THE APOLLO UNIVERSITY

DIVISION OF ALLIED HEALTH SCIENCES

SCHOOL OF HEALTH SCIENCES

COURSE STRUCTURE & SYLLABI
(B.Sc. IMAGING TECHNOLOGY)

FOR 2023, 2024 & 2025 ADMITTED BATCH

The Apollo University

A DIVISION OF AHERF

University Vision:

The Apollo University aspires to create future global leaders, preparing them for a constantly evolving world and empowering them to build a more inclusive society.

Mission:

The Mission of The Apollo University is to offer transformative education developed at the intersection of healthcare, technology, and management, having roots in innovation and research in an inclusive culture that fosters practice-oriented knowledge, stimulates critical thinking and sustains our legacy of excellence.

PROGRAM OUTCOMES (PO)

PO 1: Clinical care: Organize and implement the prescribed preventive, investigative and management plans; and will offer care and appropriate follow-up services to patients in a cost-effective way.

PO 2: Communication: Communicate effectively and appropriately with patients/clients, caregivers, other health professionals and other members of the community.

PO 3: Membership of a multidisciplinary health team: Function effectively as an individual, and as a member in multidisciplinary healthcare teams to accomplish shared goals within and across settings to achieve coordinated, high-quality care.

PO 4: Ethics and accountability at all levels: Understand the core concept of clinical ethics and law so that they may apply these to their practice as healthcare service providers.

PO 5: Commitment to professional excellence: Execute professionalism and reflect technical competence, appearance, empathy, compassion, honor, and integrity in his/her thought and action to ensure the safe delivery of healthcare.

PO 6: Leadership and mentorship: Demonstrate leadership qualities where needed in order to ensure clinical productivity and patient satisfaction in an autonomous and confident manner.

PO 7: Social accountability and responsibility: Recognize that allied health professionals need to judiciously manage resources and promote innovation and sustainability to provide optimal patient care in a socially responsible manner.

PO 8: Scientific attitude and scholarship: To be engaged in evidence-based practice and need-based research studies and to apply and disseminate research findings and knowledge for improving the quality of care.

PO 9: Lifelong learning: Recognize the need and have the ability to engage in independent and continuous lifelong learning and improvement in skills and knowledge while harnessing modern tools and technology for the advancement of self and profession.

PROGRAM EDUCATIONAL OBJECTIVES (PEO):

PEO1: Demonstrate technical proficiency, in-depth knowledge, and application of scientific and safety principles in all allied health professional programs and apply clinical skills to one's own work, as a member and leader in a team, and in multidisciplinary clinical settings and to attain high level of proficiency in defined clinical competencies of the allied health technologists

PEO2: Recognize that allied and healthcare professionals need to be advocates within the healthcare system, to judiciously manage resources and to acknowledge their social accountability. To serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Have the ability to engage in independent and lifelong learning and improvement in skills and knowledge while harnessing modern tools and technology.

PEO3: Practice with ethics and accountability at all levels (clinical, professional, personal, and social). To exhibit at all times a high level of professionalism and this be reflected in his/her thought and action, as well as in a range of attributes and characteristics that include technical competence, empathy, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude. Communicate effectively and appropriately with patients/clients, caregivers, and health professionals.

PEO4: Inculcate the skills to function effectively as an individual and as an active member of a multidisciplinary health team. Develop skills to take on a leadership role in order to ensure clinical productivity and patient satisfaction. Must be able to respond in an autonomous and confident manner to planned and uncertain situations and should be able to manage themselves and others effectively.

PROGRAM SPECIFIC OUTCOMES (PSO):

PSO 1: Understand and apply the principles of medical imaging technology to perform safe, accurate, and effective diagnostic imaging procedures tailored to individual patient needs.

PSO 2: Demonstrate proficiency in operating a wide range of imaging equipment, including X-ray, CT, MRI, and ultrasound, with a thorough understanding of imaging protocols and patient safety measures.

PSO 3: Assess imaging outcomes for diagnostic accuracy, identify potential abnormalities, and promptly communicate critical findings to the radiologist or physician for appropriate medical intervention.

THE APOLLO UNIVERSITY

ACADEMIC REGULATIONS

SCOPE:

This Academic regulation provide a framework for the regulatory guidelines of all programs offered by The Apollo University. It includes procedures and practices that are to be followed to ensure academic standards in the University. The regulations are approved by the Academic Council. These regulations may be amended from time to time with the approval of the Academic council for the benefit of students or some times to reflect the changes suggested by the statutory bodies.

Information regarding amendments (if any) to the regulations will be communicated to the students by publishing in the University website. Students must follow the amended regulations as they might impact the process for the award of degree. The decision of the Vice Chancellor shall be the final in case of any discrepancy. These regulations apply to all students, despite the program of study.

1. ADMISSION INTO THE PROGRAM

The University admits the students in two modes. One through the convenor quota as per the Andhra Pradesh Private Universities Act, for which the admissions will be carried out through the convener quota by the Govt of Andhra Pradesh. The other is through University quota for which the following procedure will be followed:

A. The applicant shall satisfy the entrance requirements specified by The Apollo University and in accordance with guidelines of statutory councils for Under-graduation.
B. The Applicant shall be qualified in the qualifying examination for a particular program.
C. The Applicant secures a rank in national level entrance exam or suitable such test conducted by The Apollo University / professional body.
D. The Applicant qualifies in the specified state or national level examinations prescribed by The Apollo University.

The Apollo University will widely notify the counselling schedule for admissions into the academic programs in the media. The provisional admission will be given to the eligible students during the counselling scheduled by Apollo University. The selected candidates will be provisionally admitted into the program of his/her choice if the candidate meets the program specific requirements in addition to academic performance qualifying

exam. Admission is purely based on merit and so merely meeting the requirements will not ensure admission. The University does not discriminate based on gender, race, region, religion, disability or nationality. The University reserves the right to make admissions based on various criteria which is specified in the admission brochure.

2. ELIGIBILITY CRITERIA

Undergraduate programs

The qualifying exam eligibility for each program is given Annexure 1. The student should have passed the qualifying exam either in the year the student is seeking admission or the previous year.

Convener Quota: The student seeking admission to any program under convener quota shall qualify in the relevant entrance exam conducted by the Government of Andhra Pradesh.

University Quota: For getting admission under University quota, percentage of marks obtained in the qualifying exam, the rank obtained in TAU entrance exam or any recognized national level examination in the year of admission will be considered.

Counselling

All the eligible students need to apply for admission and have to attend counselling conducted by TAU as per the schedule for the university quota.

3. PROGRAMS

The Apollo University offers variety of programs which includes certificate, undergraduate, postgraduate, and Research. The list of programs on offer for the academic year 2023-24 are annexed in Annexure 2.

Minimum duration of the program

The minimum duration of each program depends on the type of program, viz., undergraduate, postgraduate, integrated programs, etc., and the faculty which offers the program. The maximum duration of the program is N+2 years, where N stands for the minimum duration of the program as mentioned in Annexure 2 and 3. If the student has not obtained the minimum number of credits within the stipulated time, the Vice-Chancellor may extend the maximum duration in extenuating circumstances upon receiving a request along with reasons from the student for not completing the program on time.

4. CHOICE BASED CREDIT SYSTEM

The choice-based credit system (CBCS) facilitates the education student-centric. It provides the opportunity for the learner to choose the courses from a basket of core, elective, and skill enhanced courses. All programs of study are designed to meet the specified number of credit requirements. The courses taken by the student in each semester as part of program are allotted some credit points based on the number of hours assigned. Upon successful completion of the course, the student secures the number of credits allotted for that course. Once the minimum number of credits of the program is achieved, the degree can be awarded, subject to fulfilment of all other relevant conditions.

5. STRUCTURE OF THE PROGRAM

The Program structure Consists of

i) University Courses
   - A. University Core
   - B. University Electives

ii) Faculty Courses
   - A. Faculty Core
   - B. Faculty Electives

iii) Program Courses
   - A. Program Core
   - B. Program electives

Each course* is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week. (*one course means one subject)

Core Courses = 3 Credits /4 Credits **Elective =3 Credits**

In general, credits are assigned to the courses as detailed below:

- **A classroom lecture/ tutorial of 60 min (1 hr) duration per week, spread over the entire semester, shall be considered as one credit.**
- **A laboratory session of minimum of 120 min (2 hr) per week shall be considered as one credit.**
- **A project work/ Internship session of 60 minutes (1 hr) carried out per week shall be considered as one credit.**

6. MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

7. REGISTRATION

Any of the following student must register for the courses opted in a particular semester during the scheduled registration period.

i. a new student who enrols into any program
ii. an existing student who is continuing on rolls from the preceding regular semester
iii. a former student, i.e., who has not enrolled in the preceding regular semester or who has availed academic break or detained and got readmission

Each newly admitted student shall attend an induction/ orientation program prior to commencement of the first semester. During this program academic advisors assist the students in choosing the courses. Existing student may register online by using their registration number and mail ID through the Apollo ERP portal. Class schedules are available approximately two weeks before the beginning of every semester for each program. The concerned head of the department must approve class schedule.

8. ATTENDANCE REQUIREMENTS

- Students should earn a minimum of 80% attendance in the current semester to become eligible to write the Semester End Examinations.
- The monthly statement of attendance will be displayed on the Department Notice Board/ Apollo ERP by the respective departments within the first five working days of the following month.
- Candidates who are falling short of 80% attendance will be detained on the recommendation of the HoD and are not eligible to appear for the current semester examinations. The students who are detained in the current semester will not be allowed to register for the next semester and they have to repeat the same semester by paying the tuition fee prescribed. However, they can write arrear subjects, if any.

9. EVALUATION

The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks). A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end

examination. Clinical Skill/Practical/ Project Work/ Industrial Training/ Viva voce/ Seminar etc. are completely assessed as Continuous Evaluation (80 marks) and Semester-end examination (20 marks) put together a maximum of 100 marks, and a student has to obtain a minimum of 50% to secure Pass Grade. For courses having both theory and practical components, 60% of the weightage will be given for theory component and 40% weightage for practical component. The student must secure 40% (Theory + Practical) with 24 marks minimum in theory to attain pass grade.

Details of Assessment Procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S. No.	**Component of Assessment**	**Marks Allotted**	**Type of Assessment**	**Scheme of Evaluation**
1	Theory	40	Continuous Evaluation	i) Twenty (20) marks for mid examinations. Three mid examinations shall be conducted for 20 marks each; average of the best two performances shall be taken into consideration. ii) Ten (10) marks for Quizzes, Assignments and Presentations. iii) Ten (10) marks for periodic evaluation, case studies and projects
		60	Semester-end Examination	iv) Sixty (60) marks for Semester-end examinations
	Total	**100**		
2	Laboratory	100	Continuous Evaluation	1) 80 marks with equal weightage to all experiments subject to conduct of minimum of 10 experiments 2) 20 marks for the end exam (with one of our university teachers as external other than course teacher)

3	Internship	100	Continuous Evaluation	i) (80) marks for periodic evaluation of Internship report by the Project Supervisor. ii) Twenty (20) marks for final Report presentation and Viva-voce, by a panel of internal examiners. iii) Students shall undergo TWO internships during the course of time and the evaluation shall be done during final semester.
4	Project work	100	Continuous Evaluation	i) (80) marks for periodic evaluation and technical report writing by the Project Supervisor. ii) Twenty (20) marks for final Report presentation and Viva-voce, by a panel of internal examiners

GRADING SYSTEM

Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given inTable2.

Table 2: Grades & Grade Points

Sl. No.	Grade	Grade Points	Absolute Marks
1	O(Outstanding)	10	90 and above
2	A+(Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+(Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C(Average)	5	45 to 49
7	P(Pass)	4	40 to 44
8	F(Fail)	0	Less than 40
9	Ab. (Absent)	0	-

SEMESTER GRADEPOINTAVERAGE (SGPA)

A Semester Grade Point Average (SGPA) for the semester will be calculated according to the formula:

$$SGPA \frac{\sum [C \, X \, G]}{\sum C}$$

Where

C = Number of credits for the course,

G = Grade points obtained by the student in the course.

A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

CUMULATIVE GRADE POINT AVEARGE (CGPA)

A similar formula is used to arrive at Cumulative Grade Point Average (CGPA), considering the student's performance in all the courses taken in all the semesters up to the particular point of time.

Table 3 shows the CGPA required for the award of class after the successful completion of the program.

Table3: CGPA required for award of Class

Class	**CGPA Required**
First Class with Distinction	≥8.0*
First Class	≥6.5
Second Class	≥5.5
Pass Class	≥5.0

*In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.

11. REAPPEARANCE

a. A student who has secured 'F' grade in a Theory course shall have to reappear at the subsequent Semester end examination held for that course.
b. A student who has secured 'F' grade in a Practical course shall have to attend Special Instruction Classes scheduled by the Department for securing pass.
c. A student who has secured 'F' Grade in Internship /Project work / Industrial

Training etc shall have to reappear for Viva – voce scheduled by the department.

d. A student who is declared fail (F) in a course/s can apply for revaluation within one week from the date of publication of results with a fee prescribed by the university. The marks /grade awarded in the revaluation is final.

11.1 PROCEDURE FOR REVALUATION

- The students who have not satisfied with the marks awarded by the examiner can apply for revaluation of his/her answer script/s
- The students have to apply through proper channel for revaluation and to pay the revaluation fee per paper to the university towards revaluation fee.
- Students have to apply for revaluation within 7 days from the date publication of result.
- The scripts will get valued by second examiner and if the difference is more than 15 marks, they will get valued by the third examiner. The average of the nearest two marks will be declared as the final marks.

11.2 ASSESSMENT MECHANISM

The Apollo University offers a student the benefits of Choice Based Credit System. Every paper is allotted a certain number of credits as per the UGC norms. A student is awarded the specified credits on obtaining a pass in the respective paper.

The Choice Based Credit System (CBCS) has been adopted for UG Course from the year 2021-22 onwards as per the recommendations of the A.P. State Council for Higher Education (APSCHE). The structure of undergraduate programmes provides a wide range of choice for students to opt for courses based on their eligibility, aptitude and career goals.

11.3 SEMESTER END EXAMINATION

The End semester examination will be a comprehensive examination of 3 hours duration. Two End Semester examinations are conducted in a year-

Odd semester examinations in November/ December and

Even semester examination in May/June

Practical examination / Project viva will be held 2 weeks prior to the theory semester end examinations.

Under-Graduation Programs

Course	Continuous Assessment	End semester	Aggregate in End semester Examinations
All UG Courses	No passing minimum	40%	40%

11.4 POST EVALUATION PROGRAMME:

Under the Post Evaluation Programme there are three menus:

- Provision for improvement
- Re-totalling and Revaluation of answer scripts
- Restrictions to appear for the examinations

11.5 PROVISION FOR IMPROVEMENT:

A student who passes a paper in the first attempt can reappear for the same paper in the succeeding End-of-Semester examination only, for improving his/her marks. Re-appearance for improvement is allowed for theory and practical subjects of all semesters, except for the final semester subjects. Revised mark statement will be issued after withdrawing the previous one, if the marks obtained in improvement are higher than the marks awarded earlier. When there is no improvement, there shall not be any change in the original marks already awarded. The improved marks shall be considered for classification but not for ranking.

Provision for Re-totalling and Revaluation of valued answer scripts

- UG candidates may apply for re-totalling / revaluation of valued answer scripts, to the Controller of Examinations through the Heads of Departments and Principal / Dean, in the prescribed forms, remitting the prescribed fee within 7 days from the date of publication of results. Revaluation of answer scripts is permissible only for the current semester papers and not for any arrear paper.
- Those wish to apply for revaluation of final semester papers can do so within five days from the date of publication of results. In re-valuation, the answer papers will be valued by an external examiner and if there is a difference of 15 marks between the two evaluations then the script will be sent for third valuation which is final and the mark awarded by the third examiner will be taken into the account.
- Revised mark statement will be issued after withdrawing the previous one, if the marks obtained in revaluation / retotalling are higher than the marks obtained

earlier. In other cases, the original marks obtained earlier will be retained and the matter will be intimated to the student concerned as 'No change'.

- A candidate who applies for revaluation should not apply for retotalling.

RESTRICTIONS TO APPEAR FOR THE EXAMINATIONS

Candidates who fail in any of the papers in the UG End semester examinations shall complete the paper concerned within N+2 years from the date of admission to the particular course. If they fail to do so, they shall re-register their names and take the examination in the texts/revised regulations/syllabus of the paper prescribed for the subsequent batch of candidates, in force at the time of their reappearance. In the event of removal of that paper consequent to change of regulation and/or curriculum after N+2 years period, the candidate shall have to take up an equivalent paper in the revised syllabus as suggested by the Chairman, Board of Studies concerned.

12. BETTERMENT OF GRADES

A student who has secured only a Pass or Second class and desires to improve his/her Class can appear for Betterment Examinations only in Theory courses of any Semester of his/her choice, conducted in Summer Vacation along with the Special Examinations. Betterment of Grades is permitted 'only once' immediately after completion of the program of study.

13. DETENTION AND RE-ADMISSION

If a student fails to meet the minimum attendance requirement or minimum standards for academic progression, the concerned academic head will recommend for detention and it will be notified by the concerned Dean of the School. The students who are detained in the current semester will not be allowed to register for the next semester and they have to repeat the same semester.

The candidates who are detained or availed academic break or suspended in the previous semester/academic year and want to continue their study shall apply for re-admission to the university. The candidates shall request for re-admission to the respective Head of the Department, with details viz., Full Name, Registration Number, Department, School, Fee payment particulars with proofs and reasons for discontinuations. The concerned academic head will forward it to the Registrar with specific comments. The Registrar will notify the decision of re-admission which shall include the prescribed fee particulars, semester/ year into which readmission is granted and additional courses to be completed by the student (if any). The candidates should apply for re-admission in advance, that is before the commencement of the semester.

14. GROOMING AND ATTIRE FOR STUDENTS

Grooming and Etiquette is of great significance in the dynamic of shaping one's Personality. The Apollo University stands by a *Code of Grooming, Attire and Etiquette* that promotes a professional standard: Academic Day; Campus Placements and Non-Academic Hours on Campus.

The Dress Code to be in compliance on academic premises while attending: Formal Functions of the Institution / Lectures / Practicals / Dining Area / Library / Labs / Office Areas.

Students shall follow appropriate attire during Academic and Non-Academic hours on the campus. Students shall wear clean, neat, pressed and presentable clothing, and command respect by dressing in accordance with responsible personal norms. Students shall always wear The Apollo University ID Card with the Lanyard.

Grooming and Formal Wear - Boys:

Formal Shirts / T-Shirts with a Collar should preferably be tucked in with a Formal pair of Pants Shoes and Socks to complete the Formal Attire. Personal Hygiene should be followed and Hair should be well groomed.

Smart Casuals for Boys:

Long Kurtas / Formals / Semi-Formal Shirts with Jeans.

Grooming and Formal Wear - Girls: Sarees / Salwar Suits / Leggings or Jeggings with Long Kurtis / Long Frocks / Long Skirts / Palazzos. Complement the outfit with proper footwear. Personal Hygiene should be followed and Hair should be well groomed.

Smart Casuals for Girls:

Jeans with long Kurtis / Long Skirts / Long Frocks.

Attire for Non-Academic Hours On Campus:

The students should be neatly attired during Non-Academic Hours on Campus.

Dress Code for Boys:

Jeans / Track Suits / T-Shirts / Trousers / Shirts.

Dress Code for Girls:

Jeans / T-Shirts or Blouses / Salwar Suits / Palazzos / Leggings or Jeggings with Long Tops / Sarees / Long Skirts / Track Suits.

DO'S AND DO'NTS FOR BOYS AND GIRL STUDENTS OF THE UNIVERSITY:

- To wear modest clothing that reflects the essence of good personal grooming standards.
- To refrain from wearing Sleeveless Clothing; Shorts; Short Tops, etc.,

PLEASE NOTE: The decision as to what constitutes Appropriate Attire vests with the Authorities of The Apollo University.

15. ELIGIBILITY FOR AWARD OF THE DEGREE

The undergraduate degree will be of 4-years/ 3-years (Lateral Entry) of duration. A student shall be declared as eligible for the award of the degree if the candidate has successfully secured the minimum number of required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.

After successful completion of the program, a provisional certificate cum memorandum of grades (PCMG) will be issued to the students. The PCMG includes the secured grades and class achieved in chosen program and specialization if any, along with grades and CGPA secured by the student. The original degree will be presented in the subsequent convocation.

16. DISCRETION POWER

Not with-standing anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

ANNEXURE 1

ELIGIBILTY FOR QUALIFYING EXAM FOR UNDER GRADUATE PROGRAMS

Program Type	**Program Name**	**Eligibility**
Bachelor's	**B.Sc. Imaging Technology**	Passed with at least 45% (40% in case the candidates belong to reserved category) marks with Botany, Zoology, Physics and Chemistry or Inter vocational with Bridge course of Biological and Physical Sciences (or) APOSS with Biological Sciences and Physical Sciences from a recognized board or other equivalent board or Intermediate and attain 17 Years as on 31st December of Calendar Year.

ANNEXURE 2

PROGRAMS OFFERED BY THE DIVISION OF ALLIED HEALTH SCIENCES

FROM THE ACADEMIC YEAR 2023-24

Sl. No.	Program	Expanded	Level	Minimum Duration in Years (N)
1.	B.Sc. PAT	B.Sc. Physician Assistant	Bachelor's	4
2.	B.Sc. MLT	B.Sc. Medical Lab Technology	Bachelor's	4
3.	B.Sc. IMT	B.Sc. Imaging Technology	Bachelor's	4
4.	B.Sc. AOTT	B.Sc. Anaesthesiology and Operation Technology	Bachelor's	4
5.	B.Sc. RDT	B.Sc. Renal Dialysis Technology	Bachelor's	4
6.	B.Sc. RTT	B.Sc. Respiratory Therapy Technology	Bachelor's	4
7.	B.Sc. EMT	B.Sc. Emergency Medical Technology	Bachelor's	4
8.	BOPT	Bachelors in optometry	Bachelor's	4
9.	BPT	Bachelor of Physiotherapy	Bachelor's	4.5

I - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
AHSJ1301	Anatomy	3	1	2	5	6
AHSJ1302	Physiology	3	1	2	5	6
AHSJ1303	Biochemistry	3	1	2	5	6
TAUT1101	University Core – I (Communicative English)	3	0	0	3	3
TAUT1201	University Elective – I	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Library	0	0	0	0	1
--	Physical Activity	0	0	0	0	2
--	Extra-curricular activities	0	0	0	0	2
--	Co-curricular activity	0	0	0	0	2
--	Self-Learning	0	0	0	0	2
--	Seminar	0	0	0	0	2
TOTAL		**15**	**3**	**6**	**21**	**36**

University Elective – I
Semester – I

S. No	Name of the Course	Host Department
1	Basics of Physiotherapy	School of Health Sciences – Physiotherapy
2	Biostatistics	School of Health Sciences – BMS & GMB
3	Constitution of India	School of Social Sciences
4	Ethical Hacking	School of Technology - CSE
5	Fundamentals of Computers	School of Technology - CSE
6	Gender and Development	School of Social Sciences
7	Leadership Development	School of Management
8	Mathematical Thinking	School of Technology
9	Nursing	Apollo Institute of Nursing
10	One Health	School of Health Sciences – PH
11	Basic emergency care and life support skills	School of Health Sciences – AHS
12	Basics of Health Management	School of Health Sciences – AHS
13	Entrepreneurship	School of Management
14	Managerial Economics	School of Management
15	Organic Farming	School of Health Sciences – BMS & GMB
16	Personality Development	School of Health Sciences – Psychology
17	Social Entrepreneurship	School of Management

II - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
AHSJ1304	Microbiology	3	1	2	5	6
AHSJ1305	Pathology	3	1	2	5	6
AHSJ1306	Pharmacology	3	1	2	5	6
TAUT1102	University Core - II (Environment Studies)	3	0	0	3	3
TAUT1202	University Elective – II	3	0	0	3	3
IMTT1501	Programme Core (Fundamentals of Imaging Technology)	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Library	0	0	0	0	1
--	Physical Activity	0	0	0	0	2
--	Extra-curricular activities	0	0	0	0	2
--	Self-Learning	0	0	0	0	2
--	Seminar	0	0	0	0	1
TOTAL		**18**	**3**	**6**	**24**	**36**

University Elective – II Semester – II

S. No	Name of the Course
Indian Languages	
1	Telugu
2	Tamil
3	Hindi
4	Professional English
Foreign Languages	
5	French
6	German
7	Spanish

8	Japanese

III - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
IMTT2501	General Physics and Radiation Physics	3	1	0	4	4
IMTT2502	Radiography Equipments	3	1	0	4	4
IMTT2503	Radiobiology and Radiation safety	3	1	0	4	4
IMTL2501	Clinical Skills -I	0	0	12	6	12
TAUT2101	University Core – III (Health and Wellness)	3	0	0	3	3
TAUT2201	University Elective – III	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Library	0	0	0	0	1
--	Seminar	0	0	0	0	1
--	Self-Learning	0	0	0	0	1
TOTAL		**15**	**3**	**12**	**24**	**36**

University Elective – III Semester – III

S. No	Name of the Course	Host Department
1	Community Engagement	School of Social Sciences
2	Clinical Nutrition	School of Health Sciences – BMS & GMB
3	Emotional Intelligence & Mental Health	School of Health Sciences – Psychology
4	Human Rights	School of Social Sciences
5	Industry 4.0	School of Technology – CSE
6	Medical Terminology	School of Health Sciences – BMS & GMB
7	Social Network Analysis	School of Health Sciences – PH

8	Antibiotic Resistance & Biomedical Waste Management	School of Health Sciences – AHS
9	Behavior Change Communication	School of Health Sciences – PH
10	Disability Management	School of Health Sciences – Psychology
11	Disaster Management	School of Social Sciences
12	Human Values & Professional Ethics	School of Social Sciences
13	Infection Prevention & Control	School of Health Sciences – AHS
14	NSS & Youth Development	School of Social Sciences

IV - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
IMTT2504	Clinical Radiography	3	1	0	4	4
IMTT2505	Dark Room and Film Processing Techniques	3	1	0	4	4
IMTT2506	Contrast and Special Radiography Procedures	3	1	0	4	4
IMTL2502	Clinical Skills -II	0	0	20	10	20
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Library	0	0	0	0	1
TOTAL		**9**	**3**	**20**	**22**	**36**

V - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
IMTT3501	CT Instrumentation and Techniques	3	1	0	4	4
IMTT3502	Modern Imaging Technology and Quality Assurance	3	1	0	4	4
IMTT3503	Equipment of Radio- Diagnosis	3	1	0	4	4
IMTL3501	Clinical Skills -III	0	0	16	8	16
IMTT3601a IMTT3602b IMTT3602c	Programme Electives – I a) Orientation in Para Clinical Sciences b) Artificial Intelligence in Radiology and Imaging Sciences* c) Ethics and Pedagogy*	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Seminar	0	0	0	0	1
--	Library	0	0	0	0	1
TOTAL		**12**	**3**	**16**	**23**	**36**

***Applicable from 2024 Admitted Batches**

VI - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
IMTT3504	MRI Instrumentation and Techniques	3	1	0	4	4
IMTT3505	Interventional Radiology and Nuclear Medicine	3	1	0	4	4
IMTT3506	Care of Patient and Principles of Medical Emergencies	3	1	0	4	4
IMTL3502	Clinical skills -IV	0	0	16	8	16
IMTT3602a IMTT3602b IMTT3602c	Program Electives – II a) Medical Ethics and Radiotherapy Principle b) Biostatistics and Research Methodology* c) Professionalism and Values*	3	0	0	3	3

--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Seminar	0	0	0	0	1
--	Library	0	0	0	0	1
TOTAL		**12**	**3**	**16**	**23**	**36**

***Applicable from 2024 Admitted Batches**

VII and VIII Semester

Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per Semester**
		L	**T**	**P**		
IMTI4501	Internship-I			**48**	**25**	**1104**
TOTAL				**48**	**25**	**1104**
Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per week**
		L	**T**	**P**		
IMTI4502	Internship-II			48	25	1104
IMTP4501	Project			8	6	180
TOTAL				**56**	**31**	**1284**

SYLLABUS
I YEAR
I - Semester

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
AHSJ1301	Anatomy	3	1	2	5	6
AHSJ1302	Physiology	3	1	2	5	6
AHSJ1303	Biochemistry	3	1	2	5	6
TAUT1101	University Core – I (Communicative English)	3	0	0	3	3
TAUT1201	University Elective – I	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Library	0	0	0	0	1
--	Physical Activity	0	0	0	0	2
--	Extra-curricular activities	0	0	0	0	2
--	Co-curricular activity	0	0	0	0	2
--	Self-Learning	0	0	0	0	2
--	Seminar	0	0	0	0	2
TOTAL		**15**	**3**	**6**	**21**	**36**

University Elective – I
Semester – I

S. No	Name of the Course	Host Department
1	Basics of Physiotherapy	School of Health Sciences – Physiotherapy
2	Biostatistics	School of Health Sciences – BMS & GMB
3	Constitution of India	School of Social Sciences
4	Ethical Hacking	School of Technology - CSE
5	Fundamentals of Computers	School of Technology - CSE
6	Gender and Development	School of Social Sciences
7	Leadership Development	School of Management
8	Mathematical Thinking	School of Technology
9	Nursing	Apollo Institute of Nursing
10	One Health	School of Health Sciences – PH
11	Basic emergency care and life support skills	School of Health Sciences – AHS
12	Basics of Health Management	School of Health Sciences – AHS
13	Entrepreneurship	School of Management
14	Managerial Economics	School of Management
15	Organic Farming	School of Health Sciences – BMS & GMB
16	Personality Development	School of Health Sciences – Psychology
17	Social Entrepreneurship	School of Management

AHSJ1301	ANATOMY	L	T	P	C
		3	1	2	5

Course Description:

This course will cover anatomy with special emphasis on general anatomy including anatomical position, anatomical planes, cell structure, tissues and upper and lower limbs focussing on important muscles, arteries, veins, and nerves which are of significant clinical importance. This course also covers important and relevant anatomical knowledge of all systems namely nervous, cardiovascular, respiratory, gastrointestinal, reproductive, and excretory systems.

This course also covers practical teaching of osteology, gross anatomy of important viscera, radiology and histology.

Course Objectives:

Students undergoing this course are expected to:

1. Understand and learn the origin, insertion, action, and nerve supply of clinically important muscles.
2. Understand and learn the origin, course, branches and clinical aspects of important vessels and nerves.
3. Explain the location, external features, relations, blood supply, clinical importance of organs of nervous, cardiovascular, respiratory, gastro-intestinal, reproductive, endocrine and excretory systems.

UNIT-I **12 Hrs**

Introduction

- Introduction to anatomy
- Define Anatomy and list its sub-divisions.
- Describe the Anatomical position.

General Histology

- Describe the human cell and its organelle.
- Describe the types of cell division and give examples.
- List out the types of tissues and describe their basic structure.
- Briefly describe the types of connective tissue including specialized connective tissue
- Describe the types and functions of epithelia.

Upper limb

- Name the important bones, muscles, blood vessels & nerves of the upper limb.
- Briefly describe the movements of joints and the nerve supply and actions of the important muscle groups of the upper limb
- Describe the location and course of the major blood vessels & nerves of the upper limb.

UNIT-II **12 Hrs**

Lower limb

- Name the important bones, muscles, blood vessels & nerves of the lower limb
- Briefly describe the movements of joints, nerve supply and actions of the important muscle groups of the lower limb
- Describe the location and course of the major blood vessels & nerves of the lower limb

Respiratory system

- Name the parts of the respiratory system.
- Briefly describe the pleura and its disposition
- Describe the external features of the lungs and their relations.
- Name the Broncho pulmonary segments in each lung and explain their significance.
- Briefly describe the mechanism of respiration

UNIT-III

Cardiovascular system **12 Hrs**

- Describe the important external and internal features of the heart.
- Briefly describe the blood supply of the heart
- Describe the circulation of blood through the heart and types of circulation.
- Describe the aorta and its branches.
- List out the major veins that join into the superior and inferior vena cavae.
- Briefly describe the lymphatic system and its function

Nervous system

- Classify nervous system.
- Describe briefly the external and internal features of the spinal cord, its coverings and blood supply.
- Describe briefly the external and internal features of the brainstem and the functional significance of the tracts and nuclei seen in the brainstem.
- Briefly describe the cerebellum and its peduncles
- Describe the cerebrum in brief and its lobes and functional areas of importance.
- Briefly describe the circulation of cerebrospinal fluid

UNIT-IV **12 Hrs**

Endocrine system

- Name the endocrine glands and the hormones secreted by each.
- Briefly describe the anatomy and physiology of the pituitary, thyroid, parathyroid, Adrenal, and pancreas.

Reproductive system

- Describe briefly the male reproductive system.
- Describe briefly the female reproductive system.
- List out the hormones released by the organs in the reproductive system**.**

Excretory system

- Describe briefly the excretory system.

UNIT-V **12 Hrs**

Gastrointestinal system

- Briefly describe the extent, important anatomical features, and relations of various parts of the gastrointestinal tract.
- Describe the important anatomical features, surface anatomy, relations and functions, and blood supply of the liver.
- Briefly describe the parts, important features and functions of the oesophagus, stomach, duodenum, small intestine, and large intestine.
- Describe briefly the important anatomical features, position and relations and functions of pancreas and spleen.
- Briefly describe the blood supply of the gastrointestinal system.

Course outcomes:

At the end of this course, students should be able to:

- Explain the origin insertion, action, nerve supply, and clinical importance of muscles.
- Understand and learn the origin, course, branches and clinical aspects of important vessels and nerves.
- Explain the location, external features, relations, blood supply, and clinical importance of various organs of nervous, cardiovascular, respiratory, gastro-intestinal, reproductive, and excretory systems.

PRACTICALS **Total: 30 Hrs**

Course Objective: The course will cover Anatomy with special emphasis on osteology, histology, demonstration of viscera, radiology.

The assessment of the students will be undertaken with the help of following exercises.

- Spotters
- Viva

Textbooks:

1. Manipal manual of Human anatomy
2. Human anatomy & Physiology for Nursing – Mahindra Kumar Anand & Meena Verma
3. Understanding Human Anatomy & physiology – Willian Davis (McGraw Hill)
4. Anatomy & physiology – Kaarna Muni Shekhar
5. Textbook of Anatomy – Chaurasia
6. Textbook of Anatomy – TS Ranganathan Human Anatomy – Fattana.

Reference Books:

Textbook of anatomy-Vishram Singh

AHSJ1302 **PHYSIOLOGY** **L T P C**
3 1 2 5

Course Description:

The goal of this course is to help students in understanding functions, regulation, and integration of organ systems of the human body.

Course Objectives:

- Describe the concept of homeostasis.
- Interpret the structure of the cell membrane and describe the transport mechanisms for solute and water across the cell membrane. Explain the basis of membrane potential.
- Describe the structure and functional organization of the human nervous system and its subdivisions. Discuss the role of nervous system in homeostasis.
- Understand how heart and blood vessels work to maintain a constant delivery of blood flow (oxygenated) to all the tissues and simultaneously how the blood is returned (deoxygenated/ venous blood) to the heart. Explain how cardiovascular system adjust its activity to meet the demands placed by the body during activities of daily life (E.g., exercise)
- Describe the basic anatomy and functions of the pulmonary system.
- Explain the role of kidney in blood pressure, electrolyte, and fluid homeostasis.
- Elaborate on how the structure of gastrointestinal tract suited for digestion and absorption. Discuss the mechanism of digestion and absorption at various levels of gastrointestinal tract.
- Describe how endocrine organs are involved in regulation of growth, metabolism, fluid and electrolyte balance and reproduction.

UNIT-I **10 Hrs**

1. General Physiology (Cell Physiology)

- Homeostasis
- Cell structure and functions of cell with special emphasis on characteristics of cell membranes, Transport mechanisms across cell membrane.
- Body Fluid Compartments (volume, composition, and units to measure solute concentration).

2. Nerve-Muscle Physiology

- Neuron (structure and function), Classification of neurons, Neuroglia, Type of nerve fibers, Resting membrane potential and Action potential.
- Neuromuscular Junction (skeletal muscle) and Neuromuscular blocking drugs
- Classification and functions and structure of muscles, Excitation contraction coupling, Mechanism of muscle contraction
- Differences between skeletal, smooth, and cardiac muscle.
- Applied physiology: Nerve injury, Myasthenia gravis, neuromuscular junction blockers, Muscular dystrophy.

3. Blood (Hematology)

- Composition of blood, functions of cellular (RBC, WBC, and platelets) and non-cellular (plasma and plasma proteins) components of blood.
- RBC (Erythrocyte): Erythropoiesis and factors affecting it, Normal count, and variations. Hemoglobin: Functions and recycling of hemoglobin, Jaundice, Anemia.
- WBC: Classification, morphology, site of production, functions, normal and differential count, and variations. Immunity.
- Platelets: Origin, normal count, and functions (role in hemostasis).
- Hemostasis: Clotting factors and their role in hemostasis. Disorders of Hemostasis.
- Blood groups: ABO & Rh systems, Erythroblastosis fetalis, Hazards of mismatched blood transfusion
- Reticuloendothelial system

UNIT-II **13 Hrs**

1. Nervous system (Central Nervous system)

- Parts (gross connections)
- **Cerebral hemisphere**: parts, corpus callosum, cerebral cortex, and functions of frontal, parietal, temporal, and occipital lobes of the cerebrum.
- Connections between motor cortex and subcortical structures and spinal cord (descending tracts). Connections between spinal cord and thalamus- somatosensory cortex of parietal lobe (ascending tracts).
- Upper and lower motor neurons
- Descending and ascending tracts (origin, location, course, and termination)
- **Subcortical structures**
  Basal ganglia, Thalamus, Hypothalamus, and Limbic system. Nuclei of subcortical structures, its connections with various parts of the brain and its functions.
- **Brain stem**: (Midbrain, Pons, and Medulla oblongata)
  Nuclei, connections, and its functions
- **Cerebellum**
  Physiological anatomy: lobes, cerebella cortex, connections (afferent and efferent), functions and applied aspects.
- Reticular formation and its functions
- Sleep
- **Spinal cord:** parts of gray matter and constituents of white matter. Applied physiology.
- **Peripheral Nervous System -** Divisions and constituents of the peripheral nervous system
- Functions of cranial and spinal nerves
- Physiological anatomy of somatic nervous system and its functions
- Physiological anatomy of autonomic nervous system (sympathetic and parasympathetic) and its functions.

2. Special senses

- **Vision** –Functional anatomy of eye, visual pathway. Applied physiology: lesions along visual pathway and its effect. Refractive errors.
- **Hearing**– Physiological anatomy of ear, Mechanism of hearing, and auditory pathway. Applied physiology: deafness.
- **Olfaction** –receptors and pathway, function, and its applied physiology
- **Gustation**-modalities, receptor, function, taste pathway, and its applied physiology

UNIT- III **14 Hrs**

1. Cardiovascular system

- Physiological anatomy of the heart, autonomic innervation, and its action on the heart, pulmonary and systemic circulation
- Properties of cardiac muscle
- Conducting system of the heart
- Electrocardiogram
- Cardiac cycle, Heart sounds.
- Vascular system (branching), hemodynamics, factors influencing resistance to the blood flow.
- Cardiac output: definition, factors regulating it and measurement of cardiac output.
- Blood pressure: Definition, components, determinants of blood pressure and factors regulating it.
- Lymphatic system and its functions
- Pulse
- Applied aspects of cardiovascular physiology: myocardial infarction, heart failure, shock, and others
- Cardiovascular changes during exercise

2. Respiratory System

- Physiological anatomy of the respiratory tract, conducting and respiratory zone of the respiratory tract, pleural and pleural cavity, mechanics of respiration, changes in intrapleural and intrapulmonary pressures during respiratory cycle.
- Compliance and factors affecting it (surface tension and surfactant), respiratory distress syndrome.
- Lung volumes and capacities
- Respiratory membrane, partial pressure of gases, transport of O_2 and CO_2, Oxyhemoglobin dissociation curve.
- Regulation of respiration (Chemical and Neural)
- Hypoxia, dyspnea, apnea, asphyxia, and cyanosis
- Artificial respiration

UNIT-IV **13 Hrs**

1. Digestive System

- Introduction to Gastrointestinal system and Physiological anatomy of the wall of Gastrointestinal tract
- **Salivary glands** and its function, mastication, pharynx, and Deglutition
- **Stomach:** physiological anatomy, composition of Gastric juice (HCL secretion), its functions and its regulation.
- Vomiting reflex.
- **Liver and gall bladder**: Bile composition and its functions, and other functions of the liver, functions of the gall bladder. Enterohepatic circulation
- **Pancreas:** Pancreatic juice composition, its functions and regulation of its release.
- **Small intestine:** Succus entericus composition, functions, and regulation of its release. Small intestinal motility and its functions.
- **Large intestine:** function, movements, and Defecation reflex
- Digestion and absorption of carbohydrates, fats, and proteins.

2. Renal System

- Physiological anatomy & functions of the kidney, blood supply and special features of blood flow to the kidney. Structure and types of nephrons
- Histology of the renal corpuscle: Juxtaglomerular apparatus.
- Mechanisms of formation of urine: Glomerular filtration rate (GFR), Tubular reabsorption (Special emphasis on reabsorption of water, Na+, Glucose, HC03- and Ca2+) and tubular secretion (special emphasis on secretion of K+ and H+). Renal handling of urea, Renal threshold, and Tubular maximum.
- GFR: Starling forces acting across the glomerular capillaries and factors affecting GFR
- Concentration of urine: role of counter-current multiplier and counter-current exchanger
- Role of kidney in Regulation of blood pressure and pH
- Diuresis, diuretics, renal clearance. Renal function tests.
- Artificial kidney (Dialysis)
- Skin: Physiological anatomy of the skin and its role in temperature regulation.

UNIT-V **10 Hrs**

1. Endocrine System

- Physiological anatomy & functions of the kidney, blood supply and special features of blood flow to the kidney. Structure and types of nephrons
- Histology of the renal corpuscle: Juxtaglomerular apparatus.
- Mechanisms of formation of urine: Glomerular filtration rate (GFR), Tubular reabsorption (Special emphasis on reabsorption of water, Na+, Glucose, HC03- and Ca2+) and tubular secretion (special emphasis on secretion of K+ and H+). Renal handling of urea, Renal threshold, and Tubular maximum.
- GFR: Starling forces acting across the glomerular capillaries and factors affecting GFR
- Concentration of urine: role of counter-current multiplier and counter-current exchanger
- Role of kidney in Regulation of blood pressure and pH

- Diuresis, diuretics, renal clearance. Renal function tests.
- Artificial kidney (Dialysis)
- Skin: Physiological anatomy of the skin and its role in temperature regulation.

2. Reproductive system

- Introduction to reproductive system, sex differentiation, and Puberty.
- **Male reproductive system**, physiological anatomy of the testis and its functions, functions of testosterone, Spermatogenesis, and its regulation.
- **Female reproductive system**; physiological anatomy of ovaries and uterus.
- Functions of ovaries; Oogenesis and ovarian cycle, functions of Estrogen and Progesterone, and menstrual cycle.
- Physiological changes during pregnancy, pregnancy tests, parturition & lactation.
- Male & Female contraceptive methods

Course Outcome:

At the end of the course, students should

- have thorough knowledge and appreciation of the concepts in Human physiology
- understand the role of all organ systems in homeostasis
- understand how the organ systems work in unison to bring out integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude, and how they can sometimes fail
- be able to perform, analyze and report on experiments and observations in physiology
- be able to apply their knowledge in their respective branches of Allied Health Sciences

PRACTICALS **Total: 30 Hrs**

HEMATOLOGY

- Microscope
- Estimation of Hemoglobin
- Estimation of bleeding time and clotting time
- Measurement of ESR – demo
- Estimation of PCV – demo
- Perform RBC count of given blood sample.
- Perform WBC count of given blood sample.
- Perform a Differential Leucocyte Count.
- Calculation of blood indices

CLINICALS

A. Cardiovascular system

- Examination of radial pulse
- Measurement of blood pressure
- Recording of ECG- demo
- Measure of weight and height and calculate body mass index

- Demonstrate JVP, apex beat, percussion of cardiac borders, auscultation of heart sounds.

B. Respiratory system

- Measurement of respiratory rate and temperature
- Examination of respiratory system and temperature
- Spirometry demo

C. Nervous system

- Examination of cranial nerves
- Motor system examination
- Examination of reflexes
- Examination of the sensory system

D. Special senses

- Eye: Tests for vision (Acuity and colour perception)
- Ear: Hearing tests

Textbooks:

1. HH Sudhakar D Venkatesh "Basics of Medial Physiology", 5th edition, Wolters Kluwer,2023.
2. K Sembulingam, Prema Sembulingam, "Essentials of Physiology for Paramedical Students" JAYPEE, 2021.

Reference Books:

1. John E Hall and Michael E. Hall, Guyton & Hall, "Textbook of Medical Physiology" 14th edition, 2020
2. Eric P. Widmaier, Hershel Raff, and Kevin T. Strang "Vanders Human Physiology" 15TH edition, 2018.

AHSJ1303 **BIOCHEMISTRY** **L T P C**
3 1 2 5

Course Description:
This course introduces students to the structure and function of essential biomolecules, which are the organic compounds that constitute the various components of living cells. The course covers the biochemical reactions that facilitate cellular growth, maintenance, reproduction, and energy utilization and storage.

Course Objectives:
By the end of this course, students will be able to:

- Understand the structure and functions of the cell membrane and organelles.
- Comprehend the chemistry of carbohydrates, lipids, proteins, and nucleic acids.
- Explain enzyme actions, mechanisms, inhibition, and clinical enzymology.
- Grasp the significance of nutrition, including vitamins and minerals.
- Describe the structure and functions of immunoglobulins and haemoglobin.

UNIT-I **4 Hrs**
Cell and Membrane: Cell organelles and their functions, membrane structure, transport mechanisms across membranes, ionophores, membrane proteins, and transporters.

UNIT- II: **15 Hrs**
Chemistry of Biomolecules

- **Chemistry of Carbohydrates:** Definition, classification, important monosaccharides, stereoisomers, anomers, mutarotation, and reactions of monosaccharides (tautomerization, reduction, dehydration, osazone formation). Important disaccharides and polysaccharides.
- **Chemistry of Lipids:** Definition, classification, nature of fatty acids, triacylglycerol, saponification, iodine number, rancidity, antioxidants, complex lipids, steroids, and cholesterol functions.
- **Chemistry of Amino Acids, Peptides, and Proteins:** Definition, classification, peptide bonds, biologically important peptides, essential and non-essential amino acids, protein structure (primary, secondary, tertiary, quaternary), precipitation, denaturation, coagulation, and color reactions of amino acids.
- **Chemistry of Nucleic Acids:** Nitrogenous bases, nucleosides, nucleotides, DNA, genes, and types of RNA involved in protein synthesis.

UNIT-III: **5 Hrs**
Enzymes: Definition, classification, factors affecting enzyme activity, mechanism of action, coenzymes, proenzymes, is enzymes, measurement units, competitive and non-competitive inhibitors, and clinical enzymology with normal values.

UNIT- IV: **12 Hrs**

Nutrition and Vitamins

- **Nutrition:** Calorific values of food, basal metabolic rate, specific dynamic action, energy requirements, nutritional importance of carbohydrates, lipids, proteins, nitrogen balance, protein supplementation, Kwashiorkor, Marasmus, and Recommended Dietary Allowance (RDA).
- **Vitamins:** Overview of chemistry, sources, requirements, biochemical functions, deficiency symptoms of vitamins A, D, E, K, B-complex (thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folic acid, B-12), and Vitamin C.
- **Mineral Metabolism:** Classification of macro and micro elements, including sodium, potassium, calcium, phosphorus, iron, iodine, magnesium, copper, zinc, fluoride, manganese, selenium, and molybdenum.

UNIT -V: **4 Hrs**

Immunology and Hemoglobin

- **Immunology:** Definitions of antigens and antibodies, structure and functions of antibodies.
- **Hemoglobin:** Structure and functions of hemoglobin, its derivatives, degradation process, and jaundice.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Describe the structures and functions of cell membranes and organelles.
- Understand and explain the chemistry and classifications of major biomolecules.
- Classify enzymes and explain their mechanisms, inhibition types, and clinical relevance.
- Comprehend the basics of nutrition, including sources, recommended dietary allowances (RDA), functions, and deficiency symptoms of vitamins and minerals.
- Explain the structure and functions of immunoglobulins and hemoglobin.

Textbooks: latest editions

1. Concise Textbook of Biochemistry for Paramedical Students (2nd Edition, 2023) by DM Vasudevan
2. A Textbook on Biochemistry for Paramedical Students (2022) by Dr. Kiran Dahiya

Reference Book:

1. Textbook of Biochemistry for Medical Students (10th Edition, 2023) by DM Vasudevan

UNIVERSITY CORE

TAUT1101	COMMUNICATIVE ENGLISH	L	T	P	C
		3	0	0	3

Course Description:

The creation of the Course is to facilitate Stakeholders in productively using the Language to functional advantage to form meaningful engagements in a social context and influence their professional dynamic.

Course Objectives:

The objective of this course is to make students to:

1. To expand and enhance vocabulary systematically for clear communication, richer expression, and deeper comprehension across various contexts."
2. To provide the grammatical knowledge and skills necessary to communicate effectively in English, both orally and in writing.
3. To strengthen their ability to write academic papers, essays and summaries using the "Mind Mapping,' dynamic.
4. To enhance communication skills by analyse, evaluate, and express their opinions on various topics, fostering the development of critical thinking abilities
5. To develop proficiency in listening, speaking, reading and writing, enabling individuals to communicate effectively in various real-life situations.

UNIT-I **9 Hrs**

Vocabulary and Reading: Special Features of English Vocabulary, Reading With Purpose; Understanding What is Read; Drawing a Conclusion Based on Inferences, Deduction, Reading Between the Lines, Context, Connotation, Higher Order Thinking; How to Explain Specific Information with Clarity; Defining and Giving Reasons; Giving Directions; Professional Vocabulary.

UNIT-II **9 Hrs**

Basic Grammar: Subject-Verb Agreement; Verb Tenses; Active-Passive Voice; Direct and Indirect Speech; Question Tags; Degrees of Comparison; Articles; Avoiding Jargon.

UNIT-III **9 Hrs**

Writing: Letter Writing; Report Writing; E-Communication, Drafting and Collating Key Information, Taking Notes from Lectures, Reading Materials, Reporting on Minutes of the Meeting, Precis Writing

UNIT-IV **9 Hrs**

Basics of Communication: Role of Communication; Purpose of Communication; Barriers to Communication; Verbal and Non-Verbal Communication, Communication at the Workplace; Human Needs and Communication; "Mind Mapping" Communication; E-Communication.

UNIT-V **9 Hrs**

Presentations: Self-Introduction; Individual Presentation; Group Discussions; Debates.

Course Outcomes:

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

1. To review grammatical structures of English and the use of these forms in specific communicative contexts, which include: class activities, homework assignments, reading of texts and writing and functional real-world facets.
2. To improve their accuracy and fluency in producing and understanding spoken and written English and endorse this proficiency in both personal and professional realms.
3. To attain and enhance competence in the four modes of literacy: Writing, Speaking, Reading and Listening.
4. To develop their ability as critical thinkers.
5. To empower the individuals to connect, engage, and thrive in diverse personal and professional environments.

Textbooks:

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication: Principles and Practice", 3rd Edition, Oxford University Press, 2015.
2. M. Ashraf Rizvi, "Effective Technical Communication", Second Edition, McGraw. Hill Education, 2017.
3. Wilfred Funk and Norman Lewis, "30 Days to a More Powerful Vocabulary", Latest Edition, Pocket Books, 2021.

Reference Books:

1. Grant Taylor, "English Conversation Practice", Tata McGraw-Hill Education India, 2016.
2. Gary Blake and Robert W. Bly, "The Elements of Technical Writing", 2nd Edition, 2000, Longman.
3. Raymond Murphy, "English Grammar in Use", Fourth Edition, Cambridge University Press, 2019.

UNIVERSITY ELECTIVE - I

TAUT1201A	BASICS OF PHYSIOTHERAPY	L	T	P	C
		3	0	0	3

Course Description:

The course is designed to aim at imparting a basic level health program. This program is formulated to enable student to gain adequate knowledge, skills and leading to an ability to identify the basics of early features of the health issues

Course Objectives:

The objective of this course is to make students to:

1. Gather and interpret information within a holistic framework pertaining to health.
2. The overall content of the curriculum focuses on health care and clinical education experiences for each student
3. Understand the basic fundamentals of physiotherapy
4. Familiarizes participants with different procedures and techniques used in physiotherapy and their practical application across various conditions
5. Provide participants with a substantial understanding of physiotherapy and promote safe practices and ethical behaviour in physiotherapy practice.

UNIT-I Basics of Physiotherapy **5 Hrs**

1. What is Physiotherapy?
2. Types of Physiotherapy
3. Benefits of Physiotherapy
4. Why is Physiotherapy done?

UNIT-II Women's Health **5 Hrs**

i. Pre-natal exercises & Care
ii. Post Natal exercises

UNIT-III Acute injuries & management and the uses of Orthotics & Prosthetics **10 Hrs**

i. Mechanism of injury
ii. Acute muscle injuries
- Muscle strain
- Risks of muscle strain
- Muscle imbalance
- Muscle inflexibility

iii. Ligament sprain and difference between sprain and strain
iv. Orthotics & Prosthetics

UNIT-IV Ergonomics & Health and Aerobics **13 Hrs**

i. Work-related musculoskeletal disorders (MSDs).
ii. Risk factors associated with work-related MSDs & Possible Causes
iii. Common ergonomic symptoms

iv. Different types of Ergonomics & principles of ergonomics and v. Ergonomic Control Methods
v. Awkward body postures – hazards
vi. Physical Activity and exercise
vii. Physical Fitness and Maximum Oxygen Consumption
viii. Aerobic Exercise Training and Physiological Response to Aerobic Exercise
ix. Cardiovascular Response to Exercise and Respiratory Response to Exercise
x. Responses Providing Additional Oxygen to Muscle and Exercise Program
xi. Warm-Up Period, Aerobic Exercise Period and Cool-Down Period Application

UNIT-V Education & Awareness about common diseases and BLS 12 Hrs

i. Bell's palsy
ii. Diabetes
iii. Coronary artery heart disease
iv. OA Knee
v. Stroke
vi. LBA
vii. Early identification of congenital anomalies
viii. BLS Theory
ix. BLS Practical's

Course Outcomes:

1. Gain the basic knowledge of Physiotherapy
2. Familiarize the procedures and techniques used in physiotherapy
3. Protect and manage from the sport injuries
4. Gain Knowledge about Ergonomics
5. To maintain physical fitness

Textbooks:

1. Physiotherapy In Obstetrics And Gynecology-Polden And Mantle, Jaypee Brothers
2. Women's Health- Ruth Sapsford, Lippincott,1998
3. Textbook of orthopedics medicine Vol I & II by James Cyriax – Bailliere
4. Susan B O'Sullivan, Physical Rehabilitation 6th Edition, 6 edition F A Davis; 2013. ISBN-13: 978-0803625792
5. Arias" Practical Guide To High-Risk Pregnancy And Delivery By Amarnath Bhide, Sabaratnam Arulkumaran

Reference Books:

1. John Ebenezer- Essentials of Orthopaedics for Physiotherapists- 3rd edition 2016
2. Davidson's principles and practice of medicine
3. Fundamentals of Ergonomics in Theory and Practice- Alan Hedge- 2019
4. Introduction to Ergonomics, Third Edition" -Robert Bridger- 2018
5. Human Factors and Ergonomics in Practice: Improving System Performance and Human Well-Being"- Steven Shorrock, Claire Williams- 2020

6. Acute Care Handbook for Physical Therapists- Jaime C. Paz, Michele P. West- 2019
7. Sports Injury Prevention and Rehabilitation: Integrating Medicine and Science for Performance Solutions" David Joyce, Daniel Lewindon- 2015
8. Orthotic Intervention for the Hand and Upper Extremity: Splinting Principles and Process"- Marylyn A. Jacobs, Noelle M. Austin- 2013
9. Prosthetics and Orthotics: Lower Limb and Spine"- Joan E. Edelstein, Alex Moroz- 2017
10. "Essentials of Physiotherapy"- Prakash Narain Tandon- 2016
11. Pathology for the Physical Therapist Assistant - Catherine C. Goodman, Kenda S. Fuller- 2020 (3rd Edition)

TAUT1201B **BIOSTATICS** **L T P C**
3 0 0 3

Course Description:

Biostatistics is the application of statistical methods to biological and health-related fields. This course provides a comprehensive introduction to the principles and techniques of biostatistics essential for conducting research in medicine, public health, and biology. Students will learn how to effectively collect, analyze, and interpret data from biological and health sciences, with a focus on understanding and addressing key issues such as experimental design, sampling methods, data visualization, hypothesis testing, and regression analysis.

Course Objectives:

1. Gain a solid understanding of bio statistical principles including descriptive statistics, probability, hypothesis testing, and regression analysis.
2. Apply these principles to analyse data from biological and health sciences, focusing on experimental and observational studies.
3. Critically interpret statistical results and effectively communicate findings to different audiences.
4. Develop proficiency in using statistical software for data manipulation, analysis, and visualization.
5. Design studies, evaluate literature, and collaborate in interdisciplinary teams, preparing for advanced study and research in biostatistics and related fields.

UNIT-I Descriptive methods **9 Hrs**

Frequency Distribution, Characteristics of a Frequency Distribution, Tabular and Graphical Presentation of Data: Line Graphs, Bar Charts, Histograms, Ogives.

UNIT-II Measures of central tendency **9 Hrs**

Arithmetic Mean, Median, Mode, Position of Averages, Selection of the Appropriate Measure of Central Tendency, Geometric Mean, Harmonic Mean.

UNIT-III Measures of dispersion **9 Hrs**

Range, Interquartile Range, Mean Deviation, Variance and Standard Deviation

UNIT-IV Sampling Designs **9 Hrs**

Sampling and Sample Designs, Significance of Probability and Non-probability sampling methods, Crossover Design, Case Control Design, Cohort Study Design, Designing clinical trials - Single- and Double-Blind Experiments.

UNIT-V Data analysis and interpretation **9 Hrs**

Tests of hypothesis, Tests of significance, chi-square test, Goodness of fit, Analysis of variance.

Course Outcomes:

1. Ability to design experiments, sampling variables, analyze the biological data, interpret and present the results in meaningful way.
2. Create tables and graphs for data presentation
3. Describe measures of central tendency and dispersion along with calculating probability features of experiments.
4. Discuss the correlation between various types of data along with associated variables.
5. Test hypothesis and carry out related statistical tests

Textbooks:

1. Daniel WW, Cross CL (2013) Biostatistics: A Foundation Sciences
2. Biostatistics: A Foundation for Analysis in the Health Sciences, 11th Edition Chad L. Cross, Wayne W. Daniel , ISBN: 978-1-119-49657-1, December 2018

Reference Books

1. Forthofer RN, Lee ES, Hernandez M (2006) To Design, Analysis, and Discovery. Elsevier Ltd., Amsterdam.
2. Principles of Biostatistics, 3rd Edition, By Marcello Pagano, Kimberlee Gauvreau, Heather Mattie (2022).

TAUT1201C	CONSTITUTION OF INDIA	L	T	P	C
		3	0	0	3

Course Description:

The Constitution of India course provides a comprehensive understanding of the fundamental principles, structure, and functioning of the Indian Constitution. This course examines the historical evolution, key features, and various interpretations of the Constitution, highlighting its significance in shaping India's legal and political landscape. Through this course, students will gain insights into the roles and responsibilities of different branches of government, fundamental rights and duties of citizens, and the constitutional mechanisms that ensure the democratic functioning of the nation.

Course Objectives:

1. To realize the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
2. To identify the importance of fundamental rights as well as fundamental duties.
3. To understand the functioning of Union, State and Local Governments in Indian federal system.
4. To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.
5. To acquire knowledge to appear for competitive examinations.

UNIT-I **9 Hrs**

Historical Background – Constituent Assembly of India – Philosophical Foundations of The Indian Constitution – Preamble – Constitutional amendments

UNIT-II **9 Hrs**

Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for Citizens.

UNIT-III **9 Hrs**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT-IV **9 Hrs**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT-V **9 Hrs**

Statutory Institutions – Elections - Election Commission of India, National Human Rights Commission, National Commission for Women; Local Self Government; Lok pal.

Course Outcomes:

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

1. Understand and explain the significance of Indian Constitution as the fundamental law of the land.

2. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
4. Understand Electoral Process, Emergency provisions and Amendment procedure.
5. Take part in competitive examinations with confidence.

Textbooks:

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.

Reference Books:

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
2. The Constitution of India (2022) : https://cdnbbsr.s3waas.gov.in/s380537a945c7aaa788ccfcdf1b99b5d8f/uploads/2023/05/2023050195.pdf
3. Refer the website through the link given for Constitution of India in various Indian Languages https://legislative.gov.in/constitution-of-india/
4. Indian Constitution at Work by National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi

TAUT1201D **ETHICAL HACKING** **L T P C**

3 0 0 3

Course Description:

This course is about to learn ethical hacking and security challenges in computer networking. Which addresses the data security issues and types of attacks includes malwares, viruses, sniffer and denial of service. It teaches ethical responsibilities, professional integrity and making appropriate use of the tools and techniques.

Course Objectives:

The objective of this course is to make students to:

1. Know the concepts of hacking, ports and penetration testing
2. Understand the foot printing types and techniques of scanning
3. Understand the process of system hacking, trojans and backdoors
4. Apply the concepts of sniffing, packet analysis & session Hijacking
5. Learn the ethical issues and responsibilities associated with ethical hacking

UNIT-I **9 Hrs**

Introduction to Hacking: Hacking, Types and phases of hacking. Introduction to Ports & Protocols: Ports, Protocols, Primary Network Types. Introduction to Penetration Testing: Penetration test, Categories and Types of Penetration tests, Structure of Penetration Test Report.

UNIT-II **9 Hrs**

Foot printing: Foot printing, Types, Using ping and ns Lookup commands in Windows command line. Scanning: Scanning, Basics of Scanning, Basic Techniques of Scanning, Enumerating DNS using dns enum, Performing flag scan using hping3.

UNIT-III **10 Hrs**

Issues Hacking into System: System Hacking, Password Cracking, Default password databases, Manual and Automated Password Cracking, Process of System Hacking, Using Keyloggers. Trojans & Backdoors: Trojans, Working of Trojan, Infection Techniques, Attack, Lifecycle and Classification of Virus, Worms, Virus Construction Kit.

UNIT-IV **9 Hrs**

Types, Sniffing, Packet Analysis & Session Hijacking: Sniffing, Packet Analysis, Types of Sniffing, Active and Passive Sniffing Techniques, Session Hijacking. Cryptography: Cryptography, Digital Signature, Hash Functions.

UNIT-V **8 Hrs**

An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking. Ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking.

Course Outcomes:

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

1. Explain the concepts related to hacking, ports and protocols, penetration testing
2. Determine the applicable foot printing techniques and scanning methods
3. Explain the process of system hacking and explain the concepts Trojans, backdoors, worms and virus and its countermeasures
4. Demonstrate systematic understanding of the concepts of sniffing and cryptography
5. Understand the legal and professional responsibilities of ethical hacking

Textbooks:

1. Jiawei Hacking: Be a Hacker with Ethics, Harsh Bothra, Khanna Publications, 2019.
2. Ethical Hacking and Penetration Testing Guide, Rafay Baloch, 2014.

Reference Books:

1. Alex Berson Kali Linux Wireless Penetration Testing Beginner's Guide, Vivek Ramachandran, Cameron Buchanan, Packt Publishing, 2015.
2. SQL Injection Attacks and Defense, 1st Edition, Justin Clarke-Salt, Syngress Publication.
3. Mastering Modern Web Penetration Testing, Prakhar Prasad, Packt Publishing, October 2016.

TAUT1201E **FUNDAMENTALS OF COMPUTERS** **L T P C**
3 0 0 3

Course Description:
The course is designed to aim at imparting a basic level appreciation program. The incumbent can use the computer for basic purposes of preparing his personnel/business letters, viewing information on the Internet (the web), sending mail, using internet banking services, etc. and allows to become digitally literate.

Course Objectives:
The objective of this course is to make students to:

1. To introduce the fundamental concepts of computers, including their characteristics, types, and applications.
2. To explain the functional components of a computer and various input/output devices.
3. To understand different types of computer memory and storage devices.
4. To introduce computer languages and software, including algorithms and programming languages and provide an overview of operating systems and basic networking concepts.
5. To introduce the components and practical applications of MS Office.

UNIT-I **9 Hrs**
Introduction to Computer: Computer Characteristics, Concept of Hardware, Software, Evolution of computer and Generations, Types of Computers–Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computers, Limitations of Applications of Computer in Various Fields.

UNIT-II **9 Hrs**
Structure and Working of Computer: Functional Block Diagram of Computer. CPU, ALU, Memory UNIT-, Bus Structure of Digital Computer–Address, Data and Control Bus.
Input/Output Devices: Input Device– Keyboard, Mouse, Scanner, MICR,OMR. Output Devices–VDU, Printers– Dot Matrix, Daisywheel, Inkjet, Laser, Line Printers and Plotters.

UNIT-III **9 Hrs**
Computer Memory: Memory Concept, Memory Cell, Memory Organization, Semiconductor Memory – RAM, ROM, PROM, EPROM, Secondary Storage Devices – Magnetic Tape, Magnetic Disk (Floppy Disk and Hard Disk.), Compact Disk.
Computer Language and Software: Algorithm, Flowcharts, Machine Language, Assembly Language, High Level Language, Assembler, Compiler, Interpreter. Characteristics of Good Language. Software – System and Application Software.

UNIT-IV **9 Hrs**
Operating System: Operating System, Evolution of Operating System. Functions of Operating System. Types of Operating Systems. Detailed Study of Windows Operating System. Introduction and Features of LINUXOS.
Networking: Concept, Basic Elements of a Communication System, Data Transmission Media, Topologies, LAN, MAN, WAN, Internet

UNIT-V **9 Hrs**

MSOffice: Introduction to MS Office, Components and Features. MSWord: Creating Letter, Table, Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, AutoText, Inserting Picture, WordArt.

MS Excel: Introduction to Excel, Sorting, Queries, Graphs, Scientific Functions.

PowerPoint: Introduction to PowerPoint, Creation of Slides, Inserting Pictures, Preparing Slide Show with Animation. MS Access: Creation and Manipulation of Files.

Course Outcomes:

Upon completion of the course, student will be able to:

1. Understand the basic characteristics, types, and applications of computers.
2. Comprehend the functional components and input/output devices of a computer.
3. Describe various memory types and secondary storage devices.
4. Differentiate between machine, assembly, and high-level languages and their associated tools.
5. Understand the role and types of operating systems, with knowledge of Windows and Linux, and basic networking concepts. Utilize MS Word, Excel, PowerPoint, and Access for practical applications.

Textbooks:

1. Peter Norton: Computing Fundamentals.6th Edition, Mc Graw Hill-Osborne, 2007.
2. Sarita Dhawale, Thakur Akash Ashok: Fundamentals of Computer, Thakur Publication Pvt. Ltd.

Reference Books:

1. Deborah Morley and Charles S.Parker; Fundamentals of Computers; Cengage Learning, India edition; 2009.
2. Alex is Leon and Mathews Leon; Fundamentals of Information Technology; Vikas Publication, Chennai.
3. Francis Scheid; Theory and Problems of Introduction to Computer Science Schaum's Outline Series; Tata Mc Graw Hill publication.

TAUT1201F **GENDER AND DEVELOPMENT** **L T P C**
3 0 0 3

Course Description:
The course is important for professionals from the point of creating engendered perspectives and sensitivity toward issues concerning women, men, and sexual minorities. It further reaffirms the belief in the importance of grassroots experiences and narratives while dealing with gender issues.

Course Objectives:
1. Understand key concepts, and issues in gender and development
2. Understand the social construction of gender and develop gender perspectives in analysing social realities
3. Understand how the gender dynamics of power and inequality play out in the social institutions of households, markets, and states and within the arena of civil society.
4. Create awareness about the magnitude of gender disparities in the present context
5. Examine through the gender lens, the interlinkage between cultural practices social processes, and development approaches

UNIT-I Basic Concepts and Theories of Feminism **10 Hrs**
Concepts- gender, gender studies, gender identity, gender role stereotyping, gender division of labor, gender discrimination, gender equality, and equity. Overview of feminist theories – Liberal feminism, Radical Feminism, Black feminism, postmodern feminism, Eco- feminism; The international background to the Women's Movement, The genesis of the Women's Movement in India. Contemporary Contestations – Intersex and Transgender Movements. • Feminist thinkers in the 18th, 19th, 20th, and 21st Centuries.

UNIT-II Gender Issues **10 Hrs**
Major gender issues – national and global - causes and consequences., LGBTQIA+ issues (Gender violence in private and public spaces: Domestic violence, Dowry, trafficking in women and children, rape, sex-selective abortion, female infanticide, female foeticide, child marriage, prostitution • Gender, leadership, and workplace; Sexual Harassment at Workplace). Gender-based violence, patriarchy, sexism, racism, casteism, economic inequality, and misogyny. Gender and health (Physical and mental), reproductive health, and sexuality. Feminization of poverty. Issues of the rights of sexual minorities and transgender - Article 377 and beyond.

UNIT-III Gender Perspectives in Development **10 Hrs**
Gender Analysis Tools: Gender budgeting, Gender mainstreaming, SIG, Gender Parity Index, Gender Inequality Index, Human Development Index, Gender Development Index, Gender Empowerment Measure, Approaches to development-- Women in Development (WID), Women and Development (WAD), Gender and Development(GAD), Millennium Development Goals, and Sustainable Development Gender Analysis Frameworks; Gender blind; neutral and redistributive policies; Welfare, Efficiency and Empowerment approaches to Gender; Strategic and practical gender needs/interests; Case Studies to understand the

engagement with gender, (Poverty alleviation Forestry; Drinking Water and Sanitation; Health programmes, Urban renewal and slum rehabilitation Programmes, and micro-credit programmes like SHGs.

UNIT-IV Mechanisms Addressing Issues and Best Practices 10 Hrs

Constitutional and legislative safeguards, policies, and programmes • Institutional mechanisms: National Commission for Women, Rashtriya Mahila Kosh, Crime Against Women Cell, Family Court, Family Counselling Centers and Crisis intervention centers • Best practices to address disparity, violence, and safety issues

International initiatives world conferences, women's decade, CEDAW. Indian initiatives – Towards Equality Report, National Perspective Plan for women, National Policy for the Empowerment of Women-2001, National and State women's Commissions, Nirbhaya, Women Development Corporation; Legal remedies and Social Welfare Services available to Women Facing Violence.

UNIT-V Gender and Media 5 Hrs

Discourse on Women and Media Studies- Mainstream Media, Feminist Media. • Coverage of Women's issues, sexual minorities, and issues of women in Mass Media and Media Organizations (Audio-Visual and Print media). • Digital Media and legal protection (cybercrimes and laws). • Alternative Media – Folk Art, Street Play and Theatre. • Indecent Representation of Women (Prohibition) Act, 1986, Pornography, Impact of media on Gender. Construction of masculinity and feminity in media.

Course Outcomes:

By the end of the course, students should be able to:

1. Understand the concept of gender and the social construction of feminity and masculinity
2. Develop sensitivity towards the existing practices leading to gender discrimination and marginalization in society.
3. Develop the ability to identify social, economic and political systems that adversely affect the well-being and functioning of women.
4. Suggest affirmative action in planning to promote gender equity, equality, and safety for women and sexual minorities
5. Understand the major theoretical and empirical issues that emerge in the gender field.

Text Books:

1. Nalini Visvanathan (Ed.), (2006) The Women, Gender and Development Reader, Zubaan, New Delhi
2. Kannabiran, Kalpana& Ritu Menon. 2007. From Mathura to Manorma: Resisting Violence Against Women, New Delhi: Women Unlimited

Reference Books:

1. Seth, M. 2001. Women and Development: The Indian Experience. New Delhi: Sage Publications.
2. Banerjee, N; S. Sen &N. Dhawan. 2011. Mapping the Field: Gender Relations in Contemporary India, Volume 1, Kolkata: Stree
3. Bose, C.E. &Minjeong Kim. 2009. Global Gender Research: Transnational Perspectives, New York: Routledge

Notes

1. https://www.studocu.com/row/document/kohat-university-of-science-and-technology/gender-studies/gender-studies-new-lecture-notes-1-7/5176872
2. https://teentalk.ca/learn-about/gender-identity/#:~:text=There%20are%20many%20different%20gender,or%20a%20combination%20of%20these.
3. https://genderspectrum.org/articles/understanding-gender

TAUT1201G **LEADERSHIP DEVELOPMENT** **L T P C**
3 0 0 3

Course Description:
This course provides a comprehensive introduction to the fundamental concepts of leadership. Students will gain knowledge of different leadership levels and styles and understand the significance of vision and strategy formulation.

Course Objectives:
1. Understand the basic concepts of leadership
2. Knowledge of leadership development strategy
3. Knowledge of leadership development approaches
4. Knowledge of leadership traits
5. Awareness on self-awareness exercises.

UNIT-I **9 Hrs**
Understanding Leadership - Defining Leadership; Leadership styles, Entrepreneurial leaders, Different levels of leaders

UNIT-II **9 Hrs**
Strategy formulation - formulation of vision, Strategy formulation and communication, role of the leader in managing change, foundation for effective team development

UNIT-III **9 Hrs**
Leadership development approaches - Significance of leadership development strategy, leadership development approaches - One-to-one coaching, Mentor schemes, Role of HR and development, Buddy pairs, Action learning sets, Work-based projects

UNIT-IV **9 Hrs**
Recognizing Leadership Traits - Historical Leaders; Traits Leaders Display, Leadership Studies: What Traits Do Effective Leaders Exhibit.

UNIT-V **9 Hrs**
Recognising self - Exercises of Self-awareness using Johari Window, Development diaries, Feedback exercises, Personal vision setting

Course Outcomes:
1. Understand the basic concepts of leadership
2. Understand the significance of vision and strategy formulation
3. Knowledge of leadership development approaches.
4. Knowledge of leadership traits.
5. Knowledge of self-awareness techniques

Textbooks:
1. Rosemary Ryan, Leadership Development - A guide for HR and Training professionals, ELSEVIER, UK

2. Kim S. Cameron, Positive Leadership: Strategies for Extraordinary Performance,

Reference Books:

1. Manuel London, Leadership Development: Paths To Self-insight and Professional Growth, Psychology Press, New York.
2. Susan E. Murphy, Ronald E. Riggio, The Future of Leadership Development, Routledge is an imprint of Taylor & Franci

TAUT1201H	MATHEMATICAL THINKING	L	T	P	C
		3	0	0	3

Course Description:

Mathematical Thinking is a university elective course that teaches fundamental concepts of basic algebraic and mathematical operations. After learning this course, students will easily be able to learn more problems solving skills and use this course for practicing. The course emphasizes problem-solving skills and analytical thinking and equips students with the skills necessary to tackle real-world problems using basic mathematical and arithmetical concepts.

Course Outcomes:

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

1. To familiarize the students with the fundamental concepts of basic numbers, mathematical operations, and divisibility rules
2. Summarize the basic concepts mathematical operations on numbers and calculate LCM, GCD to solve simple problems.
3. Compute To probability concepts and statistical methods in various applications engineering.
4. Understand the formula for evaluate the square root and cube root of different types numbers
5. Impart the arrangements and selections of things and counting numbers and check for independence of events.

UNIT-I **9 Hrs**

Number system and Tests of Divisibility: Digits, numbers, Indian-Hindu-Arabic system, Roman Numbers, Face Value and Place values, Various Types of Numbers or Standard Numbers, Prime number, composite numbers, Perfect Numbers, Co-primes (or) Relative Primes, Twin primes, perfect numbers, Testing of prime numbers, Mathematical operations on even and odd numbers.

UNIT-II **9 Hrs**

LCM and GCD or HCF: Factors and Multiplers, Highest Common Factor (H.C.F.) or Greatest Common Measure (G.C.M.) or Greatest Common Divisor (G.C.D.) factorization method, division method, finding the H.C.F. of more than two numbers, factorization method of finding L.C.M, H.C.F. and L.C.M. of fractions.

UNIT-III **9 Hrs**

System Simplifications: BODMAS' Rule, Modulus of a Real Number, Virnaculum (or Bar), Algebraic identities, set theory operations (union, intersection, complements).

UNIT-IV **9 Hrs**

Square Roots, Cube Roots, averages and percentages: Square Root, cube root, Problems on numbers, concept of averages, problems on averages, concept of percentage and problems on percentages.

UNIT-V **9 Hrs**

Permutations, combinations and Probability: Fundamental principle with respect of addition and multiplication, permutations, combination, relation between permutation and combination, Random experiment, sample space and basic problems of events of a probability.

Course Outcomes:

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

1. To explain fundamental concepts of basic number system, including standard numbers, mathematical operations, and divisibility rules.
2. To apply mathematical operations on numbers and calculate lcm, gcd to solve simple problems.
3. To evaluate the arrangements and selections of things and counting numbers.
4. To understand the simplications by using identities and apply the different kinds of operations on the numbers.
5. To evaluate square root and cube root of different types numbers and calculate appropriate solutions for different problems.

Text Books:

1. Quantitative Aptitude Text Book, Dr.RS.Agrrwal.
2. Quantitative Aptitude, Text Book,S.Chandu.
3. Andhra Pradesh Academy of IPE text books.

Reference Books:

1. Quantitative Aptitude, Text Book, Quicker Mathematics ,second edition
2. Quantitative Aptitude, Text Book,Abjuirh guwaha,Fourth edition
3. www.online quantitative aptitude testseries.com
4. Quantitative Aptitude, GSR Publications,Gunturu,third edition
5. Quantitative Aptitude, verbal reasoning ,Guptha publication,3rd edition
6. www.enaduprathibaonline.com and www.sakshionlineseries.com

TAUT1201I	NURSING	L	T	P	C
		3	0	0	3

Course Description:

This module is designed to help the students to acquire comprehensive knowledge in basic concepts of Health, Nursing, Vital signs, Basic Life support, home care management of Diabetes & Hypertension and Adolescent health.

Course Objectives:

Students undergoing this course are expected to:

1. Understand the concept of health, illness, and Nursing
2. Learn the technique of assessing and monitoring vital signs
3. Perform BLS using evidence based national or international guidelines in the management of adult victims with the cardiac arrest.
4. Understand the concept of home care management of Diabetes and Hypertensive persons
5. Develop understanding about the normal growth and development, needs and health issues of adolescents

UNIT-I **3 Hrs**

Concepts of Health and Nursing: Definition of Health and ill ness, Health-illness continuum, Factors influencing Health, Nursing as a profession and Career ladder.

UNIT-II **12 Hrs**

Vital signs:

Temperature: Physiology, regulation, factors affecting body temperature, Assessment of body temperature: sites, technique and special considerations.

Pulse: Physiology & regulation, characteristics of the pulse, factors affecting pulse, Assessment of the pulse: sites, location, technique and special considerations.

Respiration: Physiology and regulation, mechanics of breathing, characteristics of the respiration, factors affecting respiration, Assessment of respiration: technique and special considerations.

Blood pressure: Physiology and regulation, characteristics of the blood pressure, factors affecting blood pressure. Assessment of blood pressure: sites, equipment and technique and special considerations. Recording of vital signs.

Pain: Definition, types of physiology of pain and factors influencing the pain

UNIT-III **8 Hrs**

Basic life support / basic cardiopulmonary life support (BLS/BCLS)

Introduction, definition, purposes, indications, contraindications and steps in procedure.

UNIT-IV **12 Hrs**

Home care management of Diabetes and Hypertension

Diabetes - Introduction to Diabetes Mellitus – A National and Global burden: Classification, risk factors, pathophysiology, manifestations, screening, diagnostic criteria and complications,

The treatment Modalities of Diabetes Mellitus: (Lifestyle modifications Diet therapy, Exercise, Medical Management, Self-Management, Practical Aspects: Blood Glucose monitoring, Diabetic foot care, Exercises, Diabetic Diet Planning, Self-Insulin administration)

Hypertension - Introduction to Hypertension, Types, risk factors, pathophysiology, manifestations, diagnostic criteria and complications, treatment modalities: lifestyle modifications, Diet therapy, Exercise, Medical management.

UNIT-V **10 Hrs**

Adolescent Health: Growth and Development of adolescent, Nutritional and developmental needs of adolescent, common health problems including mental health problems, Reproductive and sexual health issues

Course Outcomes:

At the end of this course, students should be able to:

1. Acquire a thorough knowledge on concept of health and illness.
2. Demonstrate skills in monitoring the vital signs
3. Develop skills in performing BLS/BCLS
4. Able to attain knowledge and skills on treatment modalities of DM
5. Aware of normal Growth and development and common health problems in adolescent

Textbooks:

1. Potter and perrys, Fundamentals of Nursing,4th edition, Mosby, Elsevier publication
2. Lewis, textbook of Medical Surgical Nursing 4th south Asian edition, Elsevier publication
3. Dorothy R. Marlow, Textbook of paediatric nursing, sixth edition, Elsevier publications,

Reference Books:

1. Joyce M black textbook of medical surgical nursing ,8th edition, Elsevier publications,
2. Kozier and Erbs, textbook of fundamentals of Nursing, Elsevier publications.

TAUT1201J	ONE HEALTH	L	T	P	C
		3	0	0	3

Course Description:

This course introduces students to the One Health approach, an interdisciplinary approach that recognizes the interconnectedness of human, animal and environmental health. Students will learn about the history of One Health, its relevance to global health and its role in addressing a range of health challenges, including zoonotic diseases, environmental health hazards and antimicrobial resistance. The course will also explore current and emerging One Health challenges and innovations and the ethical considerations of One Health research and practice.

Course Objectives:

1. To explain the relevance of One Health to global health.
2. To understand the interdisciplinary nature of One Health research and practice.
3. To analyse the impact of environmental health hazards on human and animal health.
4. To identify emerging One Health challenges and innovations.
5. To evaluate ethical considerations in One Health research and practice.

UNIT-I **9 Hrs**

Overview of One Health and its relevance to global health, Definition of One Health and its history, Examples of One Health challenges, such as zoonotic diseases and antimicrobial resistance, The role of inter-disciplinarily in One Health research and practice, Global One Health initiatives and their impact

UNIT-II **9 Hrs**

Environmental health and its relationship to One Health, Overview of environmental health and its impact on human and animal health, Environmental risks to health, such as pollution and climate change, Case studies highlighting the impact of environmental hazards on human and animal health, The role of One Health in addressing environmental health challenges

UNIT-III **9 Hrs**

Zoonotic diseases and One Health, Overview of zoonotic diseases and their impact on human and animal health, The ecology of zoonotic diseases and how they emerge and spread, Case studies of major zoonotic disease outbreaks, such as Ebola and COVID-19, The One Health approach to preventing and controlling zoonotic diseases.

UNIT-IV **9 Hrs**

Antimicrobial resistance and One Health, Overview of antimicrobial resistance and its impact on human and animal health, the relationship between antimicrobial use in animal agriculture and human health, the role of One Health in addressing the global challenge of antimicrobial resistance, Case studies of One Health approaches to controlling antimicrobial resistance, such as the WHO Global Action Plan

UNIT-V **9 Hrs**

Future directions in One Health research and practice, Emerging One Health challenges-food security and emerging infectious diseases, Innovations in One Health research and practice, such as digital technologies and genomics, Opportunities for One Health collaboration across sectors and disciplines, Ethical considerations in One Health research and practice.

Course Outcomes:

By the end of the course, students will be able to:

1. Describe the One Health approach and its relevance to global health
2. Analyse the impact of environmental health hazards on human and animal health
3. Evaluate the role of One Health in addressing zoonotic diseases and controlling antimicrobial resistance
4. Identify emerging One Health challenges and innovations
5. Discuss ethical considerations in One Health research and practice

Textbooks:

1. One Health: People, Animals and the Environment by Ronald M. Atlas and Stanley Maloy
2. One Health: The Human-Animal-Environment Interfaces in Emerging Infectious Diseases by John S. Mackenzie and Martyn Jeggo

Reference Books:

1. One Health: The Theory and Practice of Integrated Health Approaches edited by Jakob Zinsstag, Esther Schelling, David Waltner-Toews and Maxine Whittaker
2. One Health and the Politics of Antimicrobial Resistance edited by Laura H. Kahn, Bruce Kaplan and Thomas P. Monath
3. The One Health Initiative: A Global Movement to Achieve Sustainable Health and Well-being edited by Bruce Kaplan and Thomas P. Monath.

TAUT1201K BASIC EMERGENCY CARE AND LIFE SUPPORT SKILLS L T P C
3 0 0 3

Course Description:
This course introduces students to the fundamental skills required for providing basic emergency care and life support. It covers essential techniques in CPR, AED use, and basic first aid to prepare students for real-life emergency situations.

Course Objectives:
Students undergoing this course are expected to:

1. To understand the principles and techniques of basic life support.
2. To acquire essential first aid skills.
3. To know the use of AED
4. To get trained in the practical aspects of CPR.
5. To know the various assessment aspects of a patient in an emergency

UNIT-I Basic Life Support (BLS) and CPR **9 Hrs**
Introduction to BLS and CPR, Steps of Adult, Child, and Infant CPR, Airway Management, Rescue Breathing and Chest Compressions

UNIT-II Automated External Defibrillator (AED) **9 Hrs**
What is an AED? When and how to Use an AED, Safety Precautions, Different types of Defibrillators

UNIT-III Basic First Aid Techniques **9 Hrs**
Principles of First Aid, Managing Bleeding and Wounds, Fractures and Sprains, Burns and Scalds.

UNIT-IV Recognizing Medical Emergencies **9 Hrs**
Identifying Common Medical Emergencies, Initial Assessment and Response, Managing Breathing and Cardiac Emergencies.

UNIT-V Practical Skills Practice **9 Hrs**
Hands-on CPR Practice, AED Operation Drills, First Aid Skills Practice, Scenario-Based Training

Course Outcomes:
At the end of this course, students should be able to:

1. Acquire a thorough knowledge of the principles and techniques of basic life support.
2. Apply essential first aid skills.
3. Demonstrate the use of AED in Emergencies.
4. Demonstrate the practical aspects of CPR
5. Evaluate various assessment plans by the specific emergency.

Textbooks:

1. "Basic Life Support Provider Manual" by American Heart Association Pang, Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.
2. "First Aid Manual" by St. John Ambulance

TAUT1201L	BASICS OF HEALTH MANAGEMENT	L	T	P	C
		3	0	0	3

Course Description:

This course provides an essential foundation in health management, focusing on key areas such as basic life support, first aid, stroke management, and the prevention and management of both communicable and non-communicable diseases. Students will develop practical skills and knowledge to effectively manage health-related situations in various settings.

Course Objectives:

Students undergoing this course are expected to:

1. To understand the principles and techniques of basic life support.
2. To acquire essential first aid skills.
3. To comprehend the causes, symptoms, and management of stroke.
4. To learn about non-communicable diseases, their risk factors, and management strategies.
5. To understand communicable diseases, their transmission, prevention, and control.

UNIT-I Basic Life Support **9 Hrs**

Overview of Basic Life Support (BLS), Cardiopulmonary Resuscitation (CPR) Techniques, Use of Automated External Defibrillators (AEDs), Airway Management and Breathing Support, BLS Protocols and Procedures

UNIT-II First Aid **9 Hrs**

Introduction to First Aid Principles, Managing Wounds and Bleeding, Fractures and Musculoskeletal Injuries, Burns and Scalds Treatment, Handling Medical Emergencies (e.g., heart attack, choking, seizures)

UNIT-III Stroke **9 Hrs**

Understanding Stroke: Types and Causes, Symptoms and Warning Signs of Stroke, Immediate Response and Management, Stroke Rehabilitation and Recovery, Prevention and Risk Reduction Strategies

UNIT-IV Non-Communicable Diseases **9 Hrs**

Definition and Classification of Non-Communicable Diseases (NCDs), Common NCDs: Cardiovascular Diseases, Diabetes, Cancer, Chronic Respiratory Diseases, Risk Factors and Prevention Strategies, Management and Treatment Approaches, Public Health Implications and Policy Responses

UNIT-V Communicable Diseases **9 Hrs**

Introduction to Communicable Diseases, Modes of Transmission and Epidemiology, Prevention and Control Measures (e.g., vaccination, hygiene, quarantine), Management of Common Communicable Diseases (e.g., TB, HIV/AIDS, Influenza), Emerging Infectious Diseases and Global Health Security

Course Outcomes:

At the end of this course, students should be able to:

1. Perform basic life support techniques.
2. Administer essential first aid.
3. Recognize and manage stroke symptoms and treatments.
4. Understand and address non-communicable diseases.
5. Implement communicable disease control measures.

Textbooks:

1. "Basic Life Support Provider Manual" by American Heart Association
2. "First Aid Manual" by St. John Ambulance, St. Andrew's First Aid, and the British Red Cross

Reference Books:

1. "Stroke: Practical Guide to Management" by Charles P. Warlow
2. "Non-Communicable Diseases in the Developing World" by Rachel Nugent
3. "Communicable Disease Control and Health Protection Handbook" by Jeremy Hawker et al.

TAUT1201N **ENTREPRENEURSHIP** **L T P C**
3 0 0 3

Course Description:
This course provides an in-depth understanding of entrepreneurship, its applications, and its scope. Students will learn to generate broad ideas for starting an enterprise or startup and convert them into viable opportunities. The course covers the essentials of managing startups, understanding small and medium enterprises, and gaining knowledge of various financial institutions.

Course Objectives:
1. Understand the concept of Entrepreneurship, its applications and scope.
2. Application of knowledge for generating a broad idea for a starting an enterprise/start up and converting to opportunity.
3. Knowledge of managing the start-up's
4. Understand the small and medium enterprises
5. Knowledge of different financial institutions

UNIT-I **9 Hrs**
Entrepreneurship: Definition and Concept of entrepreneurship - Entrepreneur Characteristics – Classification of Entrepreneurs –Role of Entrepreneurship in Economic Development

UNIT-II **9 Hrs**
Idea to Opportunity - Introduction, Sources of New Ideas, Techniques for Generating Ideas, Assessing Business Potential of an Idea, Opportunity Recognition, Sources and process, Indian Economy—Opportunities, Steps Involved in Tapping Opportunity

UNIT-III **9 Hrs**
Entrepreneurship Development - Intrapreneurship, Entrepreneurship as a Career Option, Female Entrepreneurship and problems, Types of Start-ups, Start-ups and mistakes, Managing Start-ups During Downturn

UNIT-IV **9 Hrs**
Entrepreneurship Trends - Small and Medium Business Enterprises, International Entrepreneurship, Entrepreneurship—Emerging Trends in the Global Knowledge Economy

UNIT-V **9 Hrs**
Institutions Supporting and Taxation Benefits: Central level Institutions: NABARD; SIDBI,– State Level Institutions –DICs – SFC - Government Policy for MSMEs - Tax Incentives and Concessions.

Course Outcomes:
1. Basic understanding of entrepreneurship
2. Knowledge of idea generation and opportunities identification of entrepreneurship
3. Understand different forms of enterprises

4. Understand different emerging trends of entrepreneurship
5. Knowledge of different financial institutions

Textbooks:

1. Arya Kumar, Entrepreneurship, Pearson, Delhi
2. Poornima MCH, Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi

Reference Books:

1. Anil Kumar, S., ET.al., Entrepreneurship Development, New Age International Publishers, New Delhi
2. Khanka, SS, Entrepreneurship Development, S. Chand, New Delhi
3. Peter F. Drucker,Innovation and Entrepreneurship
4. A.Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges &Opportunities

TAUT1201O **MANAGERIAL ECONOMICS** **L T P C**
3 0 0 3

Course Description:
This course provides a solid foundation in the fundamentals of economics and managerial economics. Students will learn to apply concepts of production cost and revenues for effective business decisions. The course also covers analyzing capital investments to maximize returns, understanding different forms of business organizations, and evaluating business organizations and marketing strategies.

Course Objectives:
1. Understand the fundamentals of Economics and Managerial economics
2. Apply the Concept of Production cost and revenues for effective Business decision
3. Analyze how to invest their capital and maximize returns.
4. Understand different forms of business organizations
5. Evaluate Business organizations and marketing strategies

UNIT-I **9 Hrs**
Introduction: Meaning, Nature, Significance, Functions, and Advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting and methods.

UNIT-II **9 Hrs**
Production: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns

UNIT-III **9 Hrs**
Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT-IV **9 Hrs**
Business Organizations Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.

UNIT-V **9 Hrs**
Markets: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

Course Outcomes:
1. Basic understanding of managerial economics
2. Develop an understanding of the applications of production

3. Interpret cost analysis
4. Understand different forms of business organizations.
5. Analyse the causes and consequences of different market conditions.

Text Books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019.

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.

TAUT1201P **ORGANIC FARMING** **L T P C**

3 0 0 3

Course Description:

By the end of the course, students will be equipped with the knowledge and skills to plan, establish, and manage organic farms effectively. This course serves as a foundation for aspiring organic farmers, agricultural professionals, and individuals interested in sustainable food production and environmental conservation.

Course Objectives:

1. To Understand the principles and practices of organic farming.
2. To Analyze the environmental, economic, and social implications of conventional versus organic agricultural systems.
3. To Apply organic farming techniques to enhance soil health and fertility.
4. To Examine the certification processes and regulations governing organic farming.
5. To explore ways to engage with local communities and promote organic practices.

UNIT-I **9 Hrs**

Introduction to Organic Farming, Overview of organic farming principles and practices, Historical development and evolution of organic agriculture, Importance of organic farming in sustainable agriculture, Comparison between conventional and organic farming systems, Certification and regulatory requirements for organic farming.

UNIT-II **9 Hrs**

Soil Health and Management, Importance of soil health in organic farming, Soil composition and structure, Soil fertility management without synthetic inputs, Soil conservation techniques: cover cropping, crop rotation, mulching, Composting and vermicomposting for organic matter enrichment.

UNIT-III **9 Hrs**

Crop Management in Organic Systems, Selection of suitable crops for organic farming, Organic seed selection, saving, and sourcing, Crop planning and rotation strategies, Weed management without herbicides: mechanical, cultural, and biological control methods, Pest and disease management in organic systems: integrated pest management (IPM), biological control, and natural remedies.

UNIT-IV **9 Hrs**

Organic Livestock Management, Principles of organic livestock production, Organic feed sourcing and formulation, Housing and space requirements for organic livestock, Health care and disease management without antibiotics and synthetic chemicals, Organic certification requirements for livestock operations.

UNIT-V **9 Hrs**

Marketing and Economics of Organic Farming, Market trends and consumer demand for organic products, Certification and labeling requirements for organic products, Marketing strategies for organic farmers: direct sales, farmers markets, CSA (Community Supported

Agriculture), Economic viability and profitability of organic farming, Government support programs and incentives for organic farmers.

Course Outcomes:

Upon completion of the course the student shall be able to,

1. Demonstrate a comprehensive understanding of the principles of organic farming and their application in agricultural systems.
2. Critically evaluate the sustainability of different agricultural practices, considering environmental impact, economic viability, and social equity.
3. Design and implement an organic farming plan for a specific crop or agricultural enterprise.
4. Analyze case studies and research articles to assess the effectiveness of organic farming practices in various contexts.
5. Communicate effectively about organic farming principles and practices, both orally and in writing.

Text Books:

1. "Teaming with Microbes: The Organic Gardener's Guide to the Soil Food Web" by Jeff Lowenfels and Wayne Lewis
2. "The Organic Farmer's Business Handbook: A Complete Guide to Managing Finances, Crops, and Staff - and Making a Profit" by Richard Wiswall

Reference Books:

1. "Introduction to Permaculture" by Bill Mollison
2. "Crop Rotation on Organic Farms: A Planning Manual" by Charles L. Mohler and Sue Ellen Johnson
3. "The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm" by Anne Larkin Hansen

TAUT1201Q **PERSONALITY DEVELOPMENT** **L T P C**
3 0 0 3

Course Description:

Personality Development is a comprehensive course designed to equip undergraduates with the essential skills and knowledge required for personal growth and professional success. The course focuses on enhancing self-awareness, emotional intelligence, communication, and interpersonal skills. Students will learn how to build confidence, manage stress, and develop effective time management strategies. Additionally, the course covers critical aspects of professional development, including resume writing, interview techniques, and personal branding.

Course Objectives:

1. To develop self-awareness and emotional intelligence.
2. To enhance communication and interpersonal skills.
3. To build confidence and self-esteem.
4. To foster professional and personal growth.
5. To prepare students for successful careers and meaningful personal lives.

UNIT-I Introduction to Personality Development **9 Hrs**

Definition and importance of personality development; Initial self-assessment and goal setting; Short-term and long-term goal setting; Understanding oneself: strengths, weaknesses, opportunities, threats (SWOT analysis); Values, beliefs, and attitudes; Personal vision and mission statements; Components of emotional intelligence (EQ); Self-regulation and self-motivation; Empathy and social skills.

UNIT-II Communication Skills and Interpersonal Skills **9 Hrs**

Communication Skills; Verbal and non-verbal communication; Active listening and feedback; Public speaking and presentation skills; Building and maintaining relationships; Conflict resolution and negotiation; Teamwork and collaboration; Importance of cultural sensitivity in a globalized world; Developing intercultural communication skills

UNIT-III Critical Thinking, Problem Solving and Self-Esteem **9 Hrs**

Enhancing analytical and critical thinking skills; Creative problem-solving techniques Decision-making process; Confidence and Self-Esteem; Building self-confidence; Overcoming self-doubt and negative thinking; Techniques for boosting self-esteem.

UNIT-IV Time Management and Stress Management **7 Hrs**

Prioritization and productivity techniques; Overcoming procrastination; Identifying sources of stress; Techniques for managing and reducing stress; Work-life balance.

UNIT-V Professional Development and Leadership Skills **11 Hrs**

Resume writing and job interview skills; Professional etiquette and workplace behavior Networking skills; Traits of effective leaders; Leadership styles and theories; Developing leadership qualities; Personal Branding, Building a personal brand; Online presence and social

media etiquette; Personal branding strategies; Final self-assessment and reflection on personal growth

Course Outcomes:

By the end of this course, students will be able to:

1. Develop a personal vision and mission statement to guide future actions and decisions.
2. Exhibit improved verbal and non-verbal communication skills.
3. Apply strategies to boost self-confidence and maintain high self-esteem.
4. Implement effective time management techniques to enhance productivity.
5. Develop and demonstrate leadership qualities in various scenarios.

Text Books:

1. Student's Hand Book- Skill Genie-Higher Education Department, Govt. Of Andhra Pradesh -https://svimstpt.ap.nic.in/edu/skill_genie.pdf.
2. The only skill that matters- Jonathan.Levi (2019)- Super Human Enterprises, LLC. All rights reserved. ISBN:978-1-5445-0435-3

Reference Books:

1. Online courses and TED Talks on personality development and self-improvement.
2. "How to Win Friends and Influence People" by Dale Carnegie (1936) Revised- 2022.

TAUT1201R **SOCIAL ENTREPRENEURSHIP** **L T P C**
3 0 0 3

Course Description:

This course explores the role of social entrepreneurship in societies, economies, and politics. Students will learn about the three pillars of social entrepreneurship and the different types of partners and their advantages. The course also covers the typical process steps of creating a marketing concept and describes the characteristics of the financing structure of social enterprises.

Course Objectives:

1. Understand the role of social entrepreneurship in societies, economies and politics
2. Explain the three pillars of social entrepreneurship.
3. Describe different types of partners for social entrepreneurs and their particular advantages.
4. Understand the typical process steps of a marketing conception.
5. Describe the characteristics of the financing structure of social enterprises.

UNIT-I **9 Hrs**

Introduction - Meaning of social entrepreneurship- concepts and typologies, its disparity with social business and CSR, social entrepreneur & personality, social enterprise.

UNIT-II **9 Hrs**

Drivers and scope: Role of Social Entrepreneurship in -Societies, Economies and Politics, The Drivers of Social Entrepreneurship, Size and Scope of Social Entrepreneurship, Opportunities for Social Entrepreneurs.

UNIT-III **9 Hrs**

Collaboration and Partnerships - Reasons for Crafting Collaborations, Specific Types of Collaborations, Different Collaboration Partners, Potential Risks and Challenges, Guidelines to Establish a Collaboration.

UNIT-IV **9 Hrs**

Elements of a Marketing Conception - Market analysis, Marketing Goals, Competitive Strategy, Measures, Controlling; Peculiarities Concerning Marketing for Social Enterprises, Marketing Importance for Social Enterprises.

UNIT-V **9 Hrs**

Finance - Types of Financing Instruments- Donations, Equity capital, Debt capital, Hybrid capital; Financing institutions-value banks, social investment advisors, social stock exchange, Venture Philanthropy Funds, Social Investment Funds, Funding Consultancies

Course Outcomes:

1. Knowledge of social entrepreneurship differentiation from other related concepts
2. Understand the role of social entrepreneurship in societies, economies and politics

3. Analysis of different types of partners for social entrepreneurs.
4. Understand the typical process steps of a marketing conception.
5. Awareness of the peculiarities of financial elements in social enterprises

Textbooks:

1. Christine K. Volkmann & Kim Oliver Tokarski. 2012.Social Entrepreneurship and Social Business. Springer Gabler
2. Madhukar Shukla: Social Entrepreneurship in India. Sage publications

Reference Books:

1. Archana Singh (auth.) The Process of Social Value Creation: A Multiple-Case Study on Social Entrepreneurship in India. Springer India.2016.
2. Ryszard Praszkier; Andrzej Nowak. Social entrepreneurship : theory and practice [1 ed.]. Cambridge University Press
3. Alex Nicholls. Social Entrepreneurship: New Models of Sustainable Social Change. Oxford University Press, USA

I YAER
II SEMESTER

Course Code	Course Name	Periods per week			Credits	Hours per week
		L	T	P		
AHSJ1304	Microbiology	3	1	2	5	6
AHSJ1305	Pathology	3	1	2	5	6
AHSJ1306	Pharmacology	3	1	2	5	6
TAUT1102	University Core - II (Environment Studies)	3	0	0	3	3
TAUT1202	University Elective – II	3	0	0	3	3
IMTT1501	Programme Core (Fundamentals of Imaging Technology)	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Library	0	0	0	0	1
--	Physical Activity	0	0	0	0	2
--	Extra-curricular activities	0	0	0	0	2
--	Self-Learning	0	0	0	0	2
--	Seminar	0	0	0	0	1
TOTAL		**18**	**3**	**6**	**24**	**36**

University Elective - II	
S. No	**Name of the Course**
Indian Languages	
1	Telugu
2	Tamil
3	Hindi
4	Professional English
Foreign Languages	
5	French
6	German
7	Spanish
8	Japanese

AHSJ1304	MICROBIOLOGY	L	T	P	C
		3	1	2	5

Course Description:

This course will cover on general properties of pathogenic bacteria, viruses, fungi and parasites along with immune mechanisms, its response, methods of sterilization and disinfection, healthcare associated infections and hospital infection control practices. It helps the student to understand the natural history of infectious diseases to deal with etiology, pathogenesis, clinical features, laboratory diagnosis, treatment and control of infections in the community including immunoprophylaxis.

Course Objectives:

Students undergoing the course shall be expected to:

- Learn the general properties, structure and physiological aspects of bacteria and identification of bacteria.
- Learn about infection, immunity, various antigen-antibody reactions, immune mechanisms and hypersensitivity reactions and various infection control practices.
- Learn about pathogenesis, laboratory diagnosis and prophylactic measures of various bacterial infections.
- Learn about general properties of viruses and fungi and morphology, pathogenesis, laboratory diagnosis and prophylactic measures of various viral and fungal infections.
- Learn about classification of parasites and their morphological forms, life cycle, pathogenesis, laboratory diagnosis and prophylactic measures of various parasitic infections.

THEORY **Total: 60 Hrs**

UNIT-I **10 Hrs**

INTRODUCTION TO MEDICAL MICROBIOLOGY

- Importance of Medical Microbiology
- Historical aspects

GENERAL PROPERTIES & PHYSIOLOGICAL ASPECTS OF BACTERIA

- Structure of bacteria and its appendages like capsule, flagella, pili and spore
- Classification based on morphology, arrangement and motility
- Microscopy & Staining techniques
- Bacterial Growth Curve, Nutritional requirements of bacteria

BACTERIAL IDENTIFICATION METHODS

- Culture media, Culture Methods
- Specimen collection and transport to the laboratory
- Laboratory methods of Identification of Bacteria
- Antibiotic Sensitivity testing – Diffusion and Dilution methods

UNIT-II **12 Hrs**

INFECTION CONTROL PRACTICES

Infection – Definition, types and sources of infection, mode of transmission, types of infectious diseases, microbial pathogenicity

- Sterilization, Disinfection and Asepsis
- Standard Safety Precautions
- Biomedical Waste Management
- Hospital acquired infections, mode of spread, types and predisposing factors, investigation and surveillance

IMMUNOLOGY

Immunity – Definitions, terminology, Innate, acquired and herd immunity

- Antigen & Antibody
- Antigen-Antibody Reactions – Precipitation reactions, Agglutination reactions, ELISA, IFA
- Immune response
- Hypersensitivity - Definition and Classification and Type I, II, III, IV types of hypersensitivity
- Immunoprophylaxis – Immunization schedule, vaccines, storage & handling, hazards of immunization

UNIT-III **16 Hrs**

PATHOGENIC BACTERIA– Morphology, pathogenicity, laboratory diagnosis and prophylaxis of the following organisms

- **Gram Positive Cocci:** Staphylococci, Streptococci & Pneumococci
- **Gram Negative Cocci:** Meningococci, Gonococci
- **Gram Positive Bacilli:** Corynebacterium diphtheriae, Clostridium perfringens, Clostridium tetani, Clostridium botulinum, Bacillus anthracis, Bacillus cereus
- **Gram Negative Bacilli:** Escherichia coli, Klebsiella, Proteus, Salmonella, Shigella, Vibrio, Bordetella, Hemophilus
- **Acid Fast bacilli:** Mycobacterium tuberculosis, Mycobacterium leprae
- **Spirochaetes:** Treponema, Borrelia, Leptospira
- Rickettsiae

UNIT-IV **12 Hrs**

GENERAL VIROLOGY

- **General Properties of Viruses** – Structure, viral multiplication, viral cultivation, classification, inclusion bodies, antiviral agents
- Specimen collection and transport of viral disease samples to laboratory

PATHOGENIC VIRUSES – Morphology, Pathogenicity, laboratory diagnosis and prophylaxis of the following organisms

- RNA Viruses – Polio virus, influenza virus, mumps virus, measles virus, rubella virus, rabies virus, dengue virus, chickungunya virus, Japanese encephalitis virus,
- DNA Viruses – Herpes simplex virus, Varicella zoster virus, Epstein Barr virus, Variola, Molluscum contagiosum, Adeno virus, Human Papilloma virus

- Viral Hepatitis – Hepatitis A, B, C, D and E
- Rota Virus
- SARS Virus, Corona virus
- Human Immunodeficiency Virus (HIV)

PATHOGENIC FUNGI – Morphology, pathogenicity, laboratory diagnosis and prophylaxis of the following organisms

- Introduction, classification of fungi and fungal diseases, antifungal agents
- Superficial mycoses, subcutaneous mycoses, systemic mycoses and opportunistic mycoses
- Mycetism and mycotoxicosis

UNIT-V **10 Hrs**

PARASITOLOGY – Mode of infection, pathogenicity, clinical picture, laboratory diagnosis of the following parasites

0. **Protozoans:**Entamoeba histolytica, Trichomonas vaginalis, Leishmania donovani, Plasmodium spp., Toxoplasma gondii, Pneumocystis jirovecii, Cryptosporidium parvum
1. **Cestodes:**Taeniasolium, Taenia saginata, Diphylobothrium latum
2. **Trematodes:**Schistosoma haematobium, Fasciola hepatica, Fasciolposis buskii, Clonrchis sinensis, Paragonimuswestermanii
3. **Nematodes:**Ascaris lumbricoides, Ankylostoma duodenale, Enterobius vermicularis, Strongyloidesstercoralis, Wucherariabancrofti

Course Outcomes:

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

- Describe the General Properties and physiological aspects of Bacteria, Culture media, culture methods and identification of Bacteria.
- Explain about immunity, antigen, antibody and various antigen-antibody reactions, immune mechanisms and hypersensitivity reactions along sterilization & disinfections methods and various infection control practices.
- Describe the morphology, pathogenesis, laboratory diagnosis and prophylactic measures of various bacterial infections.
- Describe the General Properties of Viruses and Fungi and morphology, pathogenesis, laboratory diagnosis and prophylactic measures of various viral and fungal infections.
- Classify the parasites and describe the morphological forms, life cycle, pathogenesis, laboratory diagnosis and prophylactic measures of various parasitic infections.

PRACTICALS **Total: 30 Hrs**

Students undergoing the course shall be able to:

- Perform commonly employed bed-side tests for detection of infectious agents such as blood film for malaria, filariasis, gram staining, AFB staining, serology and stool sample for ova and cyst.

- Use the correct method of collection, storage and transport of clinical material for microbiological investigations

The assessment of the students will be done with the help of following exercises:

- Spotters
- Performing Gram stain, Acid-fast staining
- Stool Examination

Textbooks:

1. The Short Textbook of Medical Microbiology (including Parasitology): Satish Gupte
2. Medical Parasitology: C P Baveja & V Baveja
3. Ananthanarayan and Paniker's Textbook of Microbiology for Nurses

Reference Books:

1. Ananthanarayan and Paniker's Text book of Microbiology-12th Edition
2. Apurba Sastry,S; Bhat,S; Essentials of Medical Microbiology –4th Edition
3. Baveja. C.P; Text book of Microbiology – 7th Edition
4. Paniker's Text book of Medical Parasitology – 9th Edition

AHSJ1305 **PATHOLOGY** **L T P C**
3 1 2 5

Course Description:

Pathology is a vast expanding and ever-changing subject and it's the key to understanding diseases worldwide. The allied health sciences are an endeavour to present this vast subject understandably to the learners.

The aim of Teaching/learning Pathology at AHS is to provide knowledge/insight into etiology, pathogenesis, and pathophysiology &diseases.

Course Objectives:

- Describe the normal structure of a cell functions& its probable disease version. (cell in health disease)
- Cellular responses to injury& Adaptations, reversible irreversible injuries
- Inflammation & repair sequence of events happening during this.
- Infections, hemodynamic, Immunopathology, neoplasia, nutritional genetic disorder in disease conditions
- Systemic pathology ... Starting from the Heart, blood vessels, hematopathology.
- System-wise diseases discussion respiratory, GIT, hepatobiliary, urinary, MGT, FGT, Breast, Bones & joints, endocrines, Diabetes, skin, CNS & eye.
- Experiencing the practice of Clinical Pathology Starting with anticoagulants, HB estimation, blood, cell counts, hematocrit, PBS, ESR, RC, BM, examination, CSF, Semen analysis, urine &other body fluids.
- make the student understand the overall subject matter.

THEORY **Total: 60 Hrs**

UNIT-I **12 Hrs**

General Pathology -General pathology provides an overview of the basic pathologic mechanisms underlying diseases including cellular adaptations, inflammation, tissue repair, Chronic inflammation, hemodynamic disorders, immunological disorders, neoplasia, genetics and effects of radiation.

UNIT-II **12 Hrs**

Systemic Pathology 1 -Deals with various organ systems like vascular, Cardiac, LN, Respiratory system, head and neck, GIT, liver & hepatobiliary system.

UNIT-III **12 Hrs**

Systemic Pathology 2- pancreas, Urinary, Male genital system, female genital system, breast, bones, joints, soft tissue tumors, endocrines, Diabetes, Skin, CNS, peripheral nerves &Skeletal system.

UNIT-IV **12 Hrs**

Haemato pathology -Disorders of RBCs, WBCs, Platelets, anaemias, leukaemias, disorders of hemostasis, coagulation disorders, plasma cell disorders& blood

UNIT-V **12 Hrs**

Clinical pathology – deals with anticoagulants, Hb estimation blood cell counts, hematocrit, ESR, Reticulocyte count, BM examination, semen analysis, CSF and other body fluids analysis, urine examination.

Course outcome:

At the end of the course, the student can able to expand/ learn

- Define& practice of Pathology
- Haematological consequences of the disease process
- Can able to expand the Pathogenesis, pathophysiology, clinical consequences of disease process, complications

PRACTICALS **Total: 30 Hrs**

(Only theoretical lectures as there is no provision of technicians, or logistics provided for practicals for AHS students).

Hb estimation, RBC count, WBC count, platelet count, PBS, ESR, PCV, fluids, Urine examination.

Assessment of the student will be:

- Assignments
- Midterm examinations
- Workbook

References

- A well-illustrated textbook is available for AHS students – Text of pathology for AHS students – DR. Ramdas Nayak
- Robbins &cotran text book of pathology
- Harsh mohan text book of pathology
- Anderson's text book of pathology
- Bancroft text book of histological techniques

AHSJ1306	PHARMACOLOGY	L	T	P	C
		3	1	2	5

Course Description:

This course will cover general pharmacology with special emphasis on common drugs used, drug nomenclature, their routes of drug administration, dosage formulations, dose and frequency of administration.

This course also covers side effects, toxicity, management of their toxicity and drug interactions.

Course Objectives:

Students undergoing this course are expected to:

- Describe the general principles of drug action, handling of drugs by the body and drugs acting on ANS & autacoid system.
- Explain the mechanism of action, therapeutic uses and adverse effects of drugs used in common CNS disorders.
- Explain the mechanism of action, therapeutic uses and adverse effects of drugs used in common cardiovascular diseases and haematological disorders.
- Explain the mechanism of action, therapeutic uses and adverse effects drugs used in common endocrine, respiratory and gastrointestinal disorders.
- Enlist drugs used in common infections, cancers and immunological disorders and explain their mechanism of action.

THEORY **Total: 60 Hrs**

UNIT-I **12 Hrs**

General Pharmacology: Introduction, Definitions, Sources of Drugs, Drug nomenclature – Routes of administration & Pharmacokinetics – Pharmacodynamics – Factors modifying drug action – Adverse Drug Effects & Pharmacovigilance.

Drugs Acting on Autonomic Nervous System: Cholinergic Drugs –Anticholinergic Drugs – Adrenergic Drugs – Antiadrenergic Drugs

Autacoids and Related Drugs: Histamine and Antihistaminics –Prostaglandins, Leukotrienes (Eicosanoids) and Platelet Activating Factor – Nonsteroidal Anti-inflammatory Drugs (Antipyretic-Analgesics).

UNIT-II **9 Hrs**

Drugs Acting on Central Nervous System: General Anaesthetics –Local anaesthetics– Sedative & Hypnotics – Antiepileptic Drugs – Antiparkinsonian Drugs – Antipsychotic and mood stabilizers – Antidepressant and Antianxiety Drugs – Opioid Analgesics and Antagonists – Skeletal muscle relaxants.

UNIT-III **11 Hrs**

Cardiovascular Drugs: Drugs Affecting Renin-Angiotensin System & CCBs –Diuretics – Cardiac Glycosides and Drugs for Heart Failure – Antianginal Drugs –Antihypertensive Drugs – Antiarrhythmic Drugs – Hypolipidemic Drugs

Drugs Affecting Blood and Blood Formation: Haematinics and Erythropoietin – Coagulants & Anticoagulants – Antiplatelet drugs & Fibrinolytics – IV fluids, Plasma expanders & Drugs for shock.

UNIT-IV **10 Hrs**

Hormones and Related Drugs: Introduction, Thyroid Hormone and Thyroid Inhibitors – Insulin, Oral Hypoglycaemic Drugs and Glucagon – Corticosteroids– Sex hormones & Hormonal Contraceptives –Drugs Affecting Calcium Balance – Tocolytics & Ecbolics.

Respiratory System Drugs: Drugs for Cough – Drugs for Bronchial Asthma

Gastrointestinal Drugs: Drugs for Peptic Ulcer and Gastroesophageal Reflux Disease – Antiemetic & Prokinetic drugs – Drugs for Constipation and Diarrhoea

UNIT-V **18 Hrs**

Antimicrobial Drugs: Beta-Lactam Antibiotics- Penicillins – Cephalosporins, Monobactams & Carbapenems – Sulfonamides, Cotrimoxazole and Quinolones – Tetracyclines and Macrolides –Aminoglycosides and Misc. Antibacterial Antibiotics – Antitubercular Drugs & Antileprotic Drugs –Antifungal Drugs – Antiviral Drugs (Non- retroviral) – Antiviral Drugs (Anti - retroviral) – Antimalarial Drugs – Antiamoebic and Other Antiprotozoal Drugs – Anthelmintic Drugs

Chemotherapy of Neoplastic Diseases: Anticancer Drugs

Miscellaneous Drugs: Immunosuppressant Drugs – Drugs Acting on Skin and Mucous Membranes – Antiseptics and Disinfectants – Ocular Pharmacology

Course Outcomes:

At the end of this course, students should be able to:

- Apply the pharmacokinetic and pharmacodynamics principles that describe drug actions.
- Explain the rationale for selection of suitable drugs used in various CNS disorders.
- Explain the rationale for selection of suitable drugs used in various cardiovascular and haematological disorders.
- Explain the rationale for selection of suitable drugs used in various endocrine, respiratory and gastrointestinal disorders.
- Explain the rationale for selection of suitable drugs used in common infections, cancers and immunological disorders.

PRACTICALS **Total: 30 Hrs**

Course Objective: The course will cover general pharmacology with special emphasis on route of administration, type of formulations, dose and frequency of administration, importance

of manufacturing and expiry dates, storage instructions of each drug, calculation of drug doses and general principles in the management of poisoning.
The assessment of the students will be done with the help of following exercises.

- Spotters
- Dosage calculations
- Dosage formulations

Textbooks:

1. Textbook of Pharmacology for Dental & Allied Health Sciences – Padmaja Uday Kumar- 5th edition- 2023.
2. Fundamentals of Pharmacology for Allied Health Science- Dr Pradnya Deolekar- 3rd edition- 2019.
3. Textbook of Pharmacology for Allied Sciences- Kamalakannan - 3rd edition- 2019.

Reference Books:

1. Essentials of Medical Pharmacology - K.D. Tripathi- 8th edition Reprint-2023.
2. Basic & Clinical Pharmacology. Katzung BG (Ed), Publisher: Prentice Hall International Ltd., London- 15th Edition-2021.

UNIVERSITY CORE - II

TAUT1102	ENVIRONMENTAL STUDIES	L	T	P	C
		3	0	0	3

Course Description:

This course provides degree-seeking students with an array of opportunities to learn, practice and motivate communities on environmental importance. It further helps to understand the resources, optimize the recourses in future days, and address the gaps in the eco system.

Course Objectives:

Students undergoing this course are expected to:

1. Understand eco system and scope of multidisciplinary
2. Creating the awareness about environmental problems among people.
3. Imparting basic knowledge about the environment and its allied problems.
4. Developing an attitude of concern for the environment.
5. Understand the developments in global goals

Unit-I **8 Hrs**

Multidisciplinary nature of environmental studies; Definition, scope and importance; Need for public awareness; **Natural Resources:** Renewable and non-renewable resources; Forest resources: Water resources: Mineral resources; Food resources: Energy resources: Land resources; Equitable use of resources for sustainable lifestyles; Natural resources and associated problems.

Unit-II **8 Hrs**

Ecosystems: Concept of an ecosystem.; Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries); Environment Protection Act,1986; Public awareness.; Environment and human health.

Unit-III **8 Hrs**

Biodiversity and its conservation: Introduction – Definition- genetic, species and ecosystem diversity.; Biogeographical classification of India; India as a mega-diversity nation; Hot-sports of biodiversity.; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit- IV **8 Hrs**

Environmental Pollution Definition; Cause, effects and control measures of Air pollution; Water pollution; Soil pollution; Marine pollution; Noise pollution; Thermal pollution and nuclear hazards - Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution - Disaster management: floods, earthquake, cyclone and landslides.

Unit-V **8 Hrs**

Social Issues and the Environment: From Unsustainable to Sustainable development; Water conservation- rainwater harvesting- watershed management; Resettlement and rehabilitation of people; its problems and concerns.; Environmental ethics: Issues and possible solutions.; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust - Wasteland reclamation.; Consumerism and waste products.; Population and environment.

Field work **5 Hrs**

Field visits to nearby; awareness campaign; special lectures by experts; quiz, debate competitions, short film Contest, rally etc

Course Outcomes:

At the end of this course, students should be able to:

1. Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
2. Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Reflect critically about their roles and identities as citizens, consumers and environmental activists
5. Be part in Development goals and educating the communities.

Textbooks:

1. Textbook of Environmental Studies (English, Paperback, Asthana D. K.) S.Chand & co , New Delhi
2. Textbook of Environmental Studies for Undergraduate Courses, Erach B Haruchu, UGC, KINDLE Edition, Amazon.

Reference Book:

1. Encyclopedia of Environment and Society- set of 5 volumes, Sage Publications

TAUT1202A	FRENCH	L	T	P	C
		3	0	0	3

Course Description:

This course introduces students to French by intensively studying important aspects of pronunciation, vocabulary, grammar and sentence formation through practice sets and audio-visual lessons. It introduces the workings and sounds of the language and provides the necessary tools to enable students to make sentences from scratch.

Course Objectives:

1. To train the students to know about France, French culture and basics
2. To teach them to learn basic grammar and vocabulary.
3. To train them to learn tenses in French
4. To train them to talk about their daily routine
5. To train them to converse in French in day-to-day scenarios

UNIT-I **9 Hrs**

Introduction to France and its regions - French alphabets and numbers, countries and nationality

Grammaire – Verbs – s'appeler, être, avoir, definite and indefinite articles
Communication – Greetings, Self Introduction

UNIT-II **9 Hrs**

Basic vocabulary, colours, months and days

Grammaire - Verbes - Conjugation : Present tense (ER, IR, RE ending verbs) – Adjective possesive Communication – Talk about family and friends, date, time etc.

UNIT-III **9 Hrs**

Hobbies, interests and daily routine

Grammaire – Irregular verbs – Releflexive verbs - Future proche
Communication – Talking about hobbies and interests

UNIT-IV **9 Hrs**

Vocabulary of places and transport

Grammaire – Pertinent verbs, adjective demonstrative, past tense, propositions
Communication – Narrating an incident or story

UNIT-V **9 Hrs**

Vocabulary of food, services, money

Grammaire – Negation, Verbs – acheter, manger, payer, articles partitifs. Communication – Accept and refuse an invitation, situation in a restaurant

Course Outcomes:

After the course, the students will be able to:

1. Acquire familiarity in the French alphabet & basic vocabulary
2. Listen and identify individual sounds of French
3. Use basic sounds and words while speaking
4. Read and understand simple advertisements, brochures and invitations
5. Understand and use basic grammar and appropriate vocabulary in completing language tasks

Textbooks:

1. Grammaire Progressive du Français, CLÉ International, 2010.
2. Saison 1, Marie-Noëlle Cocton et al, Didier, 2014.
3. Cosmopolite A1 - Nathalie Hirschsprung, Tony Tricot

Reference Books:

1. Préparation à l'examen du DELF A1 – Hachette
2. Réussir le DELF A1 – Bruno Girardeau

TAUT1202B	GERMAN	L	T	P	C
		3	0	0	3

Course Description: German Language Training

Course Objectives:

1. Importance of German Language in Global prospective
2. To develop Reading skills for Basic Level
3. German writing skills, particularly emails & short messages
4. To develop basic German Speaking skills in order to meet the General activities
5. Listening practise to understand German Accent of the Native German Speakers

UNIT-I **9 Hrs**

GUTEN TAG: Saying hello and goodbye, introducing oneself and others, talking about oneself and others, numbers 1-20, spelling words and names, talking about countries and languages, the alphabet, first verbs in present tense, how to ask questions, useful terms and expressions

UNIT-II **9 Hrs**

FRUENDE, KOLLEGEN UND ICH: Talking about hobbies, days of the week, numbers from 20 on up, months and seasons in the year, talking about work and job, definite article, personal pronouns, the verbs to have (haben) and to be (sein), plurals of nouns.

UNIT-III **9 Hrs**

IN DER STADT: Getting around a town and asking for the way, giving directions, indefinite articles, negation with kein, imperative forms.

UNIT-IV **9 Hrs**

GUTEN APPETIT!: Talking about food, planning a trip to the grocery store, food and meals and talking about it, verbs that require the accusative

UNIT-V **9 Hrs**

TAG FÜR TAG: Telling and understanding time, talking about one's family, possessive articles (mein, dein) and modal auxiliaries (müssen, können, wollen).

Course Outcomes:

1. Basic Reading skills
2. Basic Writing skills with basic Grammar
3. Speaking skills and to do advance German Course
4. Understanding basic German for Daily Communication
5. Awareness of European Union and opportunities in Europe

Textbooks:

A1-German Level- Netzwerk A1 Book- Prescribed by International Institute- Goethe Institute Delhi.

TAUT1202C **HINDI** **L T P C**
3 0 0 3

Course Description:
बच्चों में हिन्दी पढ़ने, लिखने की क्षमता बढ़ाना । आपस में अपनी भावनाओं को प्रकट करने की क्षमता बढ़ाना मुख्य उद्देश्य है।

Course Objectives:
1. संज्ञा, संज्ञा के प्रकार,सर्वनाम, सर्वनाम के प्रकार, क्रिया, क्रिया के प्रकार, क्रर्शेषण, क्रर्शेषण के प्रकार
2. लिंग, वचन, काल, वाच्य, अर्थ, विलोम शब्द, शब्दों का वाक्य में प्रयोग
3. हिंदी सीखने की आर्श्यकता बताते हुए छोटी बहन के नाम पर पत्र।, विहार यात्रा का वर्णन करते हुए अपने ममत्र के नाम पत्र।, शूल्क भरने के लिए पैसे भेजने अपने क्रपता के नाम पत्र।
4. कफन - प्रेमचंद, वापसी - उषा प्रियम्वदा यशपाल – परदा
5. यरकान्त त्रिपाठी निराला - जूही की कली,महादेवी वर्मा - मैं नीर भरी दुख की बदली, सुममत्रानंदन पंत - भारत माता

UNIT-I **9 Hrs**
1. संज्ञा, संज्ञा के प्रकार
2. सर्वनाम, सर्वनाम के प्रकार
3. क्रिया, क्रिया के प्रकार
4. विशेषण, विशेषण के प्रकार

UNIT-II **9 Hrs**
1. लिंग,वचन, काल,कारक
2. अर्थ, विलोम शब्द
3. शब्दों का वाक्य में प्रयोग

UNIT-III (पत्र लेखन) **9 Hrs**
1. हिंदी सीखने की आवश्यकता बताते हुए छोटी बहन के नाम पर पत्र।
2. विहार यात्रा का वर्णन करते हुए अपने मित्र के नाम पत्र।
3. शूल्क भरने के लिए पैसे भेजने अपने पिता के नाम पत्र।

UNIT-IV (कहानी और कहानीकार) **9 Hrs**
1. कफन - प्रेमचंद
2. वापसी - उषा प्रियम्वदा
3. यशपाल – परदा

UNIT-V (कवि और कविता) **9 Hrs**
1. सूर्यकांत त्रिपाठी निराला - जूही की काली

2. महादेवी वर्मा - मैं नीर भरी दुख की बदली
3. सुमित्रानंदन पंत - भारत माता

Course Outcomes:

1. बच्चों में पढने का क्षमता बढाना
2. लिखने की क्षमता बढाना
3. बोलने की क्षमता बढाना
4. भाषा के प्रक्रत रुलच उत्पन्न कराना
5. दैनंददन जीर्न में भाषा का प्रयोग करना

Textbooks:

1. हिन्दी व्याकरण
2. विश्वनाथ तिवारी की हिंदी कविता
3. प्रेमचंद की कहानियां

Reference Books:

विविधि प्रकार के कहानी और व्याकरण के किताबें संदर्भ ग्रंथ सूची

1. हिन्दी व्याकरण -कांता रानी मंजूषा,हरदेव बिहारी
2. विश्वनाद प्रसाद तिवारी - हिंदी कविता
3. विश्वनाद प्रसाद तिवारी- आधुनिक हिंदी कविता
4. पुष्पपाल सिंह - समकालीन हिंदी कविता

TAUT1202D **PROFESSIONAL ENGLISH** **L T P C**
3 0 0 3

Course Description:
This course aims to enhance the English language proficiency of engineering students in professional contexts. Through a combination of theoretical knowledge and practical exercises, students will develop their skills in technical writing, oral communication, presentation, and critical thinking. The course will focus on various aspects of professional communication, including report writing, academic writing, technical presentations, and effective communication in interdisciplinary teams. Additionally, students will engage with real-world engineering scenarios to apply language skills in practical contexts.

Course Objectives:
Students undergoing this course are expected to:

1. Develop proficiency in technical writing for engineering reports, research proposals, and documentation.
2. Enhance oral communication skills for effective presentations, meetings, and discussions and thereby improve their employability skills.
3. Improve critical thinking and analytical skills through the evaluation of technical information and arguments.
4. Foster teamwork, collaboration skills in interdisciplinary engineering projects.
5. Develop awareness of cultural and linguistic diversity in professional settings.

UNIT-I **9 Hrs**

Pronunciation: Course techniques include recordings, partner work, group activities and one-on-one instructor feedback. Your speech will become clearer, more fluent and easier to understand. You'll improve your enunciation of individual sounds, intonation, stress patterns, pace and pausing.

UNIT-II **9 Hrs**

Speaking Professionally: You'll build greater confidence through individual work, group interaction and feedback from your peers and instructor. To express yourself more clearly and concisely, whether you are speaking in impromptu situations or making well-planned Presentations. Focus on language that familiarizes you with the use of English in everyday situations and contexts.

UNIT-III **9 Hrs**

Refine Your Grammar: Express yourself more accurately and eloquently by improving your English Grammar. You'll get the strong foundation you need to write and speak more clearly, precisely and persuasively. You'll explore the relationship between words in sentences, and analyse structure and meaning, clarify common problem points and improve punctuation. You'll have the opportunity to practice with your peers and get helpful feedback. You'll also learn what resources are best for ongoing grammar help. You'll apply them to produce effective, concise written work with newfound confidence. You'll express yourself more

clearly and persuasively by using varied, well-structured sentences and placing content more strategically. You'll also develop editing skills to rid your work of errors.

UNIT-IV **9 Hrs**

Writing Essentials – Professional Writing

Improve your written English for personal, professional and academic purposes. You'll refine your sentence structure, punctuation and verb tenses, and eliminate the most common errors that confuse readers. You'll enhance your writing style. Develop editing skills that help you revise your work. Lectures, discussions, e-learning tools and assignments will help you develop the communication skills you'll need in today's business environment.

UNIT-V **9 Hrs**

You'll be equipped to create power packed Power Point Presentations. Be in better stead to introducing yourself. To know the nuances that goes into the presenting of information, and articulating information. Know how to make an impressive introduction. To imbibe Life Skills that is necessary to lead a fruitful and a fulfilling life.

Course Outcomes:

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

1. To understand the importance of Professional English in workplace and learn the correct pronunciation and delivery of speech.
2. To read technical proposals properly and make them to write good technical reports.
3. To achieve better comprehending skills, vocabulary and professional speaking skills.
4. To learn and identify the Common Errors in Writing and Speaking.
5. Acquire digital competence, employment and workplace communication skills.

Textbooks:

1. Technical Communication: Process and Product by Sharon J. Gerson and Steven M. Gerson
2. Engineering Communication: From Principles to Practice by David Ingre, C. O'Brien
3. Technical Writing Basics: A Guide to Style and Form by Brian R. Holloway

Reference Books:

1. The Encyclopaedia Britannica" - A comprehensive general encyclopaedia covering a wide range of topics.
2. The Oxford English Dictionary (OED)" - A comprehensive dictionary of the English language.

	PROGRAMME CORE	L	T	P	C
IMT1501	FUNDAMENTALS OF IMAGING TECHNOLOGY	3	0	0	3

Course Description:

This course provides an in-depth understanding of the fundamental principles and techniques in radiologic technology. Topics covered include electromagnetic radiation, atomic structure, X-ray tube construction and operation, radiation protection, radiographic positioning, and contrast media usage. Through lectures, demonstrations, and hands-on practice, students will develop the knowledge and skills necessary for safe and effective radiologic imaging procedures.

Course Objective:

Students undergoing this course are expected to:

1. To know about the Nature and Properties of Electromagnetic Radiation.
2. To know about the Radioactivity and Radiation Protection.
3. To know about the Radiation Protection and Radiographic Procedures.
4. To understand the key terminologies and components related to Radiation Control and Beam Restriction.
5. To recognize Basic Interactions of X-rays and Gamma Rays.

Unit 1 X-ray Discovery and atomic structure 9hrs

- Introduction, Discovery and Properties.
- Electromagnetic radiation – Introduction, Properties, Wave and Particle Character
- Electromagnetic Spectrum – Ionizing and Non- Ionizing Radiation.
- Structure of an Atom, Nucleus
- Atomic Number (Z)
- Mass Number (A)
- Isotopes, Isobars,
- Ionization and Excitation.

Unit 2 X-ray production, X-ray tube and Grid 9hrs

- Construction and working of diagnostic X-ray tube
- Types (Stationary and rotating anode)
- Thermionic Emission, Space Charge Effect
- Line Focus Principle, Heel Effect
- Filtration (Inherent and Added Filtration)
- X ray Beam Restrictors – Aperture Diaphragm, Cones and Cylinders and Collimators
- Primary Radiation and Secondary Radiation (Scattered and Leakage Radiation)
- Grid and its types

Unit 3 Radioactivity and Attenuation process 9hrs

- Factors affecting the Quality and quantity of the X rays
- Basic Interactions of X rays and gamma rays- Coherent scattering, Photo electric effect, Compton effect
- Attenuation: Linear and Mass Attenuation Coefficient, Half Value Layer (HVL), Tenth Value Layer (TVL)

- Radioactivity – Introduction, Half –life, Units and types of Radioactivity.

Unit 4 Biological Effect of Radiation 9hrs

- Radiation units, Aim of radiation protection
- Justification, Optimization and Limitation (dose)
- International Commission on Radiation Protection (ICRP) and Atomic Energy Regulatory Board (AERB) recommended dose limits
- Principles of Radiation protection – TDS(Time, Distance and Shielding) and Radiation Protective Equipment
- Radiation protection for Personnel, Public and Patient.

Unit 5 Radiography Photography 9hrs

- Introduction, Film, structure and its types
- Intensifying Screen and cassette structure
- Radiographic Positioning
- Basic Terminologies
- Surface, 3 Planes (axial, coronal and sagittal)
- Radiographic Procedures - Contrast Media and its Classification
- Contrast reactions and Emergency Drugs used.

Course learning outcomes: At the end of the course the students should be able

1. To know about the Electromagnetic Radiation
2. To know about the Atomic Structure and Familiarity with X-Ray Tube Construction and Operation
3. To understand the basic Interactions of X-rays and Gamma Rays
4. To understand the Radioactivity and Radiation Protection
5. To know the basic Principles of Radiation Protection and Radiographic Procedures

Text Book

1. Basic Radiological Physics- K Thayalan.
2. The Physics of Radiology and Imaging – K Thayalan.
3. Textbook of Radiology for Residents and Technicians- 5th edition – Satish K Bhargava, Sumeet Bhargava.

Reference Book:

1. Christensen's Physics of Diagnostic Radiology.

II YEAR
III SEMESTER

3rd semester						
Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per week**
		L	**T**	**P**		
IMTT2501	General physics and radiation physics	3	1	0	4	4
IMTT2502	Radiographic Equipment	3	1	0	4	4
IMTT2503	Radiobiology and Radiation safety	3	1	0	4	4
IMTL2501	Clinical Skills -I	0	0	12	6	12
TAUT2101	University Core - III	3	0	0	3	3
TAUT2201	University Elective - III	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Library	0	0	0	0	1
--	Seminar	0	0	0	0	1
--	Self-Learning	0	0	0	0	1
TOTAL		**15**	**3**	**12**	**24**	**36**

University Electives-III

S. No	Name of the Course	Host Department
1	Community Engagement	School of Social Sciences
2	Clinical Nutrition	School of Health Sciences – BMS & GMB
3	Emotional Intelligence & Mental Health	School of Health Sciences – Psychology
4	Human Rights	School of Social Sciences
5	Industry 4.0	School of Technology – CSE
6	Medical Terminology	School of Health Sciences – BMS & GMB
7	Social Network Analysis	School of Health Sciences – PH
8	Antibiotic Resistance & Biomedical Waste Management	School of Health Sciences – AHS
9	Behaviour Change Communication	School of Health Sciences – PH
10	Disability Management	School of Health Sciences – Psychology
11	Disaster Management	School of Social Sciences
12	Human Values & Professional Ethics	School of Social Sciences
13	Infection Prevention & Control	School of Health Sciences – AHS
14	NSS & Youth Development	School of Social Sciences

IMTT2501	GENERAL PHYSICS AND RADIATION PHYSICS PAPER 1	L 3	T 1	P 0	C 4

Course Description:

This course covers the general physics and radiation physics, including the basic concept, atomic structure. It also explores the electromagnetic induction with the radioactivity and its classification and also the principle, construction and working of radiology diagnostic equipment's.

Course Objective:

Students undergoing this course are expected to:

1. To understand the general radiation physics related to Medical Imaging Technology.
2. To learn about the application of equipment Medical Imaging Technology.
3. To know the function of various instruments and high tech machines used in radiology.
4. To study the about the basic interaction of x-ray with the matter and the History aspects of Radioactivity and the classification.
5. To comprehend the principle, construction and working of electromagnetic induction.

Unit 1 Basic concept and atomic structure **12 hrs**

- Basic concepts of power, work, force, energy.
- Einstein's formula, Units, and measurements.
- Temperature and heat, SI units of above parameters,
- Electronics, Electricity & Magnetism, Electromagnetic waves
- Atomic structure Nucleus, electron, proton and neutron.
- Atomic Number Mass Number.
- Orbital or energy level periodic table
- Isotopes-Isobars-Isotones
- Ionization and Excitation.

Unit 2 Electromagnetic induction **12 hrs**

- Electric charges ,Electric induction, Electric potential
- Capacitance and capacitors
- Electrical energy and power ,
- Unit of current-resistance, Ohm's law - circuit laws,
- Heating effect of current,
- Laws of mutual induction and self-induction.
- Types of current - Alternating and Direct current.

Unit 3 Radioactivity **12 hrs**

- Natural and artificial radioactivity
- Alpha decay-Beta decay and spectra gamma emission positron decay electron capture.
- Half-life Unit of activity-specific activity.

- Production of radio isotopes and its methods.

Unit 4 Interaction of x-rays and gamma rays with matter 12 hrs

- Coherent scattering, Photo electric absorption, Compton scattering, Pair production and Photoelectric disintegration,
- Half value layer.
- X-Ray transmission through medium.
- Linear and Mass attenuation coefficients, HVT (Half value thickness) and TVT (Tenth value thickness).

Unit 5 Physics of diagnosis radiology 12 hrs

- X-ray Tube (Stationary and Rotating anode x ray tube)
- X-Ray generators and circuits-Transformer, Auto transformer,
- Semiconductor, diode and Rectifier(Half wave and Full wave Rectifier)
- kV circuit, mA or Filament Circuit, Generator – 3 phase,6 and 12 pulse circuits
- High Frequency generator, Exposure time, Quality and Intensity of x rays
- Factors affecting Quality and Intensity of x rays, X-ray table.
- X-Ray Grids /Bucky Scattered Radiation- Control of Scattered Radiation
- Grid principle, structure, types of Grids
- Potter Bucky Diaphragm, Grid ratio.
- X-Ray Cassettes & Intensifying screen.

Course Learning Outcome:

At the end of the course, students should be able.

1. Understand the basic concepts of Interactions of Radiation with Matter.
2. Identify and Control Scattered Radiation.
3. Understand Operate Diagnostic Radiology Equipment.
4. Understand and Perform accurate measurements and calculations involving units of exposure parameters.
5. Understand and Apply safety protocols and best practices in the use of radiologic equipment to protect patients and healthcare workers.

Text books:

1. The Physics of Radiology and Imaging – k Thayalan.
2. Textbook of Radiology for Residents & Technicians – Satish K Bhargava, Sumeet Bhargava.
3. Christensen's Physics of Diagnostic Radiology – Christensen.
4. Physics for Radiography - Hay and Hughs.

Reference books:

1. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.
2. Basic Medical Radiation physics – Stanton.

IMTT2502	RADIOGRAPHIC EQUIPMENT PAPER 2	L 3	T 1	P 0	C 4

Course Description:

This course provides an in-depth understanding of the history and production of X-rays, the construction and operation of X-ray tubes, and the principles and functioning of various radiologic equipment. And also about the principles, construction, and working of fluoroscopic equipment, as well as the foundational principles of Computed Radiography (CR), Digital Radiography (DR), and Picture Archiving and Communication Systems (PACS). The course also covers special radiological equipment and delves into the principles of tomography and Computed Tomography (CT).

Course Objective:

Students undergoing this course are expected to:

1. To understand the Equipments used in Modern Imaging.
2. To know the Medical radiation related instrument and applying techniques.
3. To understand the recent advancements in diagnostic radiology.
4. To comprehend the detailed types of Special Radiological Equipment.
5. To know about the Principle of tomography and CT.

Unit 1 X-ray Machines **12 hrs**

- X-Ray tube, Historical aspects ,Early X-Ray tubes(Coolidge tubes)Construction and working of X-Ray tubes
- Requirements for X-Ray production (electron source, target and anode material),
- Thermionic Emission, Space charge effect
- Line focus principle, Anode heel effect
- Filtration (Inherent and added Filtration), Anode Angulation
- Tube envelope and Tube housing
- Advantage of Rotating Anode X ray tube over Stationary Anode X ray tube
- Heat dissipation methods and Interlocking circuits.

Unit 2 Fluoroscopic unit **12 hrs**

- Fluoroscopic principle
- Direct fluoroscopy and indirect fluoroscopy
- Image intensifier tubes, principle construction and working
- Cine fluorography-mode of operation
- Automatic brightness control
- tilting tables, over and under couch tubes
- Safety features and Mobile Fluoroscopy C –arm and its applications.

Unit 3 Computer and digital system with film archiving **12 hrs**

- Computed Radiography Equipment parts, Principle of imaging, Applications, Advantages & disadvantages.
- Digital Radiography: Principle
- Photostimulable phosphors
- Image acquisition Equipment parts Advances-imaging

- Advantages & disadvantages.
- Film Archiving Systems: PACS
- Teleradiology
- Hospital information System
- Radiology Information System

Unit 4 Special Equipment of Radiology 12 hrs

- Instrumentation of Mobile X-ray unit
- Portable X-ray unit
- Capacitor discharge unit
- Advantages and its limitations
- OPG dental X-ray unit
- Wall mounted and portable Dental Units
- Mammography Instrumentation
- Image acquisition,
- Conventional, Digital Mammo studies and Mammo-tomogram.

Unit 5 Basics of tomography and computer tomography 12 hrs

- Theory of Tomography
- multi section radiography
- Tomography equipment
- Basics requirements and controls, attachments
- Computed Tomography Scanning Principle,
- Types of Movements and applications
- Effect on image of variation in Focus object Distance
- Object Film Distance, exposure angle and tube movement pattern.

Course learning outcomes:

At the end of the course the students should be able

1. Understand the history, production of x-ray and x-ray tube construction.
2. To know about the principle, construction and working of fluoroscopic equipment.
3. Understand the Principles of CR, DR and PACS system.
4. Understand the principles and operation of CR, DR, and PACS
5. Understand the knowledge about the principles of tomography and CT.

Text book:

1. Christensen's Physics of Diagnostic Radiology – Christensen.
2. The Physics of Radiology and Imaging – k Thayalan.
3. Basic Medical Radiation physics – Stanton.
4. Textbook of Radiology for Residents & Technicians – Satish K Bhargava, Sumeet Bhargava.
5. Quality Assurance Workbook for Radiographers & Radiologic Technologists, Peter J. Lloyd, Non serial Publication, WHO.

Reference books:

1. X-Ray Equipment Maintenance and Repairs Workbook for Radiographers and Radiological Technologists Produced by the WHO Dept. of Essential Health Technology Series. Ian R. McClelland, Publisher- WHO, 2004.
2. Physics for Radiography - Hay and Hughs.
3. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.

IMTT2503	RADIOBIOLOGY AND RADIATION SAFETY PAPER 3	L 3	T 1	P 0	C 4

Course Description:

This course provides comprehensive training in radiation safety and protection principles, focusing on monitoring devices, radiation quantities and units, biological effects of radiation, and safety guidelines. Additionally, the course covers radiation protection principles, workload calculations in radiology, and the responsibilities and safety guidelines set by regulatory bodies to ensure safe work practices in diagnostic radiology.

Course Objective:

Students undergoing this course are expected to:

1. To understand the importance of radiation monitoring devices and radiation safety.
2. To learn about the protection of patient, occupational worker and general public.
3. Gain knowledge about different radiation quantities and their units of measurement.
4. To comprehend the Regulation of radiation practices according to internationally accepted method
5. To understand the responsibilities of regulatory bodies, apply safety guidelines, and implement safe work practices in diagnostic radiology.

Unit 1 Radiation Quantities and Units **12 hrs**

- Radioactivity, Types, unit and Example Sources of radiation
- Natural radioactive sources -cosmic rays, terrestrial radiation and Man-made radiation sources.
- Units of radiation Activity, Kerma, Exposure
- Absorbed dose, Equivalent Dose and Effective Dose
- Occupational Exposure Limits, Dose limits to public.

Unit 2 Biological effects of Ionizing Radiation **12 hrs**

- Ionization, Excitation, Free radical formation
- Action of radiation on cell and Chromosomal aberration
- Effect of whole body and acute irradiation
- Somatic effects and hereditary effects
- Stochastic and deterministic effects
- Acute exposure and chronic exposure.

Unit 3 Radiation detection and measurements **12 hrs**

- Ionization of gases
- Fluorescence and Phosphorescence
- Ionization Chambers, Proportional counters
- G.M counters, Scintillation detector
- Dosimeter Film Badge, Thermo luminescent Dosimeter
- Pocket dosimeter and Radiation survey meter.

Unit 4 Radiation Protection **12 hrs**

- Radiation protection of self and patient

- Principles of radiation protection
- Shielding calculation and radiation survey,
- ALARA, Personnel dosimeters (TLD and film badge)
- Occupational exposure
- Philosophy of Radiation protection,
- Effects of time, Distance & Shielding
- Calculation of Workload, Good work practice in Diagnostic Radiology
- Planning consideration for radiology including Use factor, occupancy factors, and different shielding material.

Unit 5 Regulatory bodies and Responsibilities 12 hrs

- ICRP (International Commission on Radiation Protection)
- AERB(Atomic Energy Regulatory Board)Role of Radiographer /Technologist in Planning, QA & Radiation Protection in radiology Department.
- Setting up of a new X-Ray unit (Planning of X-ray rooms, dark rooms ,Inspection of X-Ray installations)
- ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy, and radiation protection
- Shielding materials, Guidance level for patients dose reduction in radio-diagnosis.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Identify the area and personnel monitoring devices.
2. Know about the radiation quantities and its unit.
3. Understanding the biological effects and its classification of radiation.
4. Knowledge of radiation protection principles, their application and work load calculation in radiology.
5. Understand the responsibilities and safety guideline by regulatory bodies and apply safe work practice in diagnostic in diagnostic radiology.

Text book:

1. Textbook of Radiological Safety – K. Thaylan (2010) Jaypee Brothers and medical Publishers, New Delhi.
2. The Physics of Radiology and Imaging – k Thayalan.
3. Quality Control in Diagnostic Imaging J.E.Gra.

Reference book:

1. Radiologic science for technologist – 9th edition (2008) Stewart Carlyle Bushong, Mosby Elsevier, UK

PRACTICAL SYLLABUS

		L	T	P	C
IMTL2501	**CLINICAL SKILLS I**				
	PAPER-IV	**0**	**0**	**12**	**6**

Course Description:

This course provides an in-depth understanding and practical skills in radiologic technology, focusing on both traditional and advanced imaging modalities. Students will explore the construction and working principles of various X-ray tubes, fluoroscopic equipment, and digital radiography systems. The course also covers image processing techniques, radiation protection, and the operation of special radiographic equipment. Practical demonstrations and hands-on exercises will enhance learning, ensuring students are well-equipped to handle modern radiologic technology and adhere to safety standards.

Course Objective:

Students undergoing this course are expected to:

1. To understand the part, construction and working principle of fluoroscopic equipment, including cine fluoroscopy and mobile C-arm system.
2. To gain proficiency in image processing techniques, including contrast adjustment, cropping, image sharpness and marker annotation.
3. To acquire basic knowledge and handling technique for portable, mobile, dental and mammography machine.
4. To learn the principle, construction and working of tomography and computer tomography.
5. To develop skills in workload calculation and understanding the guideline and responsibilities set by regulatory bodies.

Unit 1 **X-Ray Tubes** **30 hrs**

- Demonstration of stationary and rotating anode x-ray tube part
- Stationary anode copper bar with tungsten
- Rotating anode, tungsten rotor discs with beveled edges and target embedded on to it and filament serves as cathode.
- Demonstration of grid and cassettes with and without intensifying screen.

Unit 2 **CR X-ray unit** **30 hrs**

- Demonstration of the computer radiography along the X-ray unit
- reading out process of the CR cassette
- Image processing techniques
- Digital radiography detectors and its types
- Construction and working principle of the digitalized radiography.

Unit 3 **Fluoroscopic unit** **30 hrs**

- Basic practical skill about old method or manual method of direct vision and indirect fluoroscopy.
- Fluoroscopic equipment parts, construction, and working principle.

- Equipment construction, tilting table facilities, over couch and under couch tube.
- More detailed knowledge about the principle behind the cine fluoroscopy, mobile c-arm fluoroscopy and more about machine knobology for post processing.

Unit 4 Special Radiographic Equipment 30 hrs

- Other special radiography modalities such as portable and mobile machines, dental and mammography.
- Basic knowledge about the machines and the handling techniques of the special radiological equipment.
- Basic skill about the tomography principles and the entire principle, construction, working of computer tomography

Unit 5 Radiation Protection 30 hrs

- While handling the patient more concern about radiation protection for them, public and self.
- Basic practical knowledge about work load calculation and good work practice. Knowledgeable about regulatory bodies etc.
- Demonstration of the computer radiography along the X-ray unit, reading out process of the CR cassette and the image processing techniques like contrast adjustment, cropping the image, image sharpness, marker annotation etc.
- And in the digital radiography knowledge about the detectors and its types and the construction and working principle of the digitalized radiography.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Identify and handle special Radiographic Equipment.
2. Evaluate and utilize Digital Radiography.
3. Apply the Image processing technique.
4. Understand the operating system of fluoroscopic equipment.
5. Evaluate and perform workload calculation.

Text book

1. Basic Radiological Physics- K Thayalan.
2. The Physics of Radiology and Imaging – K Thayalan.
3. Textbook of Radiology for Residents and Technicians- 5th edition – Satish K Bhargava, Sumeet Bhargava.
4. Quality Control in Diagnostic Imaging J.E.Gra.

Reference Book

1. X-Ray Equipment Maintenance and Repairs Workbook for Radiographers and Radiological Technologists Produced by the WHO Dept. of Essential Health Technology Series. Ian R. McClelland, Publisher- WHO, 2004.
2. Physics for Radiography - Hay and Hughs.
3. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.

2nd YEAR: III SEMESTER

UNIVERSITY CORE - III

TAUT2101	**HEALTH AND WELLNESS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Description:

The course is designed to help students to learn more about human health. This course helps to understand how current health knowledge helps to make future human beings even stronger and healthier.

Course Objectives:

1. To help understand the importance of a healthy lifestyle
2. To familiarize students about physical and mental health
3. To create awareness of various lifestyle related diseases
4. To understand the multiple dimensions of health and wellness, including physical, mental, emotional, social, and environmental aspects
5. To Equip students with the knowledge and skills to develop, implement, and maintain healthy lifestyle practices

UNIT-I **9 Hrs**

Define and differentiate health and wellness, Importance of health and wellness, Basic concepts of genetics, including genes, DNA, chromosomes, and inheritance patterns. Genetic factors affecting macronutrient (carbohydrates, proteins, and fats) digestion. Genetic variations associated with micronutrient (vitamins and minerals) digestion, malnutrition, under nutrition and over nutrition

UNIT-II **9 Hrs**

Brief overview of Body systems – Skeletal system, Muscular system, Circulatory System, Lymphatic system, cardiovascular system, Respiratory system, Nervous system (Central nervous system, Peripheral nervous system, Somatic and Autonomic nervous systems), Digestive system, Urinary system, Endocrine system, Reproductive system, Integumentary system

UNIT-III **9 Hrs**

Sedentary lifestyle and its risk of disease, Lifestyle Disease and its Management, Factors affecting mental health - Stress, anxiety, and depression, Identification of suicidal tendencies, Substance abuse (Drugs, Cigarette, Alcohol), de-addiction, counselling and rehabilitation. Four Vital signs- Pulse rate, Respiratory rate, Blood pressure, Body temperature, other measurements-Body mass index, Waist-Hip Ratio, Basal Metabolic Rate

UNIT-IV **9 Hrs**

Risk factors and Pathology of the following Diseases and their Management –

- Diabetes
- Hypertension
- Coronary Heart Disease

- Obesity
- Osteoporosis
- Osteoarthritis
- Rheumatoid-arthritis
- Cancers (Blood, Breast, Brain, Lung, Liver and Kidney)
- Polycystic ovarian syndrome (PCOS)
- Pain (including Low Back pain)

UNIT-V **9 Hrs**

Introduction to Functional Foods; Nutrients and Bioactive Compounds in Functional Foods; Functional Foods for Cardiovascular Health, Weight Management, Immune Function, Cognitive Health, Chronic Disease Prevention; Yoga and its importance in Health and Wellness

Course Outcomes:

Upon successful competition of the course the student would be able to -

1. Understand the relationship between fitness and wellness
2. Gain knowledge regarding various aspects and its practical implication for Wellbeing.
3. Learn about behavior change theories and strategies for promoting healthy habits such as exercise, stress management, and nutrition
4. Study techniques for setting realistic health goals, creating wellness plans, and overcoming barriers to maintaining a healthy lifestyle.
5. Learn about the principles of a balanced diet, regular physical activity, mental health management, social relationships, and environmental factors that influence health

Textbooks:

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.
2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
3. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve WellBeing by Nashay Lorick, 2022.

Reference Books:

1. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018.
2. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013.

UNIVERSITY ELECTIVE - III

TAUT2201	COMMUNITY ENGAGEMENT	L	T	P	C
		3	0	0	3

Course Description:

This course provides degree-seeking students with an array of opportunities to engage in an immersive community service-learning experience. It further helps to understand the resources, optimize the recourses in future days, and address the gaps in the communities.

Course Objectives:

Students undergoing this course are expected to:

1. Understand community issues, needs, problems, strengths and recourses
2. Demonstrate the ability to work with a diverse population
3. Formulate more precise personal and professional life goals
4. Demonstrate the ability to communicate effectively and collaborate with institutions and public
5. Demonstrate the ability to take initiative, follow directions, lead, and solve problems

UNIT-I Social Structure **5 Hrs**

Concept of Society; Community; Association and Institution; Individual and Society; Social Groups- Meaning, Characteristics and Classification; Social Process; Social Change; Structure and Characteristics of urban, rural and tribal communities.

UNIT-II Social Organisation and Disorganisation **5 Hrs**

Social Organisation- meaning, elements and types; Voluntary Associations; Social System- definition, types and roles; Social Control- meaning, aims and process of social control; Social norms, morals and values; Social Disorganisation- definition, causes, control and planning.

UNIT-III Social Problems and Welfare State **8 Hrs**

Social Problems- Poverty, Housing, food supply, illiteracy, Prostitution, dowry, child labour, child abuse, delinquency, crime, substance abuse, HIV/ AIDS, Covid-19; Venerable Group- elderly, handicapped, minority and another marginal group; Fundamental rights of individual, women and children, NITI Aayog, Ministry of Social Justice & Empowerment, Ministry of Rural Development, Ministry of Tribal Affairs, Ministry of Health & Family Welfare, and Role of Local Bodies for transformation; Corporate Social Responsibility; Social Work.

Proposed Field activities: Field visit- Interaction with Local Self Government, Visit of Gram Panchayat & Staff, Socio-Economic Survey *(5 hours/ one day).*

UNIT-IV Communication Strategies and Community Engagement **18 Hrs**

Social Behaviour Change Communication (SBCC); Focused Group Discussion; SWOT analysis; Participatory Learning Action.

Proposed Field activities: Meeting, Mobilizing, Transect Walk, Identification of Natural Leaders, Timeline, Mapping, Case Study, Documentation; Outreach- Special Camp Viz., Health Education, Medical Camp, Environment Protection, Sustainability, Technology & Innovation, Nutrition, Swachh Bharat (*15 Hours/ 4 days).*

UNIT-V Sustainable Development Goals 2023 **9 Hrs**

Millennium Development Goals; Sustainable Development Goals (SDGs) 2030- 17 Goals; SDG Pyramid; Localizing SDGs; Gram Panchayat Development Plan (GPDP).

Proposed Field activities: Mapping the activities with SDG 2030 (6 Hours/ 1 day).

Course Outcomes:

By the end of the course, students should be able to:

1. Understand and apply the concept related to community and social structure.
2. Develop the ability to involve and work with the social system.
3. Understand various social problems emerging in society and solve them.
4. Apply SBCC tools and SWOT analysis.
5. Appreciate Sustainable Development Goals and contribute beyond SDG 2030.

Textbooks:

1. Krishna Kant Singh & Ram Shankar Singh, (2011), Social Work and Community Development.
2. Makara Rumley, (2020), Modern-Day Strategies for Community Engagement: How to Effectively Build Bridges Between People and the Bottom Line.

Reference Books:

1. Hall, B. L., Tandon, R. & Tremblay, C. (2015). Strengthening Community University Research Partnerships: Global Perspectives.
2. http://unescochaircbrsr.org/unesco/pdf/UNESCO%20Book%20Web_with%20BookCovers_Aug202015_FINAL.pdf
3. GUNi (Ed.). (2014). Knowledge, Engagement and Higher Education: Contributing to Social Change (Higher Education in the World 5). Hampshire (UK)/New York (USA): Palgrave Macmillan.
4. UNESCO Chair in Community Based Research & Social Responsibility in Higher Education (2015). Institutionalizing Community University Research Partnerships: A User's Manual. http://unescochair-cbrsr.org/unesco/pdf/CURP_Guidelines.pdf
5. Vallaeys, F. (2014). University Social Responsibility: A Mature and Responsible Definition. In GUNi (Ed.), Knowledge, Engagement and Higher Education: Contributing to Social Change (Higher Education in the World 5) (pp. 88-96).

TAUT2202 **CLINICAL NUTRITION** **L T P C**
3 0 0 3

Course Description:
Upon completion of the course, students will be prepared to apply their knowledge of clinical nutrition to promote health and manage diseases effectively, contributing to multidisciplinary healthcare teams. This course is essential for healthcare professionals, nutritionists, dietitians, and anyone interested in understanding the role of nutrition in clinical care and wellness promotion.

Course Objectives:
To enable the students to:

1. Develop proficiency in conducting comprehensive nutritional assessments using various methods such as dietary recall, biochemical tests, and anthropometric measurements.
2. Understand the impact of diet on the prevention, management, and progression of chronic diseases commonly encountered in clinical practice, including diabetes, cardiovascular diseases, and obesity.
3. Acquire skills in designing individualized nutrition plans tailored to specific patient needs and health conditions across different life stages (e.g., pediatric, geriatric, maternal).
4. Evaluate ethical issues related to nutritional counseling, respecting cultural dietary practices, and providing evidence-based dietary recommendations within clinical settings.
5. Critically appraise current research and controversies in clinical nutrition, integrating evidence-based guidelines into decision-making processes to optimize patient outcomes.

UNIT-I **9 Hrs**

Introduction to nutrition - Food as source of nutrients, functions of food, definition of nutrition, nutrients & energy, adequate, optimum & good nutrition, malnutrition, Effect of cooking & heat processing on the nutritive value of foods, role of nutrition in prior pregnancy, during pregnancy, during lactation, in adolescence, Fitness, Athletics & Sports

UNIT-II **9 Hrs**

Food guide - Basic five food groups How to use food guide (according to R.D.A.) Interrelationship between nutrition & health: - Visible symptoms of good health, Use of food in body - Digestion, Absorption, transport & utilization, Role of fibres in human nutrition. malnutrition, Protein energy malnutrition.

UNIT-III **9 Hrs**

Biomolecules as a nutrient: Carbohydrates: Functions, classification, food sources, storage in body. Fats & oils: composition, saturated and unsaturated fatty acids, classification, food sources, function of fats. Proteins - composition, sources, essential & non-essential amino acids, functions, Protein deficiency.

UNIT-IV **9 Hrs**

Water minerals and Vitamins: Water - as a nutrient, function, sources, requirement, water balance & effect of deficiency. Minerals - macro & micronutrients. - Functions, sources. Bioavailability and deficiency of Calcium, Iron, Iodine, Sodium & Potassium, Vitamins (water & fat soluble) - definition, classification & functions.

UNIT-V **9 Hrs**

Role of nutrients in disease management: Importance of nutrition in kidney and liver diseases with respect to their nutritional value. Case study- diabetes, cancer, Osteoporosis, Heart related diseases, role of Antioxidants as a nutrient in disease control.

Course Outcomes:

Upon completion of the course, the student shall be able to

1. Demonstrate proficiency in conducting thorough nutritional assessments using a variety of methods, interpreting results, and applying findings to develop dietary recommendations.
2. Apply knowledge of macro and micronutrients, dietary supplements, and hydration to design effective nutrition plans for individuals with diverse health needs and conditions.
3. Implement dietary interventions that contribute to the prevention, management, and improvement of chronic diseases, integrating nutritional strategies into comprehensive healthcare plans.
4. Evaluate and address ethical considerations in nutritional counseling, respecting cultural diversity and individual preferences while adhering to professional standards and evidence-based practices.
5. Critically analyze current research literature in clinical nutrition, utilizing evidence-based guidelines to make informed decisions and enhance patient outcomes in clinical settings.

Textbooks:

1. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy, 9thedn, W.B. Saunders Company Pennsylvania, 2000.
2. Davidson S, Passmore R, Breck JFT. Human Nutrition and Dietetics, The English Language Book Society and Churchill Livingston, 1975.

Reference Books:

1. Thomas B. Manual of Dietetic Practice. Blackwell Scientific Publications, Oxford, London, 1988.
2. Robinson CH. Normal and Therapeutic Nutrition. Oxford Publishing Co, Bombay, 1972.

TAUT2203 EMOTIONAL INTELLIGENCE AND MENTAL HEALTH

L	T	P	C
3	0	0	3

Course Description:

This course will explore the relationship between emotional intelligence and mental health. Students will learn about the importance of emotional intelligence in promoting positive mental health, and will develop skills in recognizing and regulating emotions, managing stress, and building resilience. The course will cover topics such as emotional intelligence theories, emotional regulation strategies, mindfulness, self-compassion, and the impact of emotions on mental health.

Course Objectives:

By the end of this course, students will be able to:

1. Understand the role of emotional intelligence in mental health
2. Develop skills in recognizing and regulating emotions
3. Understand the impact of stress on mental health and develop strategies for managing stress
4. Understand the importance of self-compassion in promoting positive mental health
5. Develop critical thinking and analytical skills in relation to emotional intelligence and mental health

UNIT-I **9 Hrs**

Introduction to Emotional Intelligence and Mental Health; Definition and history of emotional intelligence, the role of emotional intelligence in mental health, Professional organizations and ethical codes related to emotional intelligence

UNIT-II **9 Hrs**

Theoretical Perspectives on Emotional Intelligence; Ability model of emotional intelligence, Trait model of emotional intelligence, Mixed model of emotional intelligence, Mindfulness and Mental Health, Mindfulness and Mental Health.

UNIT-III **9 Hrs**

Stress and Mental Health, Resilience and Mental Health; The impact of stress on mental health, Stress management techniques (e.g., relaxation techniques, time management, exercise) Definition and benefits of resilience, Factors that contribute to resilience, Building resilience in oneself and others.

UNIT-IV **9 Hrs**

Self-Compassion and Mental Health, Emotions and Relationships; Definition and benefits of self-compassion, Practice of self-compassion, Relationship between self-compassion and mental health, Emotions and Relationships

UNIT-V **9 Hrs**

Emotional Intelligence in the Workplace, Ethics and Emotional Intelligence; Emotional intelligence and job performance, the role of emotional intelligence in leadership, Emotional

intelligence training in the workplace, Ethical issues related to emotional intelligence, Professional codes and standards related to emotional intelligence

Final Project Presentations

Students will present their final projects, which may include research papers, case studies, or other projects related to emotional intelligence and mental health.

Course Outcomes:

1. Able to provide an overview of emotional intelligence and mental health
2. Will understand the importance of emotional intelligence
3. The impact of stress on mental health, Stress management techniques
4. Relationship between emotional intelligence and mental health
5. Understand the importance of Emotional Intelligence in the workplace.

Textbooks:

1. Neff, K. (2011). Self-compassion: Stop Beating Yourself Up and Leave Insecurity Behind. HarperCollins.
2. Goleman, D. (2007). Emotional Intelligence (10th ed.). Bantam Books.

Reference Books:

1. Covey, Stephen R., author. (2020). The 7 habits of highly effective people: powerful lessons in personal change. New York :Simon & Schuster.
2. Tolle, E. (2016). The power of now: A guide to spiritual enlightenment. Yellow Kite.

TAUT2204 **HUMAN RIGHTS** **L T P C**
3 0 0 3

Course Description:

This course offers a comprehensive introduction to the field of human rights, exploring the historical development, philosophical foundations, and contemporary issues surrounding the protection and promotion of human rights globally. Students will engage with key concepts, major international human rights instruments, and the roles of various actors in the human rights landscape.

Course Objectives:

This course is intended to prepare the students to

1. Know Human Rights, its need importance, and kind of rights
2. Understand the Human Rights of vulnerable groups
3. Identify and analyze key international human rights documents and treaties.
4. Know about the institutions enforcing the Human Rights
5. Understand the violations of Human Rights and the safeguards available to citizens.

UNIT-I Concept of Human Rights – Indian and International Perspectives **5 Hrs**

a. Evolution of Human Rights
b. Definitions under Indian and International documents

UNIT-II Broad classification of Human Rights and Relevant Constitutional Provisions. - **11 Hrs**

c. Right to Life, Liberty and Dignity
d. Right to Equality
e. Right against Exploitation
f. Cultural and Educational Rights
g. Economic Rights
h. Political Rights
i. Social Rights

UNIT-III Human Rights of Women and Children **11 Hrs**

a. Social Practice and Constitutional Safeguards
b. Female Foeticide and Infanticide
c. Physical assault and harassment
d. Domestic violence
e. Conditions of Working Women

UNIT-IV Institutions for Implementation **9 Hrs**

a. Human Rights Commission
b. Judiciary

UNIT-V Violations and Redressal **9 Hrs**

c. Violation by State
d. Violation by Individuals

e. nuclear weapons, bio war and terrorism
f. Safeguards.

Course Outcomes:

After the successful completion of this course the students will be able to

1. Know about Human Rights, its need importance and kind of rights
2. Understand the Human Rights of vulnerable groups
3. Know about the institutions enforcing the Human Rights
4. Understand the violations of Human Rights and the safeguards available to citizens.
5. Develop critical thinking and analytical skills by examining case studies and current events.

Textbooks:

1. Human Rights in India: Historical, Social and Political Perspectives (Law in India) Hardcover – Illustrated by Chiranjivi J. Nirmal (Author)
2. History of Human Rights, Narrated by Andrea Giordani

Reference Books:

1. The Universal Declaration of Human Rights- UNO publication
2. Making Sense of Human Rights- by James Nickel.
3. The Idea of Natural Rights- by Brian Tierney.
4. The Law of Peoples- by John Rawls.
5. On Human Rights. - by James Griffin.
6. Human Rights: Contemporary Issues by V.K. Ahuja
7. Human Rights, M Girija, S Chand Edu tech Pvt. Ltd.

TAUT2205 **INDUSTRY 4.0** **L T P C**
3 0 0 3

Course Description:
The Industry 4.0 aims to the "smart" and connected production systems that are designed to sense, predict, and interact with the physical world, so as to make decisions that support production in real-time. In manufacturing, it can increase productivity, energy efficiency, and sustainability.

Course Objectives:
The objective of this course is to make students:

1. To impart basic idea in Industry 4.0.
2. To provide students with good depth of knowledge of designing Industrial 4.0 Systems for various application.
3. To learn the artificial intelligence and machine learning techniques/ tools in health care.
4. To understand the bigdata technology and its applications in health care.
5. To learn the design and analysis of Industry 4.0 systems for healthcare applications.

UNIT-I **9 Hrs**

Introduction: Introduction, Historical Context, General framework, Application areas, Dissemination of Industry 4.0 and the disciplines that contribute to its development, Artificial intelligence, The Internet of Things and Industrial Internet of Things, Additive manufacturing, Robotization and automation, Current situation of Industry 4.0.

UNIT-II **9 Hrs**

Cyber Physical System: Introduction to Cyber Physical Systems (CPS), Architecture of CPS-Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain.

UNIT-III **9 Hrs**

Artificial Intelligence & Machine Learning: Artificial Intelligence: Artificial Intelligence (AI) – What & Why? History of AI- Foundations of AI, the AI Environment, Application Domains and Tools.

Machine Learning- Introduction–Definition–Types of Machine Learning–Supervised, Unsupervised, Reinforcement Learning–Algorithms for Machine Learning–Problems solved by Machine Learning-Applications areas of Machine Learning in Health care.

UNIT-IV **9 Hrs**

Big Data & Cloud Computing: What is Big Data, Evolution of Big Data, sources of Big Data? Characteristics of Big Data Vs – Big Data Myths- Data Discovery-Traditional Approach, Big Data Technology: Big Data Technology Process– Applications of Bigdata in Healthcare.

Cloud Computing: Need– Definition – Types of Cloud-Types of Services– SaaS, PaaS, Iaas

UNIT-V **9 Hrs**

Impact of Industry 4.0 on Healthcare Industry: An introduction Discover how Industry 4.0 is impacting and transforming the Healthcare Industry including self-diagnosis systems for patients, real-time diagnosis, 3D printed organs and Internet-of-Medical Things (IOMT).

Course Outcomes:

Upon completion of the course, student will be able to:

1. Understand the basic concepts of Industry 4.0 and the other related fields
2. Analyse, design and develop systems to solve the Engineering problems by integrating thermal, design and manufacturing Domains.
3. Understand the various artificial intelligence and machine learning tools in health care domain.
4. Apply bigdata technology in health care applications.
5. Apply the learned Engineering knowledge for the Development of society and self.

Textbooks:

1. Jean-Claude André, ―Industry 4.0, Wiley- ISTE, July 2019, ISBN: 781786304827, 2019.
2. Diego Galar Pascual, Pasquale Daponte, Uday Kumar, ―Handbook of Industry 4.0 and SMART Systems, Taylor and Francis,2020

Reference Books:

1. P. Kaliraj, T. Devi, BigDataApplicationsinIndustry4.0, 2022, ISBN9781032008110, CRC Press, Taylor & Francis Group
2. P. Kaliraj, Devi Thirupathi, "Artificial Intelligence Theory, Models and Applications", Auerbach Publications, CRC Press, Taylor and Francis group, 2021.
3. Ethem Alpaydin, "Introduction to Machine Learning", Third Edition, MIT Press, 2014.
4. P. Kaliraj, T. Devi, Industry 4.0 and Education: Transformative Technology and Applications, 2022, CRC Press, Taylor & Francis Group.

TAUT2206 **MEDICAL TERMINOLOGY** **L T P C**
3 0 0 3

Course Description:
The purpose of this course is to develop a student's understanding and use of hospital and medical terminology. There is a focus on understanding the terns commonly used to identify the cause and effects of disease conditions.

Course Objectives:
1. To understand the associate medical terms with specific body systems.
2. To identify and interpret diagnostic and symptomatic terms related to the diseases specific to each body system.
3. To describe designated diagnostic testing procedures (laboratory, x-ray, surgical, pharmacy, etc.).
4. To enable students to understand, use, and correctly pronounce a wide range of medical terms.
5. To prepare students to effectively communicate with healthcare professionals and patients using accurate medical terminology.

UNIT-I **9 Hrs**
Basics of medical terminology, Specialties in a Hospital, The Human body in health and disease

UNIT-II **9 Hrs**
The Skeletal System, The Muscular System, The lymphatic and immune systems

UNIT-III **9 Hrs**
The Respiratory System, the Circulatory System, the Digestive System, The Urinary System

UNIT-IV **9 Hrs**
The Nervous system, Special senses - Eyes and Ears, Skin - The Integumentary system

UNIT-V **9 Hrs**
The Endocrine system, The Reproductive System, Diagnostic procedures, Nuclear Medicine and Pharmacology

Course Outcomes:
Upon successful completion of the course student would be –
1. Able to Identify and interpret complex medical terms by breaking them into their component word parts in order to decipher their meaning.
2. Able to understand common diseases and disorders of the body systems
3. Able to identify diagnostic tools and techniques for the common diseases and disorders of the human body
4. Able to interpret medical records, lab reports, and other documentation to ensure clear and precise communication within healthcare teams and with patients

5. Able to learn the roots, prefixes, and suffixes that form medical terms, as well as the terminology related to various body systems, diseases, procedures, and treatments. Students will be able to deconstruct complex terms into their component parts to understand their meanings.

Textbooks:

1. Medical Terminology for Health Professions, 7th Edition by Ann Ehrlich; Carol L Schroeder, ISBN 13: 9781111543297, Published by Delmar Cengage Learning (2013)
2. Workbook for Ehrlich/Schroeder's Medical Terminology for Health Professions, 7th by Carol Schroeder, Ann Ehrlich Published by Delmar Cengage Learning; 7th edition, 2012, ISBN-13 : **978-1111543280**

Reference Books:

1. Quick and Easy Medical Terminology - With Access by Peggy C. Leonard, ISBN13: 978-0323595995, 9th Edition
2. Medical Terminology Systems: A Body Systems Approach - With Access by Barbara A. Gylys, ISBN13: 978-0803658677, 8th Edition
3. Understanding Medical Terminology by Agnes C. Frenay, ISBN13: 978-0697140586, 9th Edition

TAUT2207 **SOCIAL NETWORK ANALYSIS** **L T P C**
3 0 0 3

Course Description:

A thorough introduction to Social Network Analysis (SNA), an interdisciplinary topic that studies the connections and interactions between people, groups, and things in various social contexts, is provided in this course. Students will receive a broad understanding of the core ideas, approaches and uses of SNA in a variety of disciplines. The course will cover data gathering methods, network visualization, fundamental network metrics, sophisticated network ideas and practical SNA implementations. Students will learn the skills necessary to evaluate social networks and gain useful insights from intricate network data through hands-on exercises.

Course Objectives:

1. To introduce students to the foundational concepts and historical background of Social Network Analysis (SNA).
2. To familiarize students with the basic building blocks of social networks, including nodes and edges and different types of social networks (e.g., online, offline, professional, friendship).
3. To provide students with an understanding of key network measures such as degree centrality, betweenness centrality, clustering coefficients and network density.
4. To demonstrate real-world applications of SNA, such as social network mining, influence and opinion dynamics, social network marketing and cybersecurity.
5. To equip students with practical skills for analyzing and interpreting social network data.

UNIT-I **9 Hrs**

Overview of Social Network Analysis: Definition, history and key concepts. Nodes and Edges: Understanding the basic building blocks of social networks. Types of Social Networks: Exploring different types of social networks (e.g., online, offline, professional, friendship).Importance and Applications of SNA: How SNA is used in various fields (e.g., Engineering, Sociology, Psychology, Marketing and Business).

UNIT-II **9 Hrs**

Data Collection Methods: Techniques for gathering social network data (e.g., surveys, interviews, online platforms). Data Representation: Different formats for representing network data (e.g., adjacency matrix, edge list).Network Visualization: Introduction to visualization tools for nd interpreting network structures.

UNIT-III **9 Hrs**

Degree Centrality: Identifying influential nodes based on their connections. Betweenness Centrality: Understanding nodes that act as bridges in the network. Clustering Coefficients: Analysing the degree of interconnectedness within local neighbourhoods. Network Density: Assessing the overall connectivity of a social network.

UNIT-IV **9 Hrs**

Small World Phenomenon: Exploring the "six degrees of separation" concept. Homophily and Social Influence: Understanding how social networks shape individuals' behaviour and beliefs. Network Resilience and Robustness: Examining the impact of node removal on the network's stability. Network Motifs: Identifying recurring patterns in complex social networks.

UNIT-V **9 Hrs**

Social Network Mining: Using SNA to extract meaningful patterns and insights from large-scale networks. Influence and Opinion Dynamics: Analyzing how information spreads through social networks. Social Network Marketing: Leveraging SNA for targeted marketing campaigns and product promotion. Online Social Networks and Cyber security: Understanding network-based threats and vulnerabilities.

Course Outcomes:

By the end of the course, students will be able to:

1. Comprehend the foundational concepts, methodologies and tools of Social Network Analysis.
2. Extract meaningful insights from social network data, identifying influential nodes and understanding network dynamics.
3. Apply SNA concepts to real-world challenges in areas such as marketing, cyber security and social dynamics.
4. Utilize SNA techniques to inform decision-making processes.
5. Conduct and interpret SNA in various domains effectively.

Textbooks:

1. Social Network Analysis: Methods and Applications" by S. K. Garg, 2019, Wiley India.
2. Introduction to Social Network Analysis: Concepts, Methods and Applications" by R. K. Singh, 2020, Springer India.

Reference Books:

1. Social Network Analysis: Methods and Applications" by Stanley Wasserman, Katherine Faust (1994, Cambridge University Press)
2. Analysing Social Networks" by Stephen P. Borgatti, Martin G. Everett, Jeffrey C. Johnson (2013, SAGE Publications)
3. Networks, Crowds and Markets: Reasoning About a Highly Connected World" by David Easley, Jon Kleinberg (2010, Cambridge University Press).

TAUT2208	ANTIBIOTIC RESISTANCE & BIOMEDICAL WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Description:

This course covers antibiotics and drug resistance, including mechanisms and trends, and explores biomedical waste management, focusing on segregation, treatment, and disposal. Emphasis is placed on antimicrobial stewardship and modern technologies for handling biomedical waste and ensuring environmental safety.

Course Objectives:

Students undergoing this course are expected to:

1. Understand the history, mechanisms, and types of antibiotic resistance.
2. Analyse trends in drug resistance and actions to combat it.
3. Evaluate the consequences of antibiotic resistance and implement antimicrobial stewardship.
4. Learn principles and practices of biomedical waste management and environmental safety.
5. Utilize modern technologies and personal protective equipment for effective biomedical waste handling.

UNIT-I **9 Hrs**

Antibiotics: Antibiotic Resistance, History of antibiotics, How resistance happens and spreads, Types of resistance- intrinsic, acquired, passive.

UNIT-II **9 Hrs**

Drug resistance - I: Trends in drug resistance, Actions to fight resistance, Bacterial persistence, Antibiotic sensitivity

UNIT-III **9 Hrs**

Drug resistance - II: Consequences of antibiotic resistance, Antimicrobial Stewardship – Barriers and opportunities, tools and models in hospitals.

UNIT-IV **9 Hrs**

Biomedical waste management and environmental safety - I: Definition of Biomedical, Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including colour coding).

UNIT-V **9 Hrs**

Biomedical waste management and environmental safety - II: Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern Technology for Handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling cross-infection (Protective devices).

Course Outcomes:

At the end of this course, students should be able to:

1. Explain antibiotic resistance, its history, and mechanisms.

2. Analyse trends and strategies in drug resistance management.
3. Assess the consequences of antibiotic resistance and implement antimicrobial stewardship.
4. Understand principles and practices of biomedical waste management.
5. Apply modern technologies and PPE for effective biomedical waste handling and infection control.

Textbooks:

1. "Antibiotics: Actions, Origins, Resistance" by Christopher Walsh
2. "Antimicrobial Stewardship: Principles and Practice" by Matthew Laundy, Lynda A. Sisson, and Matthew Dryden.

Reference Books:

1. "Biomedical Waste Management in Hospitals: A Manual for Health Professionals" by Sushrut S. N. H.

TAUT2209 BEHAVIOR CHANGE COMMUNICATION L T P C
3 0 0 3

Course Description:

This course introduces students to the fundamentals of behavioural theory, research and interventions in health education and promotion. The course will expose students to a wide range of theories, basic statistics and the use of open-source software in the analysis and evaluation of health aspects at the community level in a holistic manner. Furthermore, students will understand the concept of intersectoral and multidisciplinary coordination in order to improve data visualization in health education and promotion through the use of appropriate statistical tools.

Course Objectives:

1. To understand the behavioural, social and cultural factors associated with health and illness.
2. To explore factors that influence and barriers to practicing health behaviour and changing poor health habits across age groups.
3. To understand the structure of society, the role of society and various types of communication and identify the role of society, community, health education and communication in health.
4. To describe the methods, models, tools and processes used in understanding health behavior change, health education and promotion.
5. To apply relevant social and behavioural theories to diagnose and understand individual, social network, organizational, community and policymaker behaviours associated with the planning, implementation, evaluation and maintenance of community-based primary health care programs.

UNIT-I 5 Hrs

Introduction to Social and Health Behavioral Health, Importance of social and behavioral factors in health, Historical perspectives on population and diseases.

UNIT-II 8 Hrs

Health behavior: role of behavior factors in disease and disorders, Health behavior, health habits, Illness behavior, Practicing and changing health behavior, Barrier to modify poor health behavior, intervening with children, adolescents, adults and at risk, social determinants of Health, Changing health habits.

UNIT-III 12 Hrs

Basic concepts of society, community, and family, Society: features and types, Concept of culture: characteristics, elements, variability, social institutions: marriage and family. Working with communities, Community: Definition, concept of community participation, Benefits of community participation, Health communication, Communication: Definition, scope and requirements, Types of communication, Components of communication, Communication stages, Common communication approach, Methods of communication, Characteristics of effective communication, Barriers of effective communication.

UNIT-IV **10 Hrs**

Health Behavior Models, Social Epidemiology, Health belief model, Theory of planned behavior, Transtheoretical Model and change process, Social network theory, Diffusion of innovation, Social reaction to diseases, Comparative health cultures, Health disparities.

UNIT-V **10 Hrs**

Introduction Social network analysis, Basic of social network analysis, Introduction to open-source software and classification in health approaches, Introduction to Node XL software, Install, data visualize, data analysis and application among community level for policy-maker behaviors associated with the planning, implementation, evaluation, and maintenance of community-based health programs.

Course Outcomes:

End of the course completion student would be

1. Understand behavioral, social and cultural factors associated with health and illness.
2. Develop strategies to address barriers to practicing healthy behaviors and changing poor health habits across age groups.
3. Analyze the structure of society and various types of communication and identify the role of society, community, health education and communication in health.
4. Apply appropriate methods, models, tools and processes for understanding health behavior change, health education and promotion.
5. Utilize SNA tools, strategies and social and behavioral theories to diagnose and understand individual, social network, organizational, community and policymaker behaviors in community-based primary health care programs.

Textbooks:

1. Essentials of health behavior: Social and behavioral theory in public health by Mark Edberg (Jones and Bartlett publishers
2. Mahajan BK. Methods in Biostatistics. Jaypee Brothers, Medical Publishers (p) Ltd., G16, EMCA House, 23/23B, Ansari Road, Daryaganj, Post Box: 7193, New Delhi 110 002, India, 1991. List Current Essential Reference

Reference Books:

1. Foster and Anderson: Medical Anthropology, Wiley, New York
2. Anderson & Taylor, Sociology: Understanding a Diverse Society.
3. Neubeck and Glasberg, Selected Material from Sociology: Diversity, Conflict, and Change.

TAUT2201A	DISABILITY MANAGEMENT	L	T	P	C
		3	0	0	3

Course Description:

Disability Management course is designed to provide students with an in-depth understanding of the strategies, practices, and policies essential for supporting individuals with disabilities in various settings. This course covers the principles and techniques of disability management, focusing on creating inclusive environments in the workplace, educational institutions, and the community.

Course Objectives:

1. Understand the social, medical, and legal aspects of disability.
2. Evaluate the impact of disability on individuals and society.
3. Analyse policies and regulations related to disability management.
4. Develop strategies for supporting individuals with disabilities in various contexts.
5. Promote inclusivity and diversity in the workplace and community.

UNIT-I Introduction to Disability Management **9 Hrs**

Definition and classification of disabilities**,** Historical perspectives on disability**,** Disability as a social construct**,** Medical aspects of Disability**,** Common medical conditions leading to disability**,** Assessing functional limitations and impairments

UNIT- II Social and Psychological Aspects of Disability **9 Hrs**

The impact of disability on quality of life, Stigma and discrimination, Coping and psychological adjustment to disability, Role of healthcare professionals in disability management, Psychological Interventions and Chronic Health Disorders; Therapies, Pharmacological Interventions, Individual Therapy, Relaxation, Stress Management and exercise, Social Support Interventions, Help on the Internet, Support Groups

UNIT- III Legal and Ethical Framework **9 Hrs**

Disability rights and legislation, Equal opportunity and anti-discrimination laws, Ethical considerations in disability management, Emerging technologies and their impact on disability management, the future of disability policy and practice

UNIT- IV Workplace Disability Management **9 Hrs**

Reasonable accommodation and the Americans with Disabilities Act (ADA), Return-to-work programs Workplace diversity and inclusion, Current Issues

UNIT- V Community and Public Health Approach **9 Hrs**

Community resources and services for individuals with disabilities, Accessibility and universal design Disability awareness and advocacy, Analysis of real-life cases in disability management, Developing disability management plans, Accommodation strategies and their implementation, Current Issues and Future Trends

Course outcomes:

By the end of the course, the students would be able to:

1. Understand various aspects and causes of disability.
2. Get insight on the efficacy of interventions and therapies to deal disability.
3. Assess the ethical and legal consideration of disability.
4. Acknowledge the importance of ADA act and it implementation in workplace.
5. Know and participate in various community-based disability programs.

Textbooks:

1. Preventing chronic disease: a vital investment. WHO global report. Geneva, World Health Organization, 2005 (http://www.who.int/chp/chronic_disease_ report/en, accessed 15 May 2008).
2. Singh D. Transforming chronic care: evidence about improving care for people with long-term conditions. Birmingham, University of Birmingham, 2005.

Reference Books:

1. Chronic diseases [web site]. Geneva, World Health Organization, 2008 (http://www.who.int/topics/chronic_disease/en, accessed 15 May 2008).
2. National Center for Health Statistics definitions: health condition [web site]. Atlanta, United States Centers for Disease Control and Prevention, 2008.
3.

TAUT2201B **DISASTER MANAGEMENT** **L T P C**

3 0 0 3

Course Description:

The Disaster Management course is designed to provide students with a comprehensive understanding of the principles, strategies, and practices essential for effectively managing disasters. This course explores the various types of natural and human-made disasters, their causes, impacts, and the processes involved in mitigating, preparing for, responding to, and recovering from such events.

Course Objectives:

The main objectives of this course are to:

1. To impart knowledge and concepts of disaster, disaster management and disaster risk reduction.
2. To enhance the students understanding on Hazard Vulnerability and Risk Analysis
3. To develop positive attitude towards practical response to different stages of disaster
4. To management by adopting advance technology and sustainable development.

5. To ensure disaster response skills in assessment, analysis, intervention and evaluation in the Practice of reducing disaster risk.

UNIT- I **9 Hrs**

Concepts of Disaster and Vulnerability

- Hazards and disasters - Concepts, vulnerability and risks
- Hazard and disaster type- Natural, Water-related, Pandemic and Human induced hazards and disasters
- Causes and impacts of disasters- Impact on natural eco-system; physical, psychological and social impact
- Disaster and financial resilience
- GIS and Remote Sensing

Disaster vulnerability profile of India - Specific to geographical regions and states (as per regional significance).

UNIT- II **9 Hrs**

Disasters Intervention Practices

- Disaster Management Cycle-Rescue, relief, rehabilitation, reconstruction, prevention, mitigation and preparedness
- Disaster risk reduction (ORR) - community based ORR, Institutions concerned with safety, Disaster mitigation and construction techniques as per Indian Standard
- Early warning systems
- Trauma and Stress management
- First-aid and emergency procedures

Awareness generation strategies for the community on safe practices in disaster (as per regional significance)

UNIT - III **9 Hrs**

Disaster Management

Components of disasters management - Preparedness of rescue & relief, mitigation, rehabilitation & reconstruction

Institutional framework of disaster management in India (NDMA-SDMA-DDMA, NDRF, Civic volunteers, NIDM),

Phases of disasters/risk management and post-disaster responses Compensation and insurance

UNIT- IV **9 Hrs**

Applications of remote sensing & GIS in disaster management

- Capacity building for disaster/damage mitigation (structural and non-structural measures).
- Disaster risk reduction strategies and National Disaster Management Guidelines
- Disaster Management Act-2005
- Regional issues as per regional requirement/ university can take minimum two topics as per High Powered Committee.

UNIT- V **9 Hrs**

Practical exposure requirements: Field work/ community visit and Vulnerability Mapping, Safe community planning and implementation, Mock Drill/ Regional issues as per region/university

Course Outcomes:

Upon completion of this course, the student will be able to:

1. Define and analysis factors contributing to disasters, threats to development, life and nature
2. Demonstrate, and practice disaster risk reduction activities towards sustainable development
3. Formulate, organize and assess disaster risk reduction
4. Plan activities according to the nature of disasters and factors of vulnerabilities
5. Able to mitigate disaster and educate communities

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Multiple choice questions test, field work report, project report.

Textbooks:

1. "Disaster Management" by Harsh K. Gupta
2. "Disaster Management: Future Challenges and Opportunities" by Jagbir Singh

Reference Books:

1. Singh, R. (2017), "Disaster Management Guidelines for Earthquakes, Landslides, Avalanches and Tsunami". Horizon Press Publications
2. Taimpo (2016), "Disaster Management and Preparedness" CRC Press Publications
3. Nidhi, G.D. (2014), "Disaster Management Preparedness". CBS Publications Pvt. Ltd.
4. Gupta, A. K., Nair, S.S., Shiraz, A. and Dey, S.(2013), "Flood Disaster Risk Management- CBS Publications Pvt. Ltd.
5. Singh, R. (2016), "Disaster Management Guidelines for Natural Disasters" Oxford University Press Pvt. Ltd.

TAUT2201C HUMAN VALUES & PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

Course Description:

The Human Values and Professional Ethics course aims to explore the fundamental principles that underpin ethical behaviour and moral reasoning. This course provides students with an understanding of core human values and ethical frameworks, fostering the development of personal integrity, social responsibility, and professional ethics. Through this course, students will engage with key philosophical theories, contemporary ethical issues, and the application of ethical principles in various contexts.

Course Objectives:

1. Understand the need, guidelines, content, and process for Value Education.
2. Understand the concept of harmony within oneself.
3. Understand the values in human relationships.
4. Understand the interconnectedness and mutual fulfillment among the four orders of nature.
5. Understand the implications of a holistic understanding of harmony on professional ethics.

UNIT-I **9 Hrs**

Introduction – Need, guidelines, content and process for Value Education Value Education

- Understanding the need, basic guidelines, content and process for Value Education
- Self-exploration what is it? Its content and process; "Natural acceptance" and Experiential Validation as the mechanism for self-exploration.

UNIT-II **9 Hrs**

Understanding harmony in the human being- Harmony in myself!

- Understanding human being as a coexistence of the sentient I and the material body
- Understanding the harmony of I with the body: Sanyam and Swasthya; correct appraisal of physical needs, meaning of prosperity in detail.

UNIT-III **9 Hrs**

Understanding harmony in the Family and Society- Harmony in Human relationship

- Understanding values in human –
- Human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay- trupti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
- Visualizing a universal harmonious order in society-Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) from family to world family.

UNIT-IV **9 Hrs**

Understanding Harmony in Nature; Coexistence

- Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature.
- Holistic perception of harmony at all levels of existence.

UNIT-V **9 Hrs**

Implications of the above Holistic understanding of harmony on professional ethics

- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics
- Ability to utilize the professional competence for augmenting universal human order

Course Outcomes:

After the completion of this course, the learners will be able to:

1. Students will be able to explain the need, guidelines, content, and process for Value Education.
2. Students will demonstrate an understanding of the harmony within oneself, identifying the sentient self and the material body.
3. They will be capable of visualizing and explaining the concept of a universal harmonious order from the family level to the global level.
4. They will recognize and explain the importance of recyclability and self-regulation in nature and develop a holistic view of harmony at all levels of existence.
5. They will be able to define and advocate for ethical human conduct in their professional lives.

Textbooks:

1. "Value Education and Professional Ethics" by R.S. Naagarazan
2. "Human Values and Professional Ethics" by Rishabh Anand

Reference Books:

1. Mind and Body: Holistic Approach"by Dr. V.K. Sharma
2. "Integrative Body-Mind Training"** by Yi-Yuan Tang
3. Understanding Harmony in the Family and Society
4. "Human Values and Professional Ethics"** by Jayashree Suresh
5. "Ethics in Engineering Practice and Research"** by Caroline Whitbeck

TAUT2201D INFECTION PREVENTION AND CONTROL L T P C
3 0 0 3

Course Description:
This course covers infection control principles, antibiotic resistance, and antimicrobial stewardship. Students will learn about sterilization, disinfection, hand hygiene, PPE, and managing drug resistance in healthcare settings.

Course Objectives:
Students undergoing this course are expected to:

1. Understand evidence-based infection control practices.
2. Learn prevention and control of healthcare-associated infections.
3. Analyse the history and mechanisms of antibiotic resistance.
4. Examine trends and actions to combat drug resistance.
5. Implement antimicrobial stewardship in hospitals.

UNIT-I **9 Hrs**
Evidence-based infection control principles and practices: Sterilization, Disinfection, Effective hand hygiene, Use of Personal Protective Equipment (PPE).

UNIT-II **9 Hrs**
Infection control: Prevention & control of common healthcare-associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control.

UNIT-III **9 Hrs**
Antibiotics: Antibiotic Resistance, History of antibiotics, How resistance happens and spreads, Types of resistance- intrinsic, acquired, passive.

UNIT-IV **9 Hrs**
Drug resistance: Trends in drug resistance, Actions to fight resistance, Bacterial persistence, Antibiotic sensitivity.

UNIT-V **9 Hrs**
Consequences of antibiotic resistance, Antimicrobial Stewardship – Barriers and opportunities, tools and models in hospitals

Course Outcomes:
At the end of this course, students should be able to:

1. Apply effective infection control practices.
2. Prevent and manage healthcare-associated infections.
3. Explain the history and spread of antibiotic resistance.
4. Identify and combat drug resistance trends.
5. Implement antimicrobial stewardship strategies.

Textbooks:

1. "Infection Prevention and Control: Theory and Practice for Healthcare Professionals" by Debbie Weston
2. "Antibiotics: Actions, Origins, Resistance" by Christopher Walsh

Reference Books:

1. "Antimicrobial Stewardship: Principles and Practice" by Matthew Laundy, Lynda A. Sisson, and Matthew Dryden

TAUT2201E **NSS & YOUTH DEVELOPMENT** **L T P C**
3 0 0 3

Course Description:
The National Service Scheme (NSS) aims to develop students' personalities through community service and national integration. It encourages students to work towards societal development, fostering a sense of responsibility and civic duty. The program bridges academic learning and real-life experiences, promoting overall personal growth and social awareness among youth.

Course Objectives:
1. To explain the nature, functions and importance of NSS.
2. To explain the role of NSS in the context of youth, community and voluntary service.
3. To develop the necessary communication and soft skills.
4. To appreciate the importance of health, hygiene and sanitation for a healthy nation.
5. To develop the concept and skills of managing environment issues and disaster management.

UNIT-I **9 Hrs**
Youth Development Program in India and Role of Youth Leaders National Youth Policy; Youth Development Program at National Level, State Level, Volunteer Level; Youth centric and youth led organizations Role and Importance of youth leadership, Leadership capability and its development.

UNIT-II **9 Hrs**
Meaning type of leader, Qualities, Traits, Role, Importance of a Good Leader Social, psychologic factors affecting the youth.
Life Skills-Self-awareness, Empathy, Effective Communication, Decision Making; Role of Music and Art in Youth Development.

UNIT-III **9 Hrs**
Basic Features of the Indian Constitution consumer protection act right to Information; Child Protection Act, Problems of Aging: Problems Protection of Interests.

UNIT-IV **9 Hrs**
Side effects of modern lifestyle and their countermeasures Diet, exercise, sleep in Indian lifestyle; Collection, Utilization and Camp; Management of Camps; Biography of Swami Vivekananda.

UNIT-V **9 Hrs**
Field Work - Rural visit- campaign- rally- Competitions.

Course Outcomes:
After the completion of this course, the learners will be able to:

1. Explain the role and functions of NSS.
2. Appraise the role of NSS volunteers in developing the society as a whole.
3. Develop the necessary skills of effective communication, leadership and healthy living.
4. Develop the necessary skills to mitigate disasters and other environmental challenges.
5. Develop consciousness about personal health and hygiene.

Textbooks:

1. Communication Skills by N Rao & R P Das (HPH)
2. Biodiversity, Environment & Disaster Management by Shamna Hussain (Unique Publishers)

Reference Books:

1. NSS Manual published by the Ministry of Youth Affairs & Sports, Govt. of India
2. National Youth Policy Document
3. National Service Scheme - A Youth Volunteers Programme For Under Graduate Students as Per UGC Guidelines by J D S Panwar, A K Jain & B K Rathi (Astral)
4. Environmental Studies by P K Pandey (Mahaveer Publications)

II YEAR
IV SEMESTER

4th semester						
Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per week**
		L	**T**	**P**		
IMTT2504	Clinical Radiography	3	1	0	4	4
IMTT2505	Dark Room and Film Processing Technique	3	1	0	4	4
IMTT2506	Contrast and Special Radiography Procedures	3	1	0	4	4
IMTL2502	Clinical Skills -II	0	0	20	10	20
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Library	0	0	0	0	1
TOTAL		**9**	**3**	**20**	**22**	**36**

	II YEAR: IV SEMESTER				
IMTT2504	**CLINICAL RADIOGRAPHY**	**L**	**T**	**P**	**C**
	PAPER-1	**3**	**1**	**0**	**4**

Course Description:

This course is designed to enhance students' skills in radiographic image analysis and patient positioning techniques. It provides a comprehensive understanding of basic patient positioning for radiographic investigations, focusing on the upper and lower limbs, thorax, vertebral column, and skull. Practical exercises and demonstrations will ensure that students can apply these techniques effectively in clinical settings.

Course Objective:

Students undergoing this course are expected to:

1. To understand the skills in analyzing radiographic images to identify artifacts, anatomical landmarks, and pathologies.
2. To learn how to adjust positioning techniques and parameters to suit patients of different ages, sizes, and physical conditions.
3. To comprehend the impact of systemic conditions like diabetes mellitus and pregnancy on kidney health.
4. To recognize the pathological changes induced by dialysis and urinary tract obstructions.
5. To acquire knowledge of basic projection and supplementary techniques for skull imaging and apply them in practice.

Unit 1 Introduction and Extremities Radiography 12 hrs

- Anatomical terminology.
- Positioning terminology
- Projection terminology
- Techniques, Preparations, Instructions, Positioning of patient for conventional and digital radiography in the imaging
- Use of accessories and Radiation Protection of following Conventional Non contrast radiography.

Extremities Radiography:

- Upper limb Hand- Related radiological anatomy, PA, PA oblique, Lateral, Lateral-flexion and extension AP bilateral oblique (norgaard method), Finger - Related radiological anatomy, PA, Oblique and LAT
- MCP- Related radiological anatomy, AP, PA oblique, Lateral, AP (Roberts method), Skiers thumb (folio method), Wrist joint - Related radiological anatomy, PA, AP, PA oblique, Lateral, PA scapula views, Radial deviation, ulnar deviation, Carpal canal-inferiosuperior (gaynor-hart method) and Carpel bridge
- Forearm- Related radiological anatomy, AP and LAT, Elbow joint - Related radiological anatomy, AP- fully extended, partially flexed, AP oblique- external and internal rotation, Lateral, Acute flexion (jones method), Trauma axial lateral (coyle method) and Radial head lateral

- Humerus- Related radiological anatomy AP, LAT, Horizontal beam LAT, Proximal humerus views
- Shoulder Joint - AP neutral rotation, Transthoracic lateral (Lawrence method), Tangential projection, supraspinatus outlet (neer method), Apical oblique projections (garth method), Clavicle, AP and AP axial
- Acromioclavicular joints: AP bilateral with and without weight, Sternoclavicular joints (PA, RAO, LAO), Scapula AP, Scapula Y view and Lateral recumbent
- Lower limb Foot - Related radiological anatomy AP Oblique Lateral AP and lateral weight bearing,
- Calcaneus - Related radiological anatomy • Planto-dorsal (axial) • Lateral Toes,
- Tarsal bones, Ankle joint - Related radiological anatomy AP AP mortise (15° oblique) Lateral AP stress
- Knee joint, patella-tibia - Related radiological anatomy Knee AP Oblique- medial and lateral rotations Lateral Skyline view AP (weight bearing) Knee- intercondylar fossa PA axial (camp coventry and holmblad method) AP axial
- Femur, Hip joint - Related radiological anatomy, Mid and distal femur, AP, Lateral, Mid and proximal femur, AP and Lateral
-

Unit 2 Spine Radiography and pelvic gridle 12 hrs

- Atlanta occipital articulation
- Cervical spine - Related radiological anatomy, Basic views, AP open mouth (C1 and C2), AP axial, Oblique, Lateral, Erect, Trauma lateral (horizontal beam), Cardiothoracic junction (swimmers view), Special views, Lateral- hyperflexion and hyperextension, AP (fuchs method) or PA (judd method), AP wagging jaw (ottonello method)
- Thoracic spine - Related radiographic anatomy, AP, Lateral and Oblique
- Lumbar spine, sacrum and coccyx - Related radiographic anatomy, Lumbar spine, AP, Oblique, Lateral, Lateral (L5 - S1), AP axial (L5 - S1), Scoliosis series- AP or PA, Erect lateral, AP (Ferguson method), AP - R and L bending, Spinal fusion series, AP or PA - R and L bending, Lateral - hyperextension and hyperflexion
- Sacrum and Coccyx- AP axial sacrum, AP axial coccyx, Lateral sacrum and Lateral coccyx
- Pelvis-sacroiliac joint - Pelvic girdle and proximal femur, Related radiological anatomy Basic & special projections, Pelvic girdle, AP pelvis, Frog lateral (modified cleaves method), AP axial for pelvic outlet (tayelor method), AP axial for pelvic inlet (modified linienfield method), Posterior oblique- acetabulum (judet method), Hip and proximal femur, AP unilateral hip, Axiolateral, inferosuperior (danelius – miller method), Unilateral frog leg (modified cleaves method), Modified axiolateral (clements-nakayama method), Sacrioiliac joints: AP, posterior obliques

Unit 3 Skull and Cranial Bones and Facial Bones 12 hrs

- Related radiological anatomy
- Basic & special projections

- Cranium
- Base of skull
- Sella turcica
- Mastoids
- Optic foramina and Orbits
- Nasal bone
- TM joint
- Facial bone
- Zygomatic arches
- Mandible
- Para nasal sinuses

Unit 4 Chest, Abdomen and Pelvic Radiography 12 hrs

1. **Chest Radiography**

- Related radiological anatomy

Basic & special projections

- PA, LAT

Special

- AP supine &semi erect
- Lateral decubitus
- AP lordotic
- Anterior oblique
- Posterior oblique
- Upper airway: AP, LAT

1. **Abdomen & Pelvic Radiography:**

- Related radiological anatomy

Basic & special projection

- AP supine (KUB)
- PA prone
- Lateral decubitus
- Erect AP
- Dorsal decubitus
- Lateral
- Acute abdomen three-way series

KUB

- Related radiological anatomy
- Positioning- AP/Lat

Unit 5 Other Special Radiography 12 hrs

- Soft tissue radiography
- High and low KV Technique
- Stereo Radiography
- Macro radiography

- High kv technique Foreign body localization
- Skeletal Survey
- Dental radiography

Course learning outcomes:

After completion of the course, a student will be able to:

1. Develop skills in radiographic image analysis, including the identification of artifacts, anatomical landmarks, and pathologies.
2. Learn how to adjust positioning techniques and parameters to accommodate patients of different ages, sizes and physical condition.
3. Understand the basic patient positioning during radiographic investigation and apply the positioning techniques for upper and lower limb.
4. Identify and apply the basic positioning techniques and supplementary technique for thorax and vertebral column
5. Know how to apply the basic projection and supplementary techniques for skull.

Text book:

1. Clark's Handbook for Radiographers – Charles Sloane, Ken Holmes & Craig Anderson, Hodder Educations, UK
2. Merrill's Atlas of Radiographic Positioning and Procedures | by Jeannean Hall Rollins.
3. Radiology of Positioning for Technician by SK Singhal O.P. Sharma

Reference books:

1. Diagnostic Radiography – A concise practical Manual – Glenda J. Bryan (4th edn), Churchill Livingstone

IMTT2505	DARKROOM AND FILM PROCESSING TECHNIQUES PAPER-2	L	T	P	C
		3	1	0	4

Course Description:

This course provides comprehensive knowledge and practical skills in radiographic film and image processing. The course covers radiographic film processing chemistry and the factors affecting image quality in radiographic images. Additionally, students will learn to manage the use of automatic processing chemistry and apply best practices in the maintenance of radiographic film, cassettes, intensifying screens, darkroom accessories, and X-ray equipment.

Course Objective:

Students undergoing this course are expected to:

1. To understand the construction, working, types, applications, advantages, limitations, and proper storage and handling of both exposed and unexposed radiographic film.
2. To learn the chemistry involved in radiographic film processing.
3. To analyze the factors affecting the quality of radiographic images and their practical applications.
4. To recognize and manage the use of automatic processing chemistry effectively.
5. To gain knowledge and best practices in the preparation, care, and maintenance of radiographic film, cassettes, intensifying screens, darkroom accessories, and X-ray equipment.

Unit 1 **X-Ray films** **12 hrs**

- Basic principle of radiography and photography
- Latent image formation
- Preparation of emulsion and its stages
- X-ray film Structure, Film construction - Film base, subbing layer, emulsion, super coat, backing layers, Crossover effect, irradiation,
- Screen & Non-screen films.
- Types of X ray film - Composition of single and double coated radiographic film
- Film characteristics, Characteristics curve
- Applications -advantages/limitations
- Film storage - handling -film wrappings
- Handling of exposed and unexposed films.

Unit 2 **Imaging Processing** **12 hrs**

- Film developing, Acidity, Alkalinity, pH
- Processing- Developing, Developer solution, Constituents of developer.
- Rinsing
- Fixing- Fixer solution, Composition of fixer
- Washing, Drying and Replenishment
- Effect of temperature and development time,
- Common errors and faults while processing

- Latent image formation and Silver recovery
- Film archiving systems- PACS Fog.

Unit 3 Radiographic Image Quality 12 hrs

- Density, noise contrast, sharpness, resolution, Magnification and Distortion

Exposure Factors

- Milliampere seconds
- Kilovoltage
- Focus to film distance
- Secondary radiation Grids

Film artifacts

- Definition
- Causes
- Types

Unit 4 Automatic Processor 12 hrs

- Film transport, cycle time, capacity
- Feed section
- Developer section
- Fixer section
- Washing section
- Drying section
- Standby mode
- Replenishment; auto mixers
- Auto processors for special films
- Care & maintenance of the auto processors Care and maintenance
- Cleaning routine and methods of cleaning
- Common errors and faults in film processing

Unit 5 Dark Room 12 hrs

- Dark Room Site, layout, dark room design
- Construction processing area
- Illumination safe light compatibility entrance safe lighting types
- Storage shelving of films-cleaning and maintenance.
- Cassettes Construction
- Mounting Intensifying screen on cassette, Types of Cassette, Care of cassette
- Intensifying Screen – Luminescence, Screen unsharpness, Screen construction, Phosphors, Quantum detection & conversion efficiency, Types of screen,
- Intensifying factor - quantum mottle, Factors affecting speed and unsharpness, Care of screens

Course learning outcomes:

After completion of the course, a student will be able to:

1. Identify the construction, working, type, application, advantages/limitation, storage and handling of exposed and unexposed film.

2. Understand radiographic film processing chemistry.
3. Analyze the factor affecting image quality in radiographic image and their application.
4. Manage the use of automatic processing chemistry
5. Apply the prepare care maintenance of radiographic film, cassettes, intensifying screens, darkroom accessories and x-ray equipment

Text book:

1. Radiographic Imaging - Chesney & Chesney, Blakwell scientific publications, oxford(1981)
2. Photographic processing, quality control and evaluation of photographic material -J.E. Gray
3. Photographic processing Chemistry - L.F.A. Mason.
4. Physical and photography principles of Medical Radiography – Seeman & Herman.

Reference books:

1. Radiographic latent image processing – W. E. J Mckinney
2. Diagnostic Radiography – A concise practical Manual – Glenda J. Bryan (4th edn), Churchill Livingstone.

IMTT2506	CONTRAST AND SPECIAL RADIOGRAPHY PROCEDURES PAPER-3	L T P C 3 1 0 4

Course Description:

This course focuses on the principles and applications of contrast radiography in medical imaging. The course covers indications, contraindications, radiation dose, exposure timing, and safety measures for various radiological procedures. Additionally, students will explore the risks and benefits of contrast agents in different patient populations, patient management and positioning during radiological procedures, and post-procedural care.

Course Objective:

Students undergoing this course are expected to:

1. To understand the principles of contrast radiography and the various types of contrast agents used in medical imaging.
2. To learn the techniques for administering contrast agents and monitoring patients during and after contrast radiography.
3. To recognize risks and benefits of using contrast agents in various patient populations.
4. To comprehend and understand the management and positioning of patients during radiological procedures to ensure optimal imaging and patient safety.
5. To develop knowledge of post-procedural care to manage patient recovery and address any complications.

Unit 1 **Paediatric Imaging** **12 hrs**

- Special needs of patient and radiographer
- Use of dedicated equipment and accessories
- Modified technical considerations selection of exposure factors image quality considerations
- Radiation protection of the patient special techniques in children for contrast studies.
- **Geriatric radiography -** Equipment and accessories
- Exposure factor considerations in special care
- Elderly patient's profile difficulties during radiography.
- Technical considerations projections with unconventional special positioning.
- Trauma/Emergency Radiography Selection of suitable X-Ray equipment.
- Patient position, Radiographic projections and sequence for each patient. Modification of routine positioning
- Radiation protection – patient care
- Operation theater radiography O.T procedures, orthopedic procedures.
- Maintenance of asepsis, Preparation of radiographer and equipment/accessories,
- Careful safe use of mobile and fluoroscopic equipment
- Radiation protection, patient care, Cooperation with OT staff
- Patient care-radiation protection of all staff.

Unit 2 **Contrast Radiography** **12 hrs**

- Radiological contrast media, classification
- Need for radiological contrast media
- Methods of administration, dosage, reactions to contrast media
- Role of radiographer in management of patient with contrast reaction
- For all contrast investigations-patient preparation, positioning, patient care during the study-post procedural patient care
- Types of contrast media used and dosage alternative contrast used side effects and its identification
- Treatment of complication during the procedure pathological conditions indications and contraindications.

Unit 3 IVP Rapid Sequence 12 hrs

- Intra venous urography or pyelography (IVP or IVU)
- Mixturating cysto urethrography (MCU) Cystogram
- Anterior Urethrogram (AUC or RGU)
- Retrograde Pyelography (RGP)

Unit 4 Barium & Cholangiography 12 hrs

Barium studies

- Barium swallow
- Barium meal,
- Barium meal follow through
- Barium enema
- small bowel enema
- distal colography
- defecography

Cholangiography

- Pre-operative cholangiography
- Percutaneous Trans-hepatic Cholangiogram (PTC)
- Endoscopic Retrograde Cholangiopancreatography (ERCP)
- T-Tube cholangiography

Unit 5 Other Special Procedures 12 hrs

- Sialogram
- Angiography
- Diagnostic & therapeutic, venography
- Lymphangiogram
- Myelogram
- Hysterosalpingography(HSG)
- Sinography
- Fistulogram
- Orthography
- Discography

- Ductogram.
- Vasography.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understand the principles of contrast radiography and the different types of contrast agents used in medical imaging, Techniques for administering contrast agents and for monitoring patients during and after contrast radiography.
2. Knowledge of indication, contraindication, contrast media radiation dose an exposure timing and radiation safety measures for different radiological procedures
3. Identify the risk and benefits of using contrast agents in different patient population.
4. To know the management and positioning of patient while performing radiological procedures.
5. Generalize knowledge of post procedural care.

Text book:

1. A Guide on Special Radiographic Investigations & Techniques by Dr.Kushal Gehlot and Lalit Agarwal
2. Text book of radiology for residents & technicians – 4th edition, Satish K. Bhargave Radiological patient care – Jensen Chesney.
3. Merrill's Atlas of Radiographic Positioning and Procedures | by Jeannean Hall Rollins

Reference books:

1. Atlas of dental and maxillofacial radiological imaging – Brownie
2. Radiological Proceduresby Bhushan N. Lakhka

IMTL2502	CLINICAL SKILLS 2	L	T	P	C
	PRACTICAL/TRAINING PAPER	0	0	20	10

Course Description:

This comprehensive course is designed to equip students with essential skills and knowledge in radiographic imaging, focusing on various anatomical regions and contrast studies. The course covers the role and responsibilities of the radiographer in selecting technical factors, ensuring radiation safety, and managing patient care. Practical demonstrations include the use of cassettes, intensifying screens, film processing, and darkroom maintenance. Additionally, students will explore the use of contrast media in imaging the gastrointestinal tract, renal and reproductive systems, and emergency management of contrast reactions.

Course Objective:

Students undergoing this course are expected to:

1. To learn how to perform plain and special radiographic views.
2. To understand the responsibilities of the radiographer in selecting appropriate technical factors and ensuring radiation safety.
3. To know the different types and sizes of cassettes, intensifying screens, film processing chemicals, and darkroom procedures.
4. To learn the type, administration, and monitoring of contrast media used in imaging the gastrointestinal tract, renal and reproductive system, and emergency management of adverse reaction.
5. To comprehend the role of the radiographer in patient preparation, positioning, care during the study, and post procedural care for all radiographic and contrast investigation.

Unit 1 Radiographic Views of upper & lower limb 60 hrs

- plain views of the upper limb, hands
- Fingers, thumb, wrist,
- Forearm, elbow and humerus
- Plain views of shoulder joint and special views in shoulder joint
- Plain views of lower limb- foot, ankle, lower leg
- Patella, knee joint, femur, hip joint, pelvis and SI joint

Unit 2 Radiographic view of vertebra & Skull 60 hrs

- Plain views of Cervical, cervico-thoracic,
- thoracic or dorsal, thoraco lumbar
- lumbar, lumbo-sacral,
- sacrum and coccyx and dynamic views
- Radiography of skull: plain views and special views

Unit 3 Radiography of chest & Abdomen 60 hrs

- Plain views of the chest and special views apicogram,
- Radiography of Abdomen: plain views, erect abdomen, decubitus lateral

- Responsibility of the Radiographer in selecting the technical factors and radiation Safety

Unit 4 Radiography Equipment 60 hrs

- Demonstration of cassettes and intensifying screen
- Demonstration of types of cassettes and different sizes
- Conventional and CR cassettes
- Chemicals used in film processing
- Films and types of film
- Dark room processing- manual and automatic methods
- Safe light test
- Screen-film contact test
- Dark room maintenance

Unit 5 Material Required for Radiography 60 hrs

- Contrast media and its types
- GI tract: Barium studies
- Renal studies, reproductive system
- Role and responsibilities of radiographer
- Emergency drugs and Adverse reactions of contrast media
- Role of radiographer in management of patient with contrast reaction.
- For all contrast investigations-patient preparation, positioning, patient care during the study-post procedural patient care.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understand and Perform Radiographic Techniques
2. Analyze and ensure Technical Accuracy and Safety
3. Manage and handle Films and Cassettes
4. Understand and conduct Contrast Media Studies
5. Apply and manage Patient Care

Textbooks:

1. A Guide on Special Radiographic Investigations & Techniques by Dr.Kushal Gehlot and Lalit Agarwal
2. Radiographic Imaging - Chesney & Chesney, Blakwell scientific publications, oxford(1981)
3. Clark's Handbook for Radiographers – Charles Sloane, Ken Holmes & Craig Anderson, Hodder Educations, UK

References:

1. Diagnostic Radiography – A concise practical Manual – Glenda J. Bryan (4th edn), Churchill Livingstone.
2. Radiographic latent image processing – W. E. J Mckinney
3. Atlas of dental and maxillofacial radiological imaging – Brownie

III YEAR
V SEMESTER

5th semester						
Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per week**
		L	**T**	**P**		
IMTT3501	CT Instrumentation and Techniques	3	1	0	4	4
IMTT3502	Modern Imaging Technology and Quality Assurance	3	1	0	4	4
IMTT3503	Equipment of Radio- Diagnosis	3	1	0	4	4
IMTL3501	Clinical Skills -III	0	0	16	8	16
IMTT3601a	Programme Electives – I Orientation in para clinical sciences	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Seminar	0	0	0	0	1
--	Library	0	0	0	0	1
TOTAL		**12**	**3**	**16**	**23**	**36**

IMTT3501	CT INSTRUMENTATION AND TECHNIQUES PAPER-1	L 3	T 1	P 0	C 4

Course Description:

This course provides comprehensive training in the management of computed tomography (CT) procedures, focusing on the use and administration of contrast agents. The course will cover the risks and benefits of using contrast agents in different patient populations, ensuring that students can make informed decisions to optimize patient outcomes. Students will gain expertise in positioning patients for CT scans to achieve accurate imaging while ensuring patient comfort and safety.

Course Objective:

Students undergoing this course are expected to:

1. To provide the understanding of preparation, management and positioning of patients while performing CT scan
2. To understand the basic knowledge of CT instrumentation and management of patient in CT scan.
3. To comprehend various special dialysis procedures, including hemodiafiltration, hemoperfusion, and plasmapheresis.
4. To gain knowledge Prepare, position, and care for patients during radiographic procedures, ensuring their comfort and safety throughout the process.
5. To understand the Ability to handle emergency situations in CT.

Unit 1 Introduction Of CT 12 hrs

- History of Computer tomography
- Basic tomography principle and its types
- Generations of computer tomography
- Spiral CT and MDCT generations
- Multi slice technology
- advantages and disadvantages helical/spiral & multi slice
- C.T slip ring technology.

Unit 2 Instrumentation of CT 12 hrs

- Computed tomography Table, Gantry
- X-Ray generator and CT control console.
- Computer and image processing system Options and accessories for CT systems.
- Scanning principle with Detectors technology and its types
- Basic data acquisition concepts
- Image reconstruction technique and methods -iterative, back projection and filtered back projection.
- Modern iterative technique-AISIR.
- Radiation dose measurements.

Unit 3 Image Display 12 hrs

- Image display and representation

- Pixel and voxel
- CT number, Window level and window width
- pre and post processing techniques -MPR, VR (Volume rendering techniques), MIP, mIP.

Image quality

- Image quality-Resolution, Contrast, Sharpness, Noise

Artifacts

- CT Artifacts, Classification, Types, Causes and Remedies.

Unit 4 CT Non contrast studies, protocols and techniques 12 hrs

- CT Brain
- CT PNS
- thorax with HRCT
- HRCT Temporal bone
- CT Abdomen,
- CT Spine and pelvis,
- CT SI joint
- CT Upper and lower extremities.
- Anatomy, clinical indications and contraindications, patient preparation, positioning techniques

Unit 5 CT Scan contrast studies, protocols and techniques 12 hrs

- CECT Brain
- CECT neck
- CECT thorax
- CECT Abdomen and pelvis,
- CT Cisternography and angiography.
- Anatomy, clinical indications, contraindications, patient preparation, positioning of patient, technique,
- contrast media, it's type and volume, injection technique, multi-phase scanning methods, image display and patient care

CT guided procedures

- CT guided procedures ,Protocols , Both invasive and non- invasive, CT guided biopsy (lung biopsy, bone biopsy)

Course learning outcomes:

After completion of the course, a student will be able to:

1. Manage computed tomography and the contrast agents used Techniques for administrating
2. Provide post procedural care and post processing techniques.
3. Identify the risk and benefits of using contrast in different patient population.
4. Handle positioning of patients while performing CT scans
5. Knowledge of anatomy, indication, contraindication, patient preparation, patient

position, contrast media, techniques and radiation safety measures for different CT scans.

Text book:

1. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control – Euclid seeram
2. Step by Step CT
3. CT & MRI protocol – Satish K. Bhargava, CBS publishers.
4. CT PROTOCOL – Bhargava

Reference book:

1. Basic Radiological Physics by - Kuppusamy Thayalan
2. The Physics of Radiology and Imaging - Thayalan K

IMTT3502	MODERN IMAGING TECHNOLOGY AND QUALITY ASSURANCE PAPER 2	L 3	T 1	P 0	C 4

Course Description:

This course provides a thorough understanding of ultrasound principles, interactions, and characteristics. To identify and conduct quality assurance tests for X-ray equipment, CT, fluoroscopy, and mammography. The course also emphasizes understanding regulatory requirements and responsibilities, including guidelines from the International Commission on Radiological Protection (ICRP) and the Atomic Energy Regulatory Board (AERB).

Course Objective:

Students undergoing this course are expected to:

1. To understand the ultrasound principle, interaction and characteristics.
2. To learn about the generalized knowledge of transducer, modes of ultrasound, Doppler study types and uses.
3. To know the patient preparation, positioning and handling of various ultrasound scans
4. To identify the quality assurance test done for x-ray equipment, CT, Fluoroscopy and mammography
5. To understand the regulatory requirements, ICRP, AERB responsibilities.

Unit 1 Ultrasound Imaging Principle and Instrumentation 12 hrs

- Basic principle of Ultrasound imaging
- Properties of sound waves.
- Ultrasound properties of propagation in tissue, Interaction of ultrasound with matter.

Instrumentation

- Knowledge about the knobologies of control console.
- USG probe or transducer principle, construction, working and its types.
- Beams, focusing and Resolution
- Types of machines portable systems.
- Acoustic Coupling agent (ultrasound gel).
- Advantages and disadvantaged

Unit 2 Ultrasound Image Display modes 12 hrs

- A mode, B mode, M mode and TM mode.
- Gray scale imaging
- Time gain compensator
- ultrasound image formation, data storage and image display
- Doppler, Principle and Doppler Effect.
- Color Doppler, Continuous wave Doppler and Pulsed wave Doppler.
- Ultrasound image quality spatial, temporal, contrast resolution and noise.

Unit 3 Scanning Protocols technique for sonography 12 hrs

- Patient preparations, handling and positioning of patient for abdomen and pelvis, kidneys
- TAS

- TVS
- TRUS
- Neck USG extremities.
- Doppler studies.

Unit 4 Radiation Protection and Regulatory Bodies 12 hrs

- Diagnostic procedures and therapeutic procedure Performance safety and PC PNDT act of pregnant patients.
- Contrast agents used
- Artifacts-Definition, Types, Causes and Remedies.
- Performance and safety, Performance measurement, Bioeffects and Safety

Unit 5 Quality Assurance Program 12 hrs

- Congruence of Radiation and Optical field and beam.
- Determination of focal spot size of diagnostic X-ray tube.
- K.V. and Exposure time testing.
- Linearity testing of the Timer.
- Consistency of M.A. loading.
- Consistency of Radiation Output.
- Evaluation of Total filtration of the tube.
- Film screen contact testing.
- Table top Exposure rate measurement in fluoroscopy.
- Radiation protection survey, in and around of diagnostic installations.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understanding of the fundamental principles of ultrasound, its interactions and characteristics of ultrasound waves.
2. Acquire detailed knowledge about different types of transducers, modes of ultrasound imaging and the clinical applications of Doppler studies.
3. Effectively prepare patients for various ultrasound scans, accurately position them, and handle the equipment to ensure optimal imaging and patient comfort.
4. Identify and perform quality assurance tests for X-ray equipment,
5. Understand the regulatory requirements and guidelines set by the ICRP and AERB, maintain safety standards in radiological practices.

Text Book:

1. Manual of Diagnostic Ultrasound by Philip E. S. Palmer
2. Manual of Ultrasound- Garkal Gs
3. Quality Assurance Workbook for Radiographers & Radiologic Technologists, Peter J. Lloyd, Non serial Publication, WHO.
4. Processing and Quality Control – William

Reference Book:

1. Physics and Technical Aspects Diagnostic Ultrasound by DINESH K BAGHEL

IMTT3503	EQUIPMENT OF RADIO DIAGNOSIS PAPER 3	L 3	T 1	P 0	C 4

Course Description:

This course offers an in-depth understanding of the principles and practices involved in mammography, digital studies, portable, and dental radiography. The course will also cover the risks and benefits associated with portable and mobile radiography, ensuring students can make informed decisions in various clinical settings.

Course Objective:

Students undergoing this course are expected to:

1. To understand the preparation, management and positioning of patients while performing mammography
2. To commence the basic knowledge of Mammography Instrumentation, portable and dental radiography.
3. To understand the techniques in conventional and digital mammography studies.
4. To develop the knowledge about radiation safety in portable and mobile radiography
5. To understand and manage sophisticated radiological equipment and techniques.

Unit 1 History of Mammography and instrumentation 12 hrs

- History, Imaging requirements, Mammography system
- Construction/types accessories: tube, compression, grids, AEC etc.
- Nature of X-Ray beam (Low KV Technique)
- Suitable accessories and film processing.

Unit 2 Digital Mammography 12 hrs

- Digital mammography (DR)
- breast tomo-synthesis and procedure
- Recent advances in mammography techniques & Sono mammography procedures-advantages & limitations.
- Stereotactic biopsy – procedure.

Unit 3 Mammography Technique 12 hrs

- Immobilization and identification techniques
- Positioning techniques for various projections
- Exposure factors Conventional & Digital studies
- Image quality and advantage
- Diagnosis and screening Characteristics of benign and malignant lesions
- Patient care.

Unit 4 Portable and mobile x-ray unit 12 hrs

- Instrumentation of Mobile and Portable X-ray unit
- Capacitor discharge unit
- Advantages and its limitations
- Cordless mobile unit

- Radiation safety while handling the portable and mobile x-ray unit
- Handling, maintenance and techniques and also knowledge about control console keys.
- Cable of the equipment.

Unit 5 Dental X-Ray Unit 12 hrs

- OPG X ray unit with tomography technique
- Tube movement advantages of imaging the curved surface
- Continuous exposure techniques.
- Wall mounted and portable Dental Units
- Non screen film, IOPA x-rays and special views.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understand the principle of mammography and digital studies, portable and dental radiography.
2. Knowledge of anatomy, indications, contraindications, patient preparation, patient positioning, and techniques in mammography studies.
3. Identify the risks and benefits of portable /mobile radiography.
4. To understand the knowledge of OPG x ray unit and its procedure.
5. Generalize knowledge of advanced imaging modalities.

Text Book:

1. Basic Radiological Physics by - Kuppusamy Thayalan
2. The Physics of Radiology and Imaging - Thayalan K
3. Christensen's Physics of Diagnostic Radiology – Christensen.

Reference Book:

1. Text Book of Radiology for Residents & Technicians – 4th Edition – Satish K. Bhargava CBS publishers & Distributor (p) ltd.

IMTL3501	CLINICAL SKILLS 3 PRACTICAL/TRAINING PAPER	L 0	T 0	P 16	C 8

Course Description:

This course provides a comprehensive overview of the equipment, procedures, and safety protocols in various radiological imaging modalities, including CT, conventional and digitalized radiography, mammography, portable and mobile X-ray units, and ultrasound. The course also covers advanced post-processing techniques, the role and responsibilities of the radiographer, and radiation safety. Practical demonstrations include the handling of conventional and digital radiography equipment, mammography cassettes, portable X-ray machines, and ultrasound machines.

Course Objective:

Students undergoing this course are expected to:

1. To learn about CT Equipment, Prepare patients for various CT scans and CT contrast media
2. To understand the conventional and digitalized radiography, mammography, and the use of conventional and CR mammography cassettes.
3. To Handle Portable and Mobile X-ray Units
4. To Operate and Manage Ultrasound Equipment including types of probes, frequencies, and coupling media.
5. To conduct quality assurance tests for X-ray equipment, fluoroscopy, mammography, and CT to ensure optimal performance and safety.

Unit 1 **Demonstration of CT Equipment** **48 hrs**

- Gantry, patient couch, control keys and internal structures such as detectors, X-ray tube, collimator and a basic knowledge about slip ring technology.
- CT phantoms, maintenance of CT room, CT room requirements.

Unit 2 **Patient Preparation** **48 hrs**

- Preparation of patient for various CT scan
- Performing all types of CT scan,
- CT contrast media and its types – ionic or non-ionic contrast, volume of contrast, techniques,
- Assisting CT guided procedures, pressure injector.
- Post processing techniques with filming patterns.
- Role and responsibilities of radiographer.

Unit 3 **Demonstration of mammography modality** **48 hrs**

- Demonstration of Conventional
- Digitalized Radiography and mammography
- Demonstration of conventional and CR mammography cassette
- Compression peddle, collimator shutter, AEC chamber selection, foot switch
- Radiation safety in mammography

Unit 4 **Handling other modalities** **48 hrs**

- Knowledge about the handling techniques of portable and mobile x-ray machine
- Knowledge about the exposure factors and patient handling methods
- And also the external and internal structure of the equipment
- Radiation safety while handling portable and mobile X-ray unit.

Unit 5 Demonstration of ultrasound Modality 48 hrs

- Demonstration of ultrasound machine and its components
- Types of ultrasound probes and its frequency and its uses
- Ultrasound coupling media and its components
- Patient preparation for various scans
- PC-PNDT act.Quality Assurance test for x ray equipment, fluoroscopy, mammography, CT

Course learning outcomes:

After completion of the course, a student will be able to:

1. Perform and Confidently use CT scanner components
2. Manage and Demonstrate Radiographic Skills
3. Assist and Safely Manage Portable X-ray Units
4. Respond to Operate ultrasound machines
5. Understand and Conduct Quality Assurance in Radiology

Textbooks

1. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control – Euclid seeram
2. Manual of Diagnostic Ultrasound by Philip E. S. Palmer
3. Basic Radiological Physics by - Kuppusamy Thayalan
4. Text Book of Radiology for Residents & Technicians – 4th Edition – Satish K. Bhargava CBS publishers & Distributor (p) ltd.

Reference Books

1. Basic Radiological Physics by - Kuppusamy Thayalan
2. Physics and Technical Aspects Diagnostic Ultrasound by DINESH K BAGHEL
3. The Physics of Radiology and Imaging - Thayalan K
4. Christensen's Physics of Diagnostic Radiology – Christensen.

IMTT3601a	ORIENTATION IN PARA CLINICAL SCIENCES PROGRAMME ELECTIVE 1	L 3	T 0	P 0	C 3

Course Description:

This course offers an in-depth exploration of the respiratory and cardiovascular systems, upper and lower gastrointestinal tract (GIT), urological conditions, neurological conditions, and bone-related conditions. Designed for healthcare professionals and students in medical fields, the course covers the anatomy, physiology, pathophysiology, assessment techniques, and clinical management of these critical body systems.

Course Objective:

Students undergoing this course are expected to:

1. To learn and perform assessments and interpret findings related to respiratory and cardiovascular health.
2. To understand the structure and function of the upper and lower GIT.
3. To comprehend the anatomy and physiology of the urinary system.
4. To recognize common neurological disorders and their clinical features.
5. To identify common bone-related conditions and their clinical presentations.

Unit 1 Respiratory and Cardiovascular System 9hrs

- Pericarditis Heart Failure Definition and types (systolic vs. diastolic heart failure),
- Emphysema, Chronic Bronchitis its Definition and differentiation from acute bronchitis Pneumonia, Tuberculosis, Pleural Effusion
- Pneumothorax, Asthma, Chronic Obstructive Lung Disease (COLD) Overview of the respiratory system
- Overview of the cardiovascular system.

Unit 2 Assessment of Upper and Lower GIT 9 hrs

- GI bleeding**,** peptic ulcer**,** Intestinal obstruction**,** IBD (Inflammatory Bowel Disease)
- Pancreatitis**,** Portal Hypertension**,** Ascites**,** Cirrhosis**,** Cholecystitis**,** and Appendicitis
- The above disease conditions definition and causes, pathophysiology, clinical presentation and diagnostic approaches, treatment and management and complication and patient care considerations.

Unit 3 Urological conditions 9 hrs

- Hematuria**,** UTI, Urinary calculi, Polycystic Kidney disease**,** Renal failure**,**
- Hepatitis**,** Jaundice**,** Blunt injury**,** Perforation**,** Peritonitis definition,
- Pathophysiology, clinical presentation and diagnostic criteria, diagnostic tools, management and treatment and complication and prognosis for the above disease conditions.

Unit 4 Neurological conditions 9 hrs

- Epilepsy, Stroke, Hemorrhage and Brain tumor,
- Aneurysm, Embolism, Hypertension and Unconsciousness,

- Parkinson's disease, Meningitis, clinical presentation and diagnostic criteria, diagnostic tools, management and treatment and complication and prognosis for the above disease conditions.

Unit 5 Bone and its related conditions 9 hrs

- Arthritis, Scoliosis and kyphosis, Osteoarthritis, Osteomyelitis, Osteoporosis, Fracture,
- Bursitis, Carpal Tunnel Syndrome, Paget's Disease Of The Bone, Perthe's disease
- The above disease conditions definition and causes, pathophysiology, clinical presentation and diagnostic approaches, treatment and management and complication and patient care considerations.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Perform comprehensive assessments of the respiratory and cardiovascular systems, recognizing normal and abnormal findings.
2. Conduct thorough evaluations of the upper and lower GIT, identifying signs and symptoms of common gastrointestinal disorders.
3. Assess urological conditions effectively, interpreting clinical findings to inform patient management.
4. Conduct detailed neurological assessments, recognizing and interpreting signs and symptoms of neurological conditions.
5. Evaluate bone health and related conditions, understanding the clinical implications of various bone disorders.

Text book:

1. Kumar V, Abbas AK ,FaustoN, Aster JC .Robbins and Cotran Pathologic Basis of Disease,Professional Edition
2. E-Book.Elsevier Health Sciences;2014Aug27.

Reference book

3. Mohan H. Textbook of pathology. New Delhi:Jaypee brothers medical publishers
4. Boyd's . ATextbook of Pathology:An Introduction to Medicine. Academic Medicine.
5. Davidson I, Henry JB, Todd JC. Todd-Sanford clinical diagnosis by laboratory methods.

III YEAR
VI SEMESTER

6th semester						
Course Code	**Course Name**	**Periods per week**			**Credits**	**Hours per week**
		L	**T**	**P**		
IMTT3504	MRI Instrumentation and Techniques	3	1	0	4	4
IMTT3505	Interventional Radiology and Nuclear Medicine	3	1	0	4	4
IMTT3506	Care of Patient and Principles of Medical Emergencies	3	1	0	4	4
IMTL3502	Clinical skills -IV	0	0	16	8	16
IMTT3602a	Program Electives – II Medical Ethics and Radiotherapy Principle	3	0	0	3	3
--	Mentoring	0	0	0	0	1
--	Extra-curricular activities	0	0	0	0	2
--	Seminar	0	0	0	0	1
--	Library	0	0	0	0	1
TOTAL		**12**	**3**	**16**	**23**	**36**

IMTT3504	MRI INSTRUMENTATION AND TECHNIQUES Paper-1	L 3	T 1	P 0	C 4

Course Description:

This course provides an in-depth understanding of the principles and practices of Magnetic Resonance Imaging (MRI). It covers fundamental and advanced concepts including the physics of MRI, instrumentation, pulse sequences, and the use of contrast agents. The course also emphasizes advanced MRI techniques, patient management, and safety protocols, preparing students for professional excellence in MRI technology.

Course Objective:

Students undergoing this course are expected to:

1. To provide the understanding of preparation, management and positioning of patients while performing MRI scan.
2. To commence the basic knowledge of MRI instrumentation, preparation and management of patient in MRI scan.
3. Ability to handle emergency situations in MRI .
4. To develop the knowledge about MRI pulse sequences and MRI protocols for different parts.
5. To develop proficiency in positioning patients to obtain optimal imaging results while ensuring patient comfort and safety.

Unit 1 **Basic of MRI** **12 hrs**

- Introduction
- Atomic structure
- Motion within the atom
- The hydrogen nucleus, alignment
- Precession
- Larmor equation
- Resonance
- MR signal
- Free induction decay signal
- Relaxation
- T1 recovery and T2 decay
- Pulse timing parameters

Unit 2 **MRI Equipment** **12 hrs**

- MR architecture
- magnet system and gradient system
- Types of RF coils
- RF Shielding
- MRI site selection and safety.

Image Formation

- Data Collection and Image formation in MRI, ‘

- K space description and filling,
- Fourier transformation.
- Matrix
- Scan timing
- K space filling
- Partial or fractional echo imaging & averaging
- Pre- scan
- Types of acquisition

Unit 3 Pulse Sequences 12 hrs

- Introduction on Spin echo pulse sequences
- Inversion Recovery Sequences
- Gradient echo Pulse sequences
- Parallel Imaging techniques.
- Difference between CT and MRI images host computer, viewing archiving and hard copy
- Image formation and storage.

Unit 4 Imaging Protocols 12 hrs

- Protocols in MRI for whole Body
- Contrast agents
- MRI Artifacts and their remedies
- Parameters influencing MR Image Quality
- MRI Safety.

Unit 5 Advancement in MRI 12 hrs

- MR Angiography, (TOF, phase contrast and dynamic contrast MR angiography)
- Functional MRI
- MR Spectroscopy
- Recent advancement in MRI and
- Open MRI.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understand the principles of MRI, instrumentation and pulse sequences and the contrast agents used, Techniques for administrating contrast agents and for monitoring patients during and after contrast study.
2. Knowledge of anatomy, indications, contraindications, patient preparation, patient positioning, contrast media, techniques, types of coil and sequences used.
3. To know the knowledge about advanced MRI techniques.
4. To know the management and positioning of patients in MRI scans.
5. Generalize knowledge of image formation in MRI.

Text Book:

1. Step by Step MRI

2. MRI made Easy for beginners – Govind B. Chavhan – Jaypee brothers and Medical Publishers (p) Ltd, New Delhi
3. CT & MRI protocol – Satish K. Bhargava, CBS publishers.

Reference Book:

1. MRI in Practice Paperback by Catherine Westbrook (Author), Carolyn Kaut Roth
2. Text Book of Radiology for Residents & Technicians – 4th Edition – Satish K. Bhargava CBS publishers & Distributor (p) ltd.

IMTT3505	INTERVENTIONAL RADIOLOGY AND NUCLEAR MEDICINE PAPER-2	L 3	T 1	P 0	C 4

Course Description:

This course offers a comprehensive exploration of Digital Subtraction Angiography (DSA) and Nuclear Medicine, focusing on the technical, clinical, and safety aspects. Additionally, the course covers nuclear medicine modalities and techniques, emphasizing hybrid imaging and radiation safety. Designed for medical imaging professionals, this course aims to enhance proficiency in DSA and nuclear medicine, preparing students for advanced clinical practice.

Course Objective:

Students undergoing this course are expected to:

1. To commence the basic knowledge of DSA and its principle.
2. To provide the understanding of interventional procedures
3. Ability to handle nuclear medicine equipments.
4. To develop the knowledge about radio isotopes and its uses.
5. Generalize Knowledge of Hybrid Imaging and Radiation Safety in Nuclear Medicine

Unit 1 Instrumentation of Interventional Radiology 12 hrs

- Historical aspects of interventional radiology
- Digital Subtraction Angiography
- Working principle, Various Digital Subtraction uses of serial imaging devices, cine camera video recorder film processing.
- Techniques, Pressure injector, contrast media accessories types of catheters, guide wire, stents, stent grafts, and embolic agents.

Unit 2 Emergency Drugs and Supportive Equipments 12 hrs

- Invasive Procedures
- Seldinger technique
- Angiography and Venography.
- Invasive monitoring NIBP, Pulse oximetery, cardiac resuscitation measures, IBP, ECG, and Management of shock.

Unit 3 Interventional Procedures 12 hrs

- Embolization, GDC, Glue embolization, Vertebroplasty.
- PTBD,
- Stenting,
- PTA + stenting,
- stent graft,
- Embolization TIPS,
- Drainage procedure.
- Radiation sa`fety – patient safety, personnel safety, DAP

Unit 4 Basics of Nuclear Medicine 12 hrs

- Basic nuclear medicine physics, principle and equipments instrumentation

- Gamma Cameras and rectilinear scanners
- PET, SPECT
- Differences between PET AND SPECT, fusion techniques
- Image formation advantages limitation.
- Radioisotope generators.

Unit 5 Nuclear Medicine Protocol and Radiation Safety 12 hrs

- Basics of common clinical Nuclear Medicine procedures/techniques–comparison with different structural imaging studies advantages and limitations.

Radiation safety in Nuclear medicine

- Safe handling of Radioactive
- Storage of radioactive materials
- Procedures for handling spill
- Disposal of Radioactive waste
- Radiation monitoring devices Survey meters, Personnel dosimeters, Contamination monitor, Isotope calibrator
- Area monitor and Inventory of isotopes.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Understand the instrumentation of DSA equipment.
2. Knowledge of emergency drugs used.
3. To develop the knowledge of various angiography and venography studies.
4. To know the knowledge about nuclear medicine modalities and techniques**.**
5. Generalize knowledge of hybrid imaging and radiation safety in nuclear medicine.

Text Book:

1. Radiographic Imaging – Derrick
2. Physics and radiobiology of nuclear medicine Book by Gopal B. Saha

Reference book:

1. Concepts in Medical Radiographic Imaging – Marianne Tortoice

IMTT3506	CARE OF PATIENT AND PRINCIPLES OF MEDICAL EMERGENCIES PAPER-3	L 3	T 1	P 0	C 4

Course Description:

This course is designed to provide a comprehensive understanding of essential hospital practices related to patient care management. It covers fundamental topics including first aid treatment, infection control, principles of asepsis, drug storage, and departmental procedures such as biostatistics and record maintenance. The course aims to equip healthcare professionals with the knowledge and skills necessary to ensure high standards of patient care and efficient hospital operations.

Course Objective:

Students undergoing this course are expected to:

1. To Understand Trauma Care Principles and Emergency Radiographic Techniques
2. To learn and Develop Communication Skills with Patients.
3. To Understand Principles of Asepsis and Management of Communicable Diseases
4. To comprehend Manage Common Medical Emergencies
5. To Monitor Patient Vital Signs and Administer Drugs.

Unit 1 Trauma care & Emergency Radiography 12 hrs

- Procedures in the event of an accident
- Special positioning procedures & projections, modification of techniques needed for seriously injured patients.
- Radiographic factors - patient care & responsibilities
- Fluoroscopy and its application in emergency radiology

Unit 2 Development of communication skill with Patient 12 hrs

- General comfort and reassurance to the patient-patient education and explaining about the study- drugs used in the preparation of the patient.
- Handling of an unconscious patient, shifting of patients, hazards of lifting and maneuvering patients
- Rules for correct lifting transfer from chair/wheel chair or trolley to couch and vice-versa, safety of patient and worker while lifting & shifting of patients
- Handling of geriatric, pediatric and trauma patients -handling female patients-pregnant women.

Unit 3 Principle of asepsis and Communicable Diseases 12 hrs

- Sterilization and methods of sterilization, use of central sterile supply department
- Care of identification of instruments, surgical dressings in common use including filament swabs, elementary operating theatre procedure and Setting of trays and trolleys.

- Hygiene in the department-cross infection and prevention-handling of infectious patients in the department -application of asepsis.

Unit 4 Common Medical emergencies 12 hrs

- Common medical emergencies-helping in first aids & zero hour care / know to help in critical hour care.
- Trauma patients - handling trauma ward bed X-rays, Mass casualty managements-selection of study / procedures & radiographic views.
- Knowing the emergency care places in the hospital & preplanning checking & readiness of mobile units in functioning status
- Screening of the high risk patients in various procedure-supportive facilities to encounter emergency practical training.

Unit 5 Drugs in the Department 12 hrs

- Patient vital signs - temperature, pulse, respiration and blood pressure - normal values and methods of taking and recording them.
- Storage, classification, labeling and checking
- Regulations regarding dangerous and other drugs
- Units of measurement, special drugs, ant depressive, anti-hypertensive etc.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Perform trauma and emergency radiographic procedures with precision and confidence.
2. Communicate effectively with patients, ensuring their understanding and cooperation during imaging procedures.
3. Maintain aseptic conditions and implement infection control measures in the radiology department.
4. Recognize and manage common medical emergencies, providing immediate and appropriate care.
5. Accurately monitor patient vital signs and safely administer drugs, understanding their effects and potential complications.

Text Book:

1. Deeley – A guide to Radiotherapy nursing -Livingstone
2. Care of patient in diagnostic Radiography - Chesney & Chesney.
3. Chesney's Care of the patient in Diagnostic Radiography - Pauline J .Culmer.
4. Aid to Tray and Trolley Setting - Marjorie Haugher
5. First Aid - Haugher& Gardner

Reference Books:

1. A guide to Oncology nursing (Livingstone) –Deeley
2. Practical nursing and first- aid - Ross and Wilson. Livingstone.

IMTL3502	CLINICAL SKILLS 4 PRACTICAL/TRAINING PAPER	L 0	T 0	P 16	C 8

Course Description:

This course is designed to equip healthcare professionals with the advanced skills and knowledge necessary for the effective preparation, management, and positioning of patients during MRI scans, understand interventional procedures, and master trauma care principles and emergency radiographic techniques. Additionally, the course emphasizes the development of communication skills to enhance patient interactions and care.

Course Objective:

Students undergoing this course are expected to:

1. To provide the understanding of preparation, management and positioning of patients while performing MRI scan.
2. Ability to handle emergency situations in MRI.
3. To provide the understanding of interventional procedures
4. To Understand Trauma Care Principles and Emergency Radiographic Techniques
5. To learn and Develop Communication Skills with Patients.

Unit 1 **Basic of MRI** **48 hrs**

- Knowledge of history of MRI, basic principle and instrumentation.
- T1 and T2 relaxation, image formation, processing techniques, contrast, types of coil, RF shielding, site selection and safety.
- Advantages and disadvantages of MRI.

Unit 2 **MRI Protocol** **48 hrs**

- To know about the different types sequences, difference between CT and MRI. Image archiving and image format and storage.
- Imaging protocol, image quality, MRI artifacts and their remedies.
- Advancement and recent advance in MRI.

Unit 3 **Basic Interventional Principles** **48 hrs**

- Basic principle of interventional radiology, instrumentation and techniques involved.
- Procedure related and procedure done in intervention radiology.
- Patient and radiation safety, care and role of techno gist while handling patients.

Unit 4 **Basic Nuclear Medicine Principles** **48 hrs**

- Basic of nuclear medicine physics and instrumentation, knowledge about handling nuclear medicine machine and to know the control console keys.
- Various Procedure involved in the nuclear medicine department.
- Safe handling, store of radioactive material, handling spill and disposal methods. Radiation protection for patient and staffs.

Unit 5 **Medical ethics** **48 hrs**

- Knowledge about first aid care and management.

- Basics of infection control and principles of sterilization its types and methods. Department procedures involving staffing organization etc.
- And management of drugs and special drugs in the department labeling and checking look alike and sound alike.

Course learning outcomes:

After completion of the course, a student will be able to:

1. To know the knowledge about advanced MRI techniques.
2. To develop the knowledge of various angiography and venography studies.
3. To develop the knowledge about radio isotopes and its uses.
4. Perform trauma and emergency radiographic procedures with precision and confidence
5. Recognize and manage common medical emergencies, providing immediate and appropriate care.

Textbooks

1. Step by Step MRI
2. MRI made Easy for beginners – Govind B. Chavhan – Jaypee brothers and Medical Publishers (p) Ltd, New Delhi
3. First Aid – Haugher and Gardner.
4. Physics and radiobiology of nuclear medicine Book by Gopal B. Saha

Reference Books

1. Radiographic Imaging – Derrick
2. Practical Nursing and First Aid – Ross and Wilson.

IMTT3602a	MEDICAL ETHICS AND RADIOTHERAPY PRINCIPLE PROGRAMME ELECTIVE 2	L 3	T 0	P 0	C 3

Course Description:

This interdisciplinary course provides a thorough exploration of essential topics in modern healthcare, focusing on the ethical aspects of medical practice, professional confidentiality, efficient department staffing, and the management of environmental emergencies. Additionally, the course covers the principles of radiotherapy and the innovative use of virtual reality (VR) in medical training and patient care.

Course Objective:

Students undergoing this course are expected to:

1. To understand the ethical principles guiding medical practice.
2. To develop skills in creating and maintaining efficient, patient-centered healthcare teams.
3. To acquire knowledge about various types of environmental emergencies and their impact on health.
4. To learn about different radiotherapy techniques and their applications.
5. To understand the benefits and challenges of integrating VR technology into healthcare practices.

Unit 1 Ethics of Medical Practice 9 hrs

- Radiography professionalism-essential qualities of the radiographer
- Improving professional and personal qualities of Radiographer
- As a part of Hospital /Organization their responsibilities.
- Medico-legal considerations of radiographers clinical and ethical responsibilities-misconduct and malpractice.

Unit 2 Professional Confidential 9 hrs

- Search of profession confidence
- Maintenance decorum of the job responsibility
- The importance of records maintenance.
- Medico legal aspects of the radiographers work.

Unit 3 Department Staffing 9 hrs

- Department staffing and organization
- Records relating to patients and departmental statistics
- professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department
- appointments
- organization minimizing waiting time
- Out-patient and follow-up clinics
- Stock taking and stock keeping.

Unit 4 Environmental Emergencies and Radiotherapy principle 48 hrs

- Hypothermia
- Hyperthermia
- Heat stroke
- Malignant Hyperthermia
- Heat Exposure and Cold Exposure
- Physical components of telecobalt Unit
- Brachytherapy Unit
- Linear Accelerator
- Various types of sources used in Radiotherapy and their properties.

Unit 5 Virtual Reality 48 hrs

- VR Instrumentations - Headset, joysticks or controllers, tripod, field or VR room or VR box, connecting cables.
- Paring of the headset, joy sticks or controllers, creating room to perform VR.
- Tripod's fixing manually and connections.
- Skillities software uses.
- Calibrating for headset and joysticks or controllers. Advantages and disadvantages of VR and the software.

Course learning outcomes:

After completion of the course, a student will be able to:

1. Apply ethical decision-making frameworks to real-world scenarios.
2. Demonstrate leadership and teamwork skills in managing healthcare teams.
3. Coordinate with relevant agencies and stakeholders during environmental crises.
4. Develop treatment plans that ensure patient safety and efficacy.
5. Evaluate the effectiveness of VR applications in improving healthcare outcomes.

Text Book:

1. Mastering Virtual Reality: A Comprehensive Guide to Lear Virtual Reality Kindle Edition
2. Caroline's Emergency in the Streets Student Workbook
3. First Aid – Haugher and Gardner.
4. Practical Nursing and First Aid – Ross and Wilson.

Reference Books:

1. VIRTUAL REALITY (T\he MIT Press Essential Knowledge Series)
2. Practical nursing and first- aid - Ross and Wilson. Livingstone.
3. Notes on Radiological Emergencies – Ansell and Churchill
4. Care of patient in diagnostic Radiography – Chesney & Chesney.

Syllabus

V Semester

Program Electives -I

		L	T	P	C
IMTT3601a	**Orientation in Para Clinical Sciences**	**3**	**0**	**0**	**3**

Course Description:

This course offers an in-depth exploration of the respiratory and cardiovascular systems, upper and lower gastrointestinal tract (GIT), urological conditions, neurological conditions, and bone-related conditions. Designed for healthcare professionals and students in medical fields, the course covers the anatomy, physiology, pathophysiology, assessment techniques, and clinical management of these critical body systems.

Course Objective:

Students undergoing this course are expected to:

6. To learn and perform assessments and interpret findings related to respiratory and cardiovascular health.
7. To understand the structure and function of the upper and lower GIT.
8. To comprehend the anatomy and physiology of the urinary system.
9. To recognize common neurological disorders and their clinical features.
10. To identify common bone-related conditions and their clinical presentations.
11.

Unit 1 Respiratory and Cardiovascular System 9Hrs

- Pericarditis Heart Failure Definition and types (systolic vs. diastolic heart failure),
- Emphysema, Chronic Bronchitis its Definition and differentiation from acute bronchitis Pneumonia, Tuberculosis, Pleural Effusion
- Pneumothorax, Asthma, Chronic Obstructive Lung Disease (COLD) Overview of the respiratory system
- Overview of the cardiovascular system.

Unit 2 Assessment of Upper and Lower GIT 9 Hrs

- GI bleeding, peptic ulcer, Intestinal obstruction, IBD (Inflammatory Bowel Disease)
- Pancreatitis, Portal Hypertension, Ascites, Cirrhosis, Cholecystitis, and Appendicitis

- The above disease conditions definition and causes, pathophysiology, clinical presentation and diagnostic approaches, treatment and management and complication and patient care considerations.

Unit 3 Urological conditions 9 Hrs

- Hematuria**,** UTI, Urinary calculi, Polycystic Kidney disease**,** Renal failure**,**
- Hepatitis**,** Jaundice**,** Blunt injury**,** Perforation**,** Peritonitis definition,
- Pathophysiology, clinical presentation and diagnostic criteria, diagnostic tools, management and treatment and complication and prognosis for the above disease conditions.

Unit 4 Neurological conditions 9 Hrs

- Epilepsy, Stroke, Hemorrhage and Brain tumor,
- Aneurysm, Embolism, Hypertension and Unconsciousness,
- Parkinson's disease, Meningitis, clinical presentation and diagnostic criteria, diagnostic tools, management and treatment and complication and prognosis for the above disease conditions.

Unit 5 Bone and its related conditions 9 Hrs

- Arthritis, Scoliosis and kyphosis, Osteoarthritis, Osteomyelitis, Osteoporosis, Fracture,
- Bursitis, Carpal Tunnel Syndrome, Paget's Disease Of The Bone, Perthe's disease
- The above disease conditions definition and causes, pathophysiology, clinical presentation and diagnostic approaches, treatment and management and complication and patient care considerations.

Course learning outcomes:

After completion of the course, a student will be able to:

6. Perform comprehensive assessments of the respiratory and cardiovascular systems, recognizing normal and abnormal findings.
7. Conduct thorough evaluations of the upper and lower GIT, identifying signs and symptoms of common gastrointestinal disorders.
8. Assess urological conditions effectively, interpreting clinical findings to inform patient management.
9. Conduct detailed neurological assessments, recognizing and interpreting signs and

symptoms of neurological conditions.

10. Evaluate bone health and related conditions, understanding the clinical implications of various bone disorders.

Text book:

6. Kumar V, Abbas AK ,FaustoN, Aster JC .Robbins and Cotran Pathologic Basis of Disease, Professional Edition
7. E-Book. Elsevier Health Sciences;2014Aug27.

Reference book

8. Mohan H. Textbook of pathology. New Delhi:Jaypee brothers medical publishers
9. Boyd's . ATextbook of Pathology:An Introduction to Medicine. Academic Medicine.
10. Davidson I, Henry JB, Todd JC. Todd-Sanford clinical diagnosis by laboratory methods.

IMTT3601b Artificial Intelligence in Radiology and Imaging Sciences L T P C

3 0 0 3

Course Description:

This course provides a foundational understanding of Artificial Intelligence (AI) and its transformative role in Radiology and Imaging Sciences. Students will learn about machine learning, deep learning, computer vision, and their application in medical image interpretation, diagnosis, workflow optimization, and decision support systems.

Course Objectives:

The course should enable the students to:

- To introduce basic concepts of AI, machine learning, and deep learning.
- To explore applications of AI in various imaging modalities.
- To understand the principles of image processing using AI.
- To evaluate the benefits, limitations, and ethical implications of AI in radiology.
- To familiarize students with current AI tools and real-world case studies in diagnostic imaging.

UNIT 1 Introduction to Artificial Intelligence 9 Hrs

- History and Evolution of AI
- Definitions: AI, Machine Learning (ML), Deep Learning (DL)
- Types of AI: Narrow vs General AI
- Overview of AI Algorithms (Decision Trees, SVM, Neural Networks)
- AI vs Human Intelligence in Radiology

UNIT 2 AI in Medical Imaging Modalities 9 Hrs

- Role of AI in:
  - X-ray Interpretation
  - CT & MRI Image Analysis
  - Ultrasound and Mammography
- AI in Interventional Radiology
- AI in Functional Imaging (e.g., PET, fMRI)
- Image Reconstruction and Enhancement using AI

UNIT 3 Machine Learning and Deep Learning Concepts 9 Hrs

- Supervised vs Unsupervised Learning
- Convolutional Neural Networks (CNNs)
- Natural Language Processing (NLP) in Radiology Reports
- Data Annotation, Labeling, and Training Models
- Introduction to Image Segmentation, Classification, and Detection

UNIT 4 Practical Applications and Tools 9 Hrs

- Clinical Decision Support Systems (CDSS)
- Radiomics and AI in Precision Medicine

- AI for Workflow Optimization (e.g., triage, scheduling)
- AI Software/Platforms: Aidoc, Zebra Medical, Google Health, etc.
- Basics of Python, TensorFlow/Kera's for Medical Imaging (intro only)

UNIT 5 Challenges, Ethics, and Future Directions 9 Hrs

- Data Privacy, Security, and Bias in AI Models
- Legal and Regulatory Aspects (FDA, CE, CDSCO Guidelines)
- Role of the Radiologist in the AI Era
- Explainable AI and Trust in Automation
- Future Trends: Federated Learning, Augmented Intelligence

Course Outcomes:

After completion of the course, students will be able to

1. Explain the key concepts and types of AI relevant to medical imaging.
2. Identify AI-based image analysis methods across imaging modalities.
3. Understand how AI supports radiologists in detection, diagnosis, and workflow management.
4. Evaluate challenges, ethical issues, and regulatory standards in AI applications.
5. Apply basic AI tools in simple radiological data or imaging problems.

Text Books:

- Dreyer K.J., Geis J.R. – Artificial Intelligence in Radiology
- Hosny A., Aerts H.J.W.L. – AI in Healthcare: Radiology and Beyond

Reference Books:

- Liu S., Cheng J. – Deep Learning in Medical Image Analysis
- Langlotz C.P. – The Radiology Report: A Guide to Thoughtful Communication for Radiologists and Other Medical Professionals
- Arunima Haldar – Artificial Intelligence and Machine Learning in Healthcare

IMTT3601c	**Ethics and Pedagogy**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Description:

This course focuses on the ethical foundations and teaching methodologies required in healthcare, education, and allied sciences. It emphasizes professional ethics, moral responsibilities, educational philosophies, curriculum development, and modern teaching-

learning strategies. Students will explore how to apply ethical principles in professional practice and how to deliver knowledge effectively with integrity and sensitivity.

Course Objectives:

The course should enable the students to:

- To understand ethical theories, moral reasoning, and their application to professional practice.
- To study fundamental pedagogical approaches and teaching methodologies.
- To analyze ethical dilemmas and decision-making frameworks.
- To design effective, student-centered learning experiences.
- To foster professional values, respect for diversity, and lifelong learning attitudes.

UNIT 1 Introduction to Ethics and Professional Values 9 Hrs

- Definition and Nature of Ethics
- Ethical Principles in Healthcare, Education, and Research
- Professional Codes of Ethics (Medical, Allied Health, Teaching)
- Moral Development and Moral Reasoning (Kohlberg's Theory)
- Concepts of Integrity, Honesty, Respect, and Responsibility

UNIT 2 Theories and Frameworks of Ethics 9 Hrs

- Major Ethical Theories: Deontology, Utilitarianism, Virtue Ethics
- Bioethics and Professional Ethical Issues
- Ethical Decision-Making Models
- Confidentiality, Autonomy, Beneficence, and Justice
- Handling Ethical Dilemmas in Professional Practice

UNIT-3 Foundations of Pedagogy 9 Hrs

- Meaning, Nature, and Scope of Pedagogy
- Philosophical Foundations of Education: Idealism, Pragmatism, Realism, Existentialism
- Learning Theories: Behaviorism, Cognitivism, Constructivism
- Role of a Teacher/Facilitator
- Adult Learning Principles (Andragogy)

UNIT 4 Teaching-Learning Strategies and Methods 9 Hrs

- Traditional and Modern Teaching Methods
- Active Learning Strategies: Problem-Based Learning (PBL), Case-Based Learning (CBL), Team-Based Learning (TBL)
- Use of Technology in Teaching (E-learning, Blended Learning)
- Assessment Techniques: Formative and Summative
- Lesson Planning and Classroom Management.

UNIT 5 Ethics in Teaching and Research 9 Hrs

- Ethical Issues in Education and Research
- Plagiarism, Copyright, Intellectual Property Rights
- Responsibilities of Teachers and Researchers
- Diversity, Equity, and Inclusion in Education
- Promoting Academic Integrity and Respectful Learning Environments

Course Outcomes:

After completion of the course, students will be able to

- Explain the significance of ethics in professional practice and education.
- Apply ethical decision-making models to real-world situations.
- Develop effective lesson plans using pedagogical theories and strategies.
- Demonstrate sensitivity to ethical, cultural, and social issues in teaching and healthcare delivery.
- Reflect critically on personal values and professional responsibilities.

Text Books:

- Beauchamp, T.L., Childress, J.F. – Principles of Biomedical Ethics
- Ornstein, A.C., Levine, D.U. – Foundations of Education

Reference Books:

- Dhillon, J.S., Dhillon, S.S. – Professional Ethics and Human Values
- Freire, Paulo – Pedagogy of the Oppressed
- Richards, J.C., Rodgers, T.S. – Approaches and Methods in Language Teaching
- Strike, K.A., Soltis, J.F. – The Ethics of Teaching

VI Semester

Program Electives-II

		L	T	P	C
IMTT3602a	**Medical Ethics and Radiotherapy Principle**	**3**	**0**	**0**	**3**

Course Description:

This interdisciplinary course provides a thorough exploration of essential topics in modern healthcare, focusing on the ethical aspects of medical practice, professional confidentiality, efficient department staffing, and the management of environmental emergencies. Additionally, the course covers the principles of radiotherapy and the innovative use of virtual reality (VR) in medical training and patient care.

Course Objective:

Students undergoing this course are expected to:

6. To understand the ethical principles guiding medical practice.
7. To develop skills in creating and maintaining efficient, patient-centered healthcare teams.
8. To acquire knowledge about various types of environmental emergencies and their impact on health.
9. To learn about different radiotherapy techniques and their applications.
10. To understand the benefits and challenges of integrating VR technology into healthcare practices.

UNIT 1 Ethics of Medical Practice 9 Hrs

- Radiography professionalism-essential qualities of the radiographer
- Improving professional and personal qualities of Radiographer
- As a part of Hospital /Organization their responsibilities.
- Medico-legal considerations of radiographers clinical and ethical responsibilities-misconduct and malpractice.

UNIT 2 Professional Confidential 9 Hrs

- Search of profession confidence
- Maintenance decorum of the job responsibility
- The importance of records maintenance.
- Medico legal aspects of the radiographers work.

UNIT 3 Department Staffing 9 Hr

- Department staffing and organization
- Records relating to patients and departmental statistics
- professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department
- appointments
- organization minimizing waiting time
- Out-patient and follow-up clinics
- Stock taking and stock keeping.

UNIT 4 Environmental Emergencies and Radiotherapy Principle 9 Hrs

- Hypothermia
- Hyperthermia
- Heat stroke
- Malignant Hyperthermia
- Heat Exposure and Cold Exposure
- Physical components of telecobalt Unit
- Brachytherapy Unit
- Linear Accelerator
- Various types of sources used in Radiotherapy and their properties.

UNIT 5 Virtual Reality 9 Hrs

- VR Instrumentations - Headset, joysticks or controllers, tripod, field or VR room or VR box, connecting cables.
- Paring of the headset, joy sticks or controllers, creating room to perform VR.
- Tripod's fixing manually and connections.
- Skillitics software uses.
- Calibrating for headset and joysticks or controllers. Advantages and disadvantages of VR and the software.

Course learning outcomes:

After completion of the course, a student will be able to:

6. Apply ethical decision-making frameworks to real-world scenarios.
7. Demonstrate leadership and teamwork skills in managing healthcare teams.
8. Coordinate with relevant agencies and stakeholders during environmental crises.

9. Develop treatment plans that ensure patient safety and efficacy.
10. Evaluate the effectiveness of VR applications in improving healthcare outcomes.

Text Book:

5. Mastering Virtual Reality: A Comprehensive Guide to Lear Virtual Reality Kindle Edition
6. Caroline's Emergency in the Streets Student Workbook
7. First Aid – Hauger and Gardner.
8. Practical Nursing and First Aid – Ross and Wilson.

Reference Books:

5. VIRTUAL REALITY (The MIT Press Essential Knowledge Series)
6. Practical nursing and first- aid - Ross and Wilson. Livingstone.
7. Notes on Radiological Emergencies – Ansell and Churchill
8. Care of patient in diagnostic Radiography – Chesney & Chesney.

IMTT3602b	**Biostatistics and Research Methodology**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Description:

This course introduces students to the fundamental concepts and applications of statistics in medical radiology and imaging technology. It covers methods of data collection, organization, analysis, and interpretation. Through descriptive and inferential statistics, students will learn to make informed decisions based on medical data. Emphasis will be placed on the practical application of statistics in diagnostic imaging and healthcare research.

Course Objectives:

The course should enable the students to:

- To explain the basic concepts, types, and importance of statistics in healthcare.
- To teach students how to collect, tabulate, and graphically represent data.
- To equip students with the skills to apply measures of central tendency and dispersion.
- To develop a foundational understanding of probability, distributions, and normality.

- To apply sampling techniques and understand statistical inference in medical studies.

UNIT 1 Fundamentals of Statistics 9 Hrs

- Introduction to Statistics: Meaning, Definition, and Characteristics
- Importance of Statistics in Medical Imaging and Radiology
- Branches of Statistics: Descriptive and Inferential
- Types of Variables: Discrete, Continuous, Dependent, Independent
- Measurement Scales: Nominal, Ordinal, Interval, Ratio

UNIT 2 Data Presentation and Graphical Representation 9 Hrs

- Data Organization: Raw Data, Array, Frequency Distribution
- Tabulation: Rules and Format of Frequency Tables
- Graphical Representation:
    1. Histogram
    2. Frequency Polygon
    3. Smooth Frequency Polygon
    4. Cumulative Frequency Curve (Ogive)
    5. Normal Probability Curve
    6. Basic Principles of Graph Construction

UNIT 3 Measures of Central Tendency 9 Hrs

- Need and Purpose of Central Tendency
- Mean: Calculation for Ungrouped and Grouped Data
- Median: Meaning, Interpretation, and Calculation
- Mode: Meaning and Calculation
- Comparison: Mean vs. Median vs. Mode
- Guidelines for Selection of Appropriate Measure

UNIT 4 Measures of Variability / Dispersion 9 Hrs

- Purpose of Measuring Dispersion
- Range and Average Deviation
- Variance and Standard Deviation (Ungrouped and Grouped Data)

- Interpretation of Dispersion in Medical Data
- Application in Quality Control and Clinical Research

UNIT 5 Probability, Distributions, and Sampling 9 Hrs

- Probability: Basic Concepts and Rules
- Standard Distributions: Binomial Distribution, Normal Distribution
- Divergence from Normality: Skewness, Kurtosis
- Sampling Techniques: Need and Criteria for Good Samples, Types of Sampling: Random, Systematic, Stratified, Cluster Sampling Errors and Variation, Concept of Tests of Significance

Course Outcomes:

After completion of the course, students will be able to

1. Describe the nature and role of statistics in medical imaging and radiology.
2. Organize and represent data through tables and graphs.
3. Apply statistical tools to compute and interpret measures of central tendency and variability.
4. Understand and apply probability distributions in healthcare contexts.
5. Demonstrate knowledge of sampling methods and perform basic statistical inference.

Text Books:

- Mahajan B.K. – Methods in Biostatistics for Medical Students and Research Workers, Jaypee Brothers
- Khan & Khanum – Biostatistics for the Health Sciences, Ukas Publications

Reference Books:

- Daniel, W.W. – Biostatistics: A Foundation for Analysis in the Health Sciences, Wiley
- Pagano, M., Gauvreau, K. – Principles of Biostatistics, Duxbury Press
- Sundar Rao, P.S.S. – An Introduction to Biostatistics: A Manual for Students in Health Sciences, Prentice Hall

IMTT3602c Professionalism and Values L T P C

3 0 0 3

Course Description:

This course is designed to instill core professional behaviors, ethical principles, and values essential for healthcare and allied health professionals. It covers professional identity, ethics, interpersonal skills, patient-centered care, cultural sensitivity, and continuous self-improvement necessary for building trust and delivering high-quality healthcare services.

Course Objectives:

The course should enable the students to:

- To define professionalism and its significance in healthcare practice.
- To develop ethical reasoning and understanding of healthcare ethics and law.
- To build skills in communication, empathy, teamwork, and respect for diversity.
- To promote accountability, responsibility, and commitment to lifelong learning.
- To foster leadership, integrity, and humanistic patient care attitudes.

UNIT 1 Introduction to Professionalism 9 Hrs

- Definition and Attributes of Professionalism
- Importance of Professional Behavior in Healthcare
- Roles and Responsibilities of Healthcare Professionals
- Professional Boundaries and Relationships
- Professional Identity Formation

UNIT 2 Values and Ethics in Healthcare 9 Hrs

- Core Values: Compassion, Respect, Excellence, Integrity, Stewardship
- Principles of Healthcare Ethics: Autonomy, Beneficence, Non-maleficence, Justice
- Ethical Decision-Making Models
- Patient Rights and Informed Consent
- Confidentiality and Privacy (HIPAA Basics)

UNIT 3 Communication and Interpersonal Skills 9 Hrs

- Fundamentals of Professional Communication
- Empathy, Active Listening, and Patient-centered Care
- Handling Difficult Conversations
- Teamwork and Interdisciplinary Collaboration
- Conflict Resolution Strategies

UNIT 4 Diversity, Equity, and Cultural Competence 9Hrs

- Understanding Cultural Sensitivity and Diversity in Healthcare
- Addressing Health Disparities and Bias
- Inclusive Care Practices
- Respecting Different Beliefs, Cultures, and Traditions
- Global Perspectives on Professionalism

UNIT 5 Professional Growth and Lifelong Learning 9 Hrs

- Reflective Practice and Self-Assessment
- Importance of Continuing Education and Skills Upgradation
- Professional Organizations and Accreditation Bodies
- Leadership in Healthcare Settings
- Managing Stress, Burnout, and Promoting Wellness

Course Outcomes:

After completion of the course, students will be able to

- Demonstrate professional behaviours and decision-making in healthcare settings.
- Apply ethical principles and legal standards in clinical practice.
- Communicate effectively and empathetically with patients and colleagues.
- Respect and work across diverse cultures, beliefs, and backgrounds.
- Uphold values such as honesty, integrity, accountability, and compassion.

Text Books:

- Koontz H. & Weirich H. – Essentials of Management
- Stoner J.A.F., Freeman R.E. – Management

Reference Books:

- Robbins S.P., Coulter M. – Management
- Tripathi P.C., Reddy P.N. – Principles of Management
- Rao V.S.P., Narayana P.S. – Organizational Theory and Behaviour

IV YEAR

VII & VIII Semester

Course Code	Course Name	Periods per week			Credits	Hours per Semester
		L	T	P		
IMTI4501	Internship-I			**48**	**25**	**1104**
TOTAL				**48**	**25**	**1104**

Course Code	Course Name	Periods per week			Credits	Hours per Semester
		L	T	P		
IMTI4502	Internship-II			**48**	**25**	**1104**
IMTP4501	Project			**8**	**6**	**180**
TOTAL				**56**	**31**	**1284**

Internship Guidelines
2023 Admitted Batch

DESCRIPTION

The internship for BSc Allied Health Science spans one year, providing students with extensive practical training across key departments of various Hospitals. This hands-on experience aims to develop confidence, proficiency, and advanced skills necessary for a career in Allied Health Sciences.

OBJECTIVES

- **Skill Development:** Develop competence in beginning and intermediate clinical skills procedures relevant to respective departments.
- **Observational Learning:** Observe and understand advanced and specialized procedures in hospital settings.
- **Clinical Practice**: Apply theoretical knowledge gained in classrooms to practical settings, demonstrating proficiency in conducting invasive and noninvasive techniques.
- **Logbook Maintenance**: Maintain a detailed work logbook endorsed by supervisors or trainers, documenting daily activities and achievements during the internship.

GENERAL GUIDELINES

1. Every candidate, after passing the final semester exams (should not have any back papers), is required to undergo a compulsory rotatory internship for a period of 12 months (365 calendar days) to be eligible for the award of the degree.
2. Internship is in partial fulfilment of the requirements of the course, and no candidate shall be declared to have completed the course otherwise.
3. All parts of the internship shall be done in the teaching hospital under a National Medical Commission (NMC)/National Accreditation Board for Hospital and Healthcare Providers (NABH).
4. The interns should conduct themselves in a manner befitting the profession and should dress appropriately in their respective work areas.
5. Interns should complete postings in all specialties as decided by the department.
6. Students are eligible to commence internship from next month of completion of their end semester examination (6^{th} semester).

7. Each intern should maintain a logbook wherever he/she is posted. The intern has to get a signature from the supervising staff at the end of each posting.
8. Project work/ duties during the internship must be duly undertaken and performed.
9. A review meeting to assess the progress of the project and logbook will be conducted on the first Saturday of every third month. A detailed report on the progress must be submitted following each meeting.
10. The intern is allowed to take his internship from other than the parent institution, provided there is a NOC obtained from both the parent institution and the institution offering the internship. Dean has to permit the student for internship after verifying the NOC.

GUIDELINES FOR COMPLETION, LEAVE &REPETITION

COMPLETION

The internship shall be completed within months of passing the final semester examination whenever in force but not limited to.

LEAVE

Normal Leave: Intern shall be permitted a maximum of 12 days leave with prior permission during the entire period of internship.

The entire period of 12 days cannot be availed during any one-week / two week postings applicable to a single department.

Medical Leave: Medical leave shall be included within the 12 days of normal leave. Any medical leave beyond this period shall be recommended only by a duly constituted committee at the college level, which consists of the Dean, HOD, Supervisor and medical practitioner. The internship shall be extended if the leave of absence extends beyond this period**.**

TIME DISTRIBUTION

Internship (Practical training:1500 Hours)		
Section	**Topics**	**Hours**
X rays	Routine X rays and Special X rays	**300**
Fluoroscopy, Interventional Radiology, Operation theatre Radiography	All fluoroscopy procedures (contrast) Cath-lab procedures (Diagnostic Procedures) C-arm	**250**
CT	Routine CT scans (Plain and contrast studies-NCCT, CECT, HRCT, CT guided biopsy)	**300**
MRI	Routine MRI scans (with contrast and without contrast) , MRA, MR Spectroscopy, Advanced MRI techniques	**300**
Mammography	Routine Views in Mammography (CC, MLO)	**150**
USG	Know the knowledge about USG equipment, patient preparation and procedures and sono-mammography	**50**
Portable x rays	All portable x rays in ICU's , ward side radiography and emergency radiography	**150**
Total		**1500**

COMPETENCIES TO BE ACQUIRED DURING INTERNSHIP

BSc Imaging Technology Internship Competencies

Upon completion of their internship, students in the BSc Imaging Technology program should demonstrate the following competencies:

1. Ability to operate imaging equipment (e.g., X-ray, CT, MRI, Portable X ray and Mammography) to acquire high quality images.
2. Knowledge of patient positioning and adherence to imaging protocols for accurate and consistent results.
3. Understanding of radiation safety principles and adherence to ALARA (As Low As Reasonably Achievable) guidelines.
4. Safe preparation and administration of contrast agents.
5. Manage information to enable effective, timely, accurate diagnostic information.

6. Perform routine x-rays, fluoroscopy procedures, portable x rays, mammography, CT scans and MRI etc., and Perform contrast and non- contrast studies.
7. Competency in performing quality control tests on imaging equipment to ensure optimal functionality.
8. Ability to assess image quality, identifying artifacts and take corrective measures if necessary.
9. Adhere to ethical standards, including patient confidentiality and informed consent.
10. Recording patient data and image findings accurately in health care records.
11. Communicate with other members of healthcare team, and patients in an effective manner.
12. Recognizing normal versus abnormal anatomical structures and basic pathologies.
13. Upgrade knowledge and skills in a changing healthcare scenario.
14. Conducting routine checks on imaging equipment and identifying technical issues.
15. Communicating effectively with patients to explain procedures, ensure comfort.
16. Implementing radiation protection measures, understanding MRI safety.
17. Modifying imaging techniques or parameters based on patient needs or specific clinical indications.
18. Familiarity with DICOM (Digital Imaging and Communications in Medicine) standards and using PACS for data management.
19. Applying basic post-processing techniques to enhance image quality or focus on specific details.

Academic Project/Dissertation

A Student wants to complete the project work in addition to an Internship.

Course Code : IMTI4501

Course Name : Internship-I

S. No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	**Internship**	80	Continuous Evaluation	• Twenty (20) marks for review assessment. • Each review assessment will carry 20 marks. • A total of three review assessment will be held over 12 months, scheduled on the first Saturday of every third month. • The 20 marks for each review assessment will be distributed as follows: 5 marks for the logbook, 5 marks for the report, 5 marks for the presentation, and 5 marks for the viva. • 20 Marks for final Internship report submission.
2	**Final Assessment**	20	End Assessment	Twenty (20) marks • Final Presentation (10marks) • Viva-voce (10 marks)
	Total	**100**		

Course Code : IMTI4502

Course Name : Internship-II

S. No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	**Internship**	80	Continuous Evaluation	• Twenty (20) marks for review assessment. • Each review assessment will carry 20 marks. • A total of three review assessment will be held over 12 months, scheduled on the first Saturday of every third month. • The 20 marks for each review assessment will be distributed as follows: 5 marks for the logbook, 5 marks for the report, 5 marks for the presentation, and 5 marks for the viva. • 20 Marks for final Internship report submission.
2	**Final Assessment**	20	End Assessment	Twenty (20) marks • Final Presentation (10marks) • Viva-voce (10 marks)
	Total	**100**		

Course Code : IMTP4501

Course Name : Project Work

S. No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	**Project Work**	80	Continuous Evaluation	Continuous Assessment -80mark Project Planning and Proposal approval - 20 mark Project Execution - 20 mark Log Book- 20 mark Project Report - 20 mark
2	**Project Work/Dissertation**	20	Final Assessment	Twenty (20) marks • Final Presentation (10marks) • Viva-voce (10 marks)
	Total	**100**		

SEMESTER VII INTERNSHIP

Course Outcome:

1. To became a competent Allied Health science professional Engaged in Patient care
2. To learn the routine functioning of the health Care System
3. To gain practical and clinical skills
4. To learn various Difficulties in the field through valuable experience
5. To explore the broad field opportunities and engage in Specialization

SEMESTER VIII INTERNSHIP & PROJECT WORK

Course Outcome:

1. To conduct High quality Scientific research
2. Ability to apply the excellent theoretical knowledge gained in the Academic career
3. Pursue academic excellence through relevant research
4. To identify existing research gaps
5. Ability to engage in furtherance of the medical field