in egg.
- understand the preservation strategies of meat.
- inculcate techniques of packaging and storage.

**Laboratory Experiments**

1. Processing of chicken and quality testing.
2. Determination of egg components.
3. Preparation of egg products, boiled, fried, omelet.
4. Determine quality of egg by brine floatation technique.
5. Determination of egg density.
6. Visit to different meat processing industries.
7. Awareness of common adulterants in food samples.
8. Test to detect adulterants.
9. Awareness of certified marks on food packages.
10. Visit to toxicology lab and public health laboratory.

**References:**

1. Srilakshmi, B. (2002). Food science. New Age Publishers, New Delhi.