GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM | HYDERABAD | BENGALURU

Accredited by NAAC with A^{++} Grade

Regulations and Syllabusof

B.Sc. RADIOLOGY AND IMAGING TECHNOLOGY

(W.e.f. 2023-2024 admitted batch)

B.Sc. RADIOLOGY AND IMAGING TECHNOLOGY

(Effective from 2023-24 Admitted batch)

ADMISSIONS

Admissions into B.Sc. Paramedical (Specialization in Radiology and Imaging Technology) program of GITAM (Deemed to be University) are governed by GITAM (Deemed to be University) admission regulations.

ELIGIBILITY CRITERIA

Eligibility:

Qualified in Intermediate or 10+2 equivalent examinations with 60%Aggregate marks in Physics, Chemistry, Biology and English or APOSS (Open school intermediate) with GPA 5.5 or equivalent.

ABOUT THE COURSE:

Our popular Medical Science program B. Sc. Radiology and Imaging Technology lasts for 3 years and prepares students to diagnose and treat various illnesses and disorders utilizing X-rays. The candidate should have a sharp eye for detail, excellent research abilities, the ability to analyse technical data, and the ability to utilize radiography equipment with the highest accuracy if they want to develop a successful career in radiology and radiography and candidates may become ready for that by doing a B. Sc. Radiology and Imaging Technology programme.

COURSE ADMINISTRATION

- The course is delivered in 6semesters with each semester dealing with prescribed subjects.
- All subjects are mandatory for the student. The student is trained in both theory and practical/clinical aspects of the course. Student is assessed by formative and summative assessment every semester.
- There will be on internal exam before the semester –end exam. Candidates should score
- A minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.

A candidate shall be declared to have passed in the concerned subject, if he fulfills the
Following criteria

- He/ She secured 35% marks in the internal assessment and
- He/ She secured 40%marks in theory and
- 50% marks in practical & viva and
- 50% marks in theory, practical &viva put together in each subject separately. Course objectives and learning outcomes are specified leading to clarity on what a student would be able to do at the end of the program.

STRUCTURE OF THE PROGRAM

The Program consists of

- Foundation Course (FC)
- Core course (C)

Each academic year consists of two semesters. The curriculum structure of the BSc Paramedical program and the contents for various courses offered are recommended by the Board of Studies concerned and approved by the Academic Council.

MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English. The method of instruction shall comprise classroom lectures, guest lectures, demonstrations, presentations, role-playgroup discussions, seminars, class tests, case analysis, situational analysis, practical training etc.

ATTENDANCE REQUIREMENTS

- A candidate must have not less than 75% attendance in theory and 80% in practicals separately.
- Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- There will be one internal exam before the semester- end exam.
- Internal marks will be considered for eligibility for the semester exam but will not be added for the semester exam.

EVALUATION:

CONTINUOUS ASSESSMENT AND EXAMINATIONS

- There will be one internal exam before the semester – end exam.
- Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- Internal marks will be considered for eligibility for the semester exam but will not be added for the semester exam.

EXAMINATION DURATION AND PATTERN

a. Anatomy, Biochemistry & Physiology, Microbiology, Pathology, Pharmacology, Community medicine, General Medicine, General Surgery & Parent Department-
   100 marks each
   Theory : 60 marks
   Practical : 40 marks (Practical: 30marks + Viva-voce: 10marks)

b. English, Psychology, EVS, Computer - 40 marks each
   Theory : 40 marks

c. Pattern of question paper

60 marks paper (Duration: 2 ½ Hours)

1 Q	Essay	(1x 10m = 10 marks)
2 Q to 5 Q	Short notes	(total 4 Q, 4 x 5 m = 20 marks)
6 Q to 15 Q	very short notes	(total 10 Q, 10 x 3m = 30marks)

40 marks paper (Duration: 2 hours)

1 Q	Essay question	(1 x10 m = 10 marks)
2 Q to 4 Q	Short notes	(3 Q x 5 = 15marks)
5 Q to 9 Q	Very short notes	(5 Q x 3 m = 15marks)

PAPER SETTING

Paper setting, paper valuation and practical examination is done by internal examiners from the I to VI semesters.

CRITERIA FOR EXAMINER

- Professor or Associate Professor or Assistant Professor with minimum of 2years of teaching experience after post-graduation are eligible to be as examiners

Grace Marks: Maximum 5 marks can be awarded to one subject provided he passedall the other subjects or these 5 marks can be split for maximum 2 subjects. Providedthe candidate has passed rest of the subjects.

A candidate shall be declared to have passed the examination if…

(a) He / She secured 40% marks in theory.
(b) 50% marks in practical & viva
(c) 50% marks in theory, practical & viva put together in each subject separately.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	To impart knowledge and skill in accordance with the requirement in basic medical sciences and paramedical specialty as relevant
PEO 2	To impart training required to carry out necessary investigative procedures accurately to facilitate proper diagnosis and prognosis of diseases
PEO 3	To train the student to perform routine as well as special investigative procedures in the concerned paramedical specialty
PEO 4	To impart knowledge and practical training required to operate and maintain all equipment used in the concerned specialization
PEO 5	To impart knowledge about communication skills, basic researchskills, professionalism, and ethical aspects required in various health care settings for effective delivery of health care

PROGRAMME OUTCOMES (POs)

PO1	To prepare a cadre of healthcare technologists who can effectively assist senior health professionals in the delivery of quality healthservices.
PO2	To prepare skilled paramedical human resources for all levels of the healthcare delivery system from primary to tertiary care level.
PO3	To train the students to carry out necessary procedures accurately and to facilitate proper diagnosis and prognosis of diseases.
PO4	To enable to perform routine as well as special investigative procedures inthe concerned paramedical specialty.
PO5	To develop knowledge and skill in accordance with the demand in the field of paramedical specialty as applicable.
PO6	To enable to operate and maintain all types of equipment used in the concerned specialization.
PO7	To make capable to support advanced testing activities and Research.
PO8	To enable to work as Supervisor/Trainer/Teacher in the field of Paramedical sciences.
PO9	To enable to communicate and interact effectively with non-clinical and clinical persons in various healthcare environments
PO10	To be able to present oneself in an ethical and professional manner
PO11	To equip the paramedical staff with modern skills and knowledge to bring them at par with other national and international standards
PO12	Students who complete these programs will be able to work in both an individual and team environment

PROGRAM SPECIFIC OUTCOMES (PSOs)

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

PSO1	To be able to demonstrate quality patient care skills including Professionalism, patient consent and ethical behaviors as specified in the code of ethics.
PSO2	To be able to undertake X-RAY, Mammography, CT scan and MRI Procedures independently.
PSO3	Assist in specialized radiological procedures.
PSO4	To be able to do the image processing and evaluation for technical quality.
PSO5	To be able to handle, take care and maintenance of all radiological and Imaging equipment independently.
PSO6	Should ensure radiation protection and quality assurance.
PSO7	Able to identify and manage emergency situations.
PSO8	Able to receive and document verbal, written and electronic orders in the Patient's medical record.

SUBJECTS FOR SEMESTER EXAMS WITH HOURS AND CREDITS

Semester - I									
SI.No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	23ANAT1001	Anatomy - I	30	15	45	2	0.5	2.5	C
2	23BCHE1001	Biochemistry	30	30	60	2	1	3	C
3	23PSGY1001	Physiology - I	30	30	60	2	1	3	C
4	LANG1141	English	30	-	30	2	-	2	FC
5	PSYC1031	Psychology	15	-	15	1	-	1	FC
6	CSCI1301	Computer Basics	30	-	30	2	-	2	FC
7	ENVS1051	Environmental Science	15	-	15	1	-	1	FC
8	23RADG1001	Conventional Radiography Part - I		255	255		8.5	8.5	C
		Total	**180**	**330**	**510**	**12**	**11**	**23**	
Semester -II									
1	23ANAT2001	Anatomy - II	30	30	60	2	1	3	C
2	23PSGY2001	Physiology - II	60	30	90	4	1	5	C
3	23RADG2001	Conventional Radiography Part - II		300	300		10	10	C
		Total	**120**	**360**	**480**	**6**	**12**	**18**	
Semester - III									
1	23PHCG1001	Pharmacology - I	15	15	30	1	0.5	1.5	C
2	23MIBG1001	Microbiology - I	30	15	45	2	0.5	2.5	C
3	23PATH1011	Pathology - I	30	15	45	2	0.5	2.5	C
4	23CMED1001	Community Medicine - I	30	15	45	2	0.5	2.5	C
5	23NURS1001	Basics of Patient care & Hospital orientation	15	-	15	-	-	-	FC
6	23RADG2011	Conventional Radiography Part - III (RIT - I)	30	330	360	2	11	13	C
		Total	**150**	**390**	**540**	**9**	**13**	**22**	
Semester - IV									

1	23PHCG2001	Pharmacology - II	15	15	30	1	0.5	1.5	C
2	23MIBG2001	Microbiology - II	15	30	45	1	1	2	C
3	23PHCG2001	Pathology - II	15	15	30	1	0.5	1.5	C
4	23CMED2001	Community Medicine - II	30	15	45	2	0.5	2.5	C
7	23RADG2021	Ultrasonography (RIT - II)	30	345	375	2	11.5	13.5	C
		Total	**105**	**420**	**525**	**7**	**14**	**21**	
Semester - V									
1	23GMED1001	General Medicine	15	30	45	1	1	2	C
2	23GSUR1001	General Surgery	15	30	45	1	1	2	C
3	23RADG3001	Basics & Advances in CT Imaging Physics (RIT - III)	30	180	210	2	6	8	C
4	23RADG3011	Doppler and special Radiographic Procedures (RIT - IV)	30	180	210	2	6	8	C
		Total	**90**	**420**	**510**	**6**	**14**	**20**	
Semester - VI									
1	23RADG3021	Basics & Advance in MRI Imaging Physics (RIT - V)	120	300	330	8	10	18	C
2	23RADG3031	Techniques in CT & MRI (RIT - VI)	30	30	60	2	1	3	C
3	23RADG3041	Interventional CT Procedures and Contrast Radiography (RIT - VII)	30	30	60	2	1	3	C
		Total	**180**	**360**	**450**	**12**	**12**	**24**	
TOTAL								**128**	

SEMESTER - I

ANATOMY – I

23ANAT1001

INTRODUCTION:

Anatomy deals with the structural organization of the human body. Anatomy forms the basis for the practice of medicine. Students need core knowledge of human anatomy as they venture into the clinical domain. The department of anatomy is committed to providing quality education for students by its fully-equipped facilities. Cadaveric dissections & specimens, histology slides, and VARIOUS models provide the ideal environment to learn anatomy during the 1st year of their course.

COURSE OBJECTIVES:

- The objective of this subject is to provide an outline of anatomy to improve the students understanding of the technical and diagnostic procedures used, with special emphasis on applied aspects.

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

Theory:

UNIT	CONTENT	No. OF HOURS
I	Introduction to anatomical terms andorganization of the human body Introduction to anatomical terms relative to position – anterior, ventral, posterior dorsal,superior, inferior, median, lateral, proximal,distal, superficial, deep, prone, supine, palmar and plantar Anatomical planes (axial/ transverse/horizontal, sagittal/vertical plane andcoronal/frontal/oblique plane) Movements (flexion, extension, abduction,adduction, medial rotation, lateral rotation,inversion, eversion, supination, pronation, plantar flexion, dorsal flexion and circumduction Cell structure, Cell division, Tissue - definition, types, characteristics,classification, location Hyaline, fibro cartilage, elastic cartilage, Histology of Bone, Features of skeletal, smooth and cardiacmuscle.	5
II	The Respiratory system Structure of the organs of respiration, , Pleura, Morphology of Lungs, Broncho Pulmonary Segments, Histology of Lungs	5
III	Cardiovascular system Morphology of Heart, Internal features of Heart – right atrium and right ventricle Chambers & Openings of the heart, Types of Circulation, Coronary Circulation, Aorta and its branches	8

IV	Muscular system types of muscles Muscles of Upper Limb, Muscles of back, diaphragm, Muscles of arm, Muscles of Forearm Significance of Deltoid Muscle, Muscles of Lower Limb, Muscles of thigh, Muscles of Leg	5
V	Muscular system types of muscles Muscles of Upper Limb, Muscles of back, diaphragm, Muscles of arm, Muscles of Forearm, Significance of Deltoid Muscle, Muscles of Lower Limb, Muscles of thigh, Muscles of Leg Significance of Gluteus Maximus Muscle, Blood vessels of Upper Limb : Arm- Axillary artery, brachial artery fore Arm - Radial artery, ulnar Artery, medial cubital vein, Blood vessels of Lower Limb : Thigh femoral artery, popliteal artery	7

Practical:

UNIT	CONTENT	No. OF HOURS
I	Microscopy, Histology of tissues – cartilage, Bone and Lung	2
II	Intercostal space, Heart, Lungs	3
III	Upper Limb – Bones, Muscles, Axillary artery, brachial artery, fore Arm - Radial artery, ulnar Artery, medial cubital vein, Nerves : Axillaries Nerve , Median Nerve, Ulnar Nerve, radial Nerve	4
IV	Lower Limb – Bones, Muscles, Thigh femoral artery, popliteal artery Nerves of Lower Limb: Femoral Nerve, Sciatic Nerve, Obturator Nerve	4
V	Normal X- Rays, Surface markings	2

Course Outcomes:

- Explains knowledge on the basic anatomy of various regions like limbs, thoracicand abdominal viscera, osteology, neuroanatomy, endocrine system, basic radiology which provides a foundation in completion of the course.
- Explain the anatomy and functions of various Tissues and cells, an organization ofa cellular system.
- Understand the functioning of lungs, heart, and blood vessels.

References:

1. BD Chaurasia : Handbook of general anatomy
2. Textbook of Anatomy & Physiology by InduKhurana&Arushi
3. Textbook of Anatomy & Physiology by PR Ashalatha& G Deepa
4. Textbook of Anatomy & Physiology by Ashalatha N Nandedkar, Vijay D Joshi & Sadhana – 3rd edition

BIOCHEMISTRY
23BCHE1001

Introduction:

Biochemistry deals with the structures, bonding, functions, and interactions of biological macromolecules, such as proteins, nucleic acids, carbohydrates, and lipids. They provide the structure of cells and perform many of the functions associated with life. Biochemistry focuses on understanding the chemical basis which allows biological molecules to give rise to the processes that occur within living cells and between cells, in turn relating greatly to the understanding of tissues and organs, as well as organism structure and function.

Course Objectives:

Students must understand the basic principles of Biochemistry and the biochemical processes that take place in the human body and their applied aspects.

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 30

THEORY	CONTENT	No. OF HOURS
UNIT - I		
Cell biology	Recall the structure and functions of the cell and cell membrane. List intracellular organelles and mention their functions.	1
Nucleotide and Nucleic acid chemistry	Show nucleotide composition and list functions of free nucleotides in body Compare between DNA & RNA, explain structure and functions of DNA & RNA (tRNA, rRNA, mRNA)	1
Enzymes	I) Define and classify with examples, active site, cofactor, proenzyme. II) List the factors affecting enzyme activity III) Define isoenzymes, enzymology (clinical significance of enzymes)	3
UNIT - II		

Carbohydrate Chemistry & Metabolism	Define carbohydrates, classify carbohydrates with examples, explain glycosidicbond Illustrate composition, sources, and functions of monosaccharides, disaccharides, oligosaccharides, and polysaccharides. Illustrate glycolysis-aerobic, anaerobic, citric acid cycle, substratephosphorylation Elaborate glycogen metabolism -glycogenesis, glycogenolysis, metabolicdisorders of glycogen, gluconeogenesis, Cori cycle. Summarize hormonal regulation of glucose, glycosuria, diabetes mellitus	4
Lipid Chemistry& Metabolism	Define and classify lipids, Functions of Fatty acids, Triacylglycerol, Phospholipids, cholesteroliii.Essential fatty acids and their importance, Explain Lipoproteins: definition, classification, function, ketone bodies. Fat metabolism in adipose tissues Elaborate ketone body metabolism: formation(ketogenesis),utilization(ketolysis), ketosis, Rothera's test. Summarize cholesterol metabolism: synthesis, degradation, cholesteroltransport. Define Hypercholesterolemia, list its effects, causing agents commonhyperlipoproteinemia, Lipoproteins. Explain about fatty liver	4
UNIT - III		
Amino -acid Chemistry & Amino acid and protein metabolism	Define and classify amino acids Define peptides and explain peptide bonds, list the biologically importantpeptides. Define and classify proteins, enumerate functions of proteins. Define Catabolism of amino acids- transamination, deamination Illustrate fate of ammonia, transport of ammonia, Urea cycle Outline the specialized products formed from amino acids	3
UNIT - IV		
Vitamins	Define vitamins and classify them according to solubility. List the sources, Coenzyme forms, functions, Recommended Dietary Allowance(RDA). Tell about digestion, absorption and transport, deficiency and toxicity ofindividual vitamins	4
Mineral metabolism	Define minerals and list the sources for mineral and their Recommended Dietary Allowance. Tell about digestion, absorption, transport, excretion of various minerals List the functions and disorders of individual minerals – Calcium, phosphate, iron, magnesium, fluoride, selenium, molybdenum, copper	4
UNIT - V		
Acid-base balance	Define acids, base and pH. Define buffers and describe buffer systems of the body (bicarbonate buffersystem). Elaborate about the role of lungs and kidneys in acid-base balance.iv. Acid base disorders	2
FUNCTION TESTS	Describe the biochemical functions of kidney and the principal RenalFunction Tests Describe the biochemical functions of liver and the principal Liver FunctionTests	2
Hemoglobin Chemistry & Metabolism	I. Describe briefly the normal structure and function of Hemoglobin. II. Hemoglobin synthesis and breakdown. List out the important abnormal hemoglobins and their effect	2

PRACTICAL	PRACTICAL TOPICS – DEMONSTRATIONS	No. OF HOURS
UNIT – 1	Lab safety & Glass ware	2
UNIT - 2	Centrifuge	2
UNIT – 3	Sample Collection, Blood, Anticoagulants, Random urine sample, 24 hours urine sample, Preservatives	6
UNIT – 4	Urine Analysis – Normal constituents (Organic & Inorganic) &Abnormal constituents (Demo)	10
UNIT – 5	Serum Analytes – Significance of Blood Glucose, Significance of Blood Urea, Significance of Serum Creatinine,Significance of Electrolytes	10

Course Outcomes:

- At the end of this course student should be able
- To know the properties, classification and metabolism of carbohydrates
- To know the properties, classification and metabolism of proteins
- To know the properties, classification and metabolism of lipids
- To know the properties, classification and metabolism of nucleic acids
- To know the properties, classification and metabolism of enzymes andvitamins

References:

- Concise textbook of Biochemistry DM Vasudevan 2nd edition
- Essentials of Biochemistry U Satyanarayana, U Chakrapani 2nd edition
- Essentials of Biochemistry and ocular biochemistry S Ramakrishnan

PHYSIOLOGY - I

23PSGY1001

INTRODUCTION

Physiology is the study of functions and mechanisms in a living system. Physiology focuses on individual organs, cells, and bio molecules carrying out the chemical and physical functions in a living system. The physiological state is the condition of normal function, while the pathological state refers to abnormal conditions, including human diseases.

Course Objective

- Understand the basic physiological functions of different organs and parts of the human body and important applied aspects.

SYLLABUS

Credits: Theory 02 & Practical 1

Hours: Theory 30 & Practical 30

THEORY	CONTENT	No. OF HOURS
UNIT - I		
Cell Physiology	Describe the structure and functions of cell, Describe the functions of the cell organelles, Describe briefly the types of transport across cell membrane and carrier systems.	3
Immunity	Define immunity and describe the types of immunity, Classify antigen & antibodies Describe T cell immunity & B cell immunity	2
UNIT - II		
Blood Physiology	Describe the normal composition of human blood and its functions Describe the normal plasma proteins & their functions Describe the structure and functions of RBC and hemoglobin Describe the process of Erythropoiesis Describe the Structure, production, & functions of WBCs Describe the structure, production & functions of Platelets Describe the Types of blood groups and their importance, Describe the Mechanism of coagulation	8
UNIT - III		
Digestive System	Describe briefly the Physiological anatomy of G.I.T and its functions. Describe briefly the composition and functions of Saliva Describe briefly the physiological anatomy of the stomach and the composition, functions of gastric juice. Describe briefly the functions of pancreas, and the composition & functions of pancreatic juice. Describe briefly the functions of liver and gall bladder and the Composition, and functions of bile juice	7
UNIT - IV		

Respiratory System	Describe the physiological structure and functions of Respiratory tract. Describe the Mechanics of respiration and its regulation Describe the Fundamentals of oxygen and CO2 transport in blood Describe the lung volumes, spirometry & their importance	5
UNIT - V		
Cardiovascular System	Describe the gross structure of heart and the normal circulation of blood Describe the cardiac cycle Describe the normal arterial pulse wave and the normal heart rate, and factors increasing and decreasing it. Describe normal Blood pressure and its regulation, Describe the normal Heart sounds Describe the normal ECG and its importance	5
PRACTICAL	**CONTENT**	**No. OF HOURS**
UNIT – I	Estimate Hemoglobin in given blood sample, Estimate bleeding time & clotting time	8
UNIT – II	Measure ESR of given blood sample, Perform RBC count of given blood sample	8
UNIT – III	Perform WBC count of given blood sample Perform a differential WBC count of the given sample	4
UNIT – IV	Calculation of blood indices, Determination of Blood Groups	4
UNIT – V	Measure pulse rate, heart rate, Measure BP, respiratory rate & temperature	6

Course Outcomes:

- Explain the anatomy, physiology and functions of various Tissues and cell, organization of cellular system.
- Explain Hematopoietic and lymphatic system homeostatic and its altered physiology.
- Explain the anatomy and Physiology of the cardiovascular and respiratory system and its disorders.
- Explain the anatomy and Physiology of digestive, urinary, and reproductive systems and their disorders.
- Describe the Physiology of muscle contraction and its disorders.

References:

- Textbook of physiology for BDS AK Jain 6th edition
- Textbook of physiology for BDS Sembulingam 3rd edition
- Physiology in nutshell by AK Jain 5th edition

ENGLISH

LANG1141

INTRODUCTION:

The course is a unified approach to enhance language skills of learners with an aim to honetheir social skills and to increase their employability. The course is designed to acquaint the learners with the necessary LSRW (Listening/ Speaking / Reading/ Writing) skills It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives.

COURSE OBJECTIVES

- Understand and communicate in simple English, written and verbal
- Understand and practice the basic principles of English grammar
- Comprehend and summarize a given English essay/paragraph
- Understand common English terms used in the medical/ health care field

SYLLABUS

Credits: 02 & Hours:30

THEORY	CONTENT	No. OF HOURS
UNIT - I Prescribed Prose	1. Leo Tolstoy: How much land does a man need? 2. O' Henry: The Last Leaf 3. Frank Stockton: The Lady or the Tiger	3
UNIT - II Prescribed Poetry	1. William Shakespeare: The Seven Ages of Man 2. Robert Frost: The Road not Taken 3. John Milton: On his Blindness	3
UNIT – III Basic English Grammar	Grammar - 8 parts of speech. Structure of sentence. Sentence writing. Paragraph writing. Summarizing / precis writing. Reading & comprehension (a small paragraph followed by questions).	4
UNIT – IV	General English Vocabulary & Use of dictionary Common Medical Terminology Spoken & Written English	2 2 2
UNIT – V	Listening & Reading skills English comprehension & summarizing & inference Writing skills - Questions based on prescribed prose/ poetry, letter, Summary, Medical Report, Documentation, Case history, Note taking Verbal communication - discussion & summarizing. Taking minutes of meeting.	2 2 8 2

Course Outcomes

- By the end of the course, the learners will be able to:
- Think critically, analytically, creatively and communicate confidently in English insocial and professional contexts with improved skills of fluency and accuracy.
- Write grammatically correct sentences employing appropriate vocabulary suitableto different contexts
- Comprehend and analyze different academic texts.
- Make notes effectively and handle academic writing tasks such as Paragraph writing and Essay writing.
- Effectively handle formal correspondence like e-mail drafting and letter writing.

Reference Books:

- Arosteguy, K.O. and Bright, A. and Rinard, B.J. and Poe, M. A Student's Guide toAcademic and Professional Writing in Education, UK, Teachers College Press, 2019
- Raymond Murphy, English Grammar in Use A Self-Study Reference and Practice Book for Intermediate Learners of English: Cambridge University Press;2019
- Peter Watkins, Teaching and Developing Reading Skills: UK, CUP, 2018
- Deeptha Achar et al. Basic of Academic Writing. (1and 2) parts New Delhi: OrientBlack Swan. (2012& 2013).
- Kumar S and Lata P, Communication Skills: New Delhi Oxford University Press, 2015

PSYCHOLOGY

PSYC1031

Introduction:

Health in its broadest sense includes physical and mental health. Health workers in recentyears have become interested in dealing with mental health problems in general health centers. Mental illnesses have been shown to be common, occurring in all societies and inall sections of the population, causing immense suffering and disability.

Course Objective

The objective of this course is:

- To enable the student to enlist common mental health issues encounteredin general health care settings.

Learning Outcomes

- The course enables the student to:
- Identify psychological distress states in the general health setting.
- Distinguish between psychotic and non-psychotic disorders.

SYLLABUS

Credits: Theory 01 & Hours: 15

UNIT	CONTENT	THEORY HOURS
I	Behaviors that Cause Concern – Violent Behavior and Aggression; Confusion and Agitation; Suicide; Seizures; Disturbances Among the Elderly.	03
II	Symptoms that are Medically Unexplained – Multiple Physical Complaints; Fear and Panic; Sleep Problems; Fatigue; Loss of a Body Function.	03
III	Problems Arising from Loss and Violence – Trauma; Intimate Partner Abuse; Sexual Assault; Bereavement.	03
IV	Problems in Childhood and Adolescence – Learning Disturbances; ADHD; Child Abuse; Misbehavior; Enuresis;	03
V	Mental Health in Other Contexts – Reproductive Health; Health of Prisoners; Refugees; Disasters; Caring for Carers.	03

Textbook

Patel, V. (2003). *Where there is No Psychiatrist. A Mental Health Care Manual*. Glasgow: Gaskell.

Reference Books

- Goldberg, D.P. (1992). *Common Mental Disorders: A Bio-Social Model*. London: Routledge.
- Helzer, J.E. & Hudziak, J.J. (2002). *Defining Psychopathology in the 21st Century: DSM V and Beyond*. Washington DC: American Psychiatric Publishing Inc.
- Pilgrim, D. (2014). *Key Concepts in Mental Health*. London: Sage.

Journals

- International Journal of Mental Health
- Community Mental Health Journal

BASICS OF COMPUTERS

CSCI1301

Introduction:

Computer science spans theoretical disciplines (such as algorithms, theory of computation, and information theory) to practical disciplines (including the design and implementation of hardware and software). It deals with concepts regarding the architecture of a computer, common application software and uses of computers in everyday life.

Course Objectives:

To build necessary concepts regarding the architecture of a computer

To develop an understanding of the common application software.

To understand the uses of computers in everyday life.

SYLLABUS

Credits: 02 & Hours:30

UNIT	CONTENT	HOURS
I	1. Describe and identify the principal components of a computer 2. Define the various terms used in computer – hardware/software / operating system 3. Describe the functions and uses of computers including in health care	5
II	1. Mention the common types of files including Word documents, Spreadsheets (Excel) and Presentations (PowerPoint) and their uses 2. Basic Network connecting 3. Explain the uses of the internet and email 4. Collaborative work using Google suite of applications / Microsoft Office 365	5
III	1. Demonstrate use of a computer for common purposes 2. Demonstrate methods for Data storage & retrieval and making folders; 3. Perform functions like date/time setting or changing, change display settings, Installing /removing programs etc. 4. Understand and Use MS Word / Word Document program 5. Prepare a properly formatted, spell-checked document in Word Document including insertion of images and tables and take a print-out/mail as an attachment, and convert to pdf (portable document format) 6. Understand and Use MS Excel / Data spreadsheet 7. Prepare a proper Excel document (spreadsheet) with given data and sort out data, insert / delete cells, etc., use formula bar for common functions like calculate mean etc, convert to pictorial format like bar / pie diagram, etc. 8. Prepare and use computer-based presentations like PowerPoint with appropriate fonts and colors including insertion of images, videos etc.	10
IV	1. Prepare an appropriate file like excel to enter patient data and retrieve it 2. Use the facility of Mail Merge between Excel to a Word document 3. Sending customized email to selected members. 4. Prepare a patient report and take a print out	5
V	1. Prepare a database of patient info and lab results for storage and later retrieval 2. Communicate by e-mail including opening email account 3. Demonstrate use of search engines / Google search etc. for academic information	5

Learning Outcomes:

At the end of the training program, the student would be able to

Classify various components of the computer.

Experiment with the various application software of Microsoft Office suite.

Make use of collaborative applications over the internet

Course Outcomes:

At the end of the course student is expected to

1. Know about the concept and architecture of a computer.
2. To understand the common application software.
3. To understand and apply the uses of computers in everyday life.

References –

1. Introduction to Computers by Peter Norton (McGraw Hill Education)
2. Mastering Excel: A Problem-Solving Approach by James Gips (John Wiley and Sons)
3. SAMs Teach Yourself Computer Basics in 24 hours

ENVIRONMENTAL SCIENCE

ENVS1051

Introduction:

The course enables the students to adapt eco-centric thinking and actions rather than human-centric thinking on natural resources, their utilization and conservation. The course also focuses on the importance of ecosystems, biodiversity and their degradation led to pollution. This course helps in finding solutions through application of control measures to combat pollution and legal measures to achieve sustainable development.

Course Objectives :

- To impart knowledge on natural resources and its associated problems.
- To familiarize learners about ecosystem, biodiversity, and their conservation.
- To introduce learners about environment pollution.
- To acquaint learners on different social issues such as conservation of water, green building concept.
- To make learners understand about the present population scenario, its impacts and role of informational technology on environment and human health.
- To make learners understand about the importance of field visit.

SYLLABUS

Credits: 01 & Hours: 15

UNIT	CONTENT	HOURS
UNIT – I Multidisciplinary nature of environmental studies:	Definition, scope and importance. Need for public awareness.	01
UNIT – II Natural Resources	Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, timber extraction. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits, and problems. Mineral resources: environmental effects of mining. Food resources: World food problems, overgrazing, fertilizer-pesticide problems. Energy resources: use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	03
UNIT – III Environmental pollution	Definition Causes, effects, and control measures of: Air pollution. Water pollution. Soil pollution. Thermal pollution. Solid waste Management: Causes, effects, and control measures of urban and industrial wastes. Cyclone, and landslides; Role of an individual in prevention of pollution.	03

UNIT – IV Ecosystem and biodiversity	**Ecosystem:** Structure components of ecosystem: Biotic and Abiotic components. Functional components of an ecosystem: Food chains, Food webs, Ecological pyramids, Ecological succession. Introduction, types, structure and function of Forest ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers). **Biodiversity:** Definition, genetic, species and ecosystem diversity. Biogeographical classification of India, Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega – diversity nation. Hot-spots of biodiversity. Threats to biodiversity, Conservation of biodiversity.	03
UNIT – V Social issues and Environmental legislation	From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rainwater harvesting and water shed management. Resettlement and rehabilitation of people; its problems and concerns related Environmental ethics. Role of Information Technology in Environment and human health. Environment Legislation. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Environmental Protection Act, Issues involved in enforcement of environmental legislation. Public awareness.	05
Pedagogy tools: Blended learning, Case let, video lectures, self-reading		

Text Book(s):

1. Erach Bharucha. Textbook of environmental studies for undergraduates courses-Universities Press, India Private Limited. 2019.

2. Kaushik A and Kaushik C.P. Perspectives in Environmental Studies. New Age International Publishers Edition-VI. 2018.

3. Dave D Katewa S.S. Textbook of Environmental Studies, 2nd Edition. Cengage Learning India. 2012.

Additional Reading

Benny Joseph. Textbook of Environmental Studies 3rd edition, McGraw Hill Publishing company limited. 2017.

Reference Book(s):

1. McKinney M.L., Schoch R.M., Yonavjak L. Mincy G. Environmental Science: Systems and Solutions. Jones and Bartlett Publishers. 6th Edition. 2017.

2. Botkin D.B. Environmental Science: Earth as a Living Planet. John Wiley and Sons. 5th edition. 2005.

Journal(s):

https://www.tandfonline.com/loi/genv20

https://library.lclark.edu/envs/corejournals

Website(s):

https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

Learning Outcome:

List different natural resources and their uses.
Relate how the over-exploitation of natural resources impact human life
Find the role of an individual in the conservation of natural resources.
Recall the demand of potable water in a community.
Explain the equitable use of natural resources for sustainable lifestyles.
Demonstrate how ecosystem functions.
Summarize the structure and function of terrestrial and aquatic ecosystems.
Explain the values and threats to biodiversity.
Identify the importance of conservation of biodiversity.
Identify causes, effects, and control measures of pollution (air, water & soil).
Improve wasteland reclamation.
Analyze the role of an individual in prevention of pollution.
Solve disaster management issues of cyclone, and landslides.
Examine different water conservation methods.

CONVENTIONAL RADIOGRAPHY PART - I

23RADG1001
SYLLABUS

Credits: Practical 8.5 & Hours: 255

INTRODUCTION:

B.Sc. Radiology & Imaging Technology meticulously structure to impart in depth advance knowledge of imaging methods and principles. The curriculum has been designed to meet the growing needs of professionals in the field of clinical radiography, imaging technology and radiation safety. Students benefit from doing the course as there is a large volume of work in allareas.

COURSE OBJECTIVES:

- To know about X RAY of upper limb, lower limb, pelvis, vertebra.
- To train in assisting specialized radiological procedures.
- To know about how to do the image processing**.**

UNITS	CONTENT	HOURS
I	Upper Limb Techniques for hand-fingers-thumb-wrist joint-forearm-elbow joint-humerus shoulder joint and sterno-clavicular joint.	47
II	Lower Limb Techniques for foot-calcaneum-ankle joint-leg-knee joint-patella- and femur(lower two thirds) Pelvic Girdle	48
III	Pelvic Girdle - Techniques for pelvic-iliac fossa-ischium-and sacro iliac joint	47
IV	Techniques for Atlanto-occipital articulation, cervical vertebrae, cervicothoracic junction, thoracic vertebrae, lumbar vertebrae, lumbosacral articulation, sacrum	38
V	Coccyx Bones of Thorax Techniques for sternum, ribs (upper and lower).	75

COURSE OUTCOMES:

- Should be able to undertake X RAYS of upper limb, lower limb, pelvis, vertebra independently.
- Assist in specialized radiological procedures.
- Able to do the image processing.
- Should be able to handle all radiological and imaging equipment independently.

REFERENCES:

1. Textbook of radiology for residents and technicians – Satish K Bhargava- 5th edition
2. Handbook of Medical Radiography latest edition by C Ram Mohan
3. Radiographic positioning Niranjan Baghel

SEMESTER – II

ANATOMY – II

23ANAT2001

INTRODUCTION:

Anatomy deals with the structural organization of human body. Anatomy forms the basis for the practice of medicine. Students need core knowledge of human anatomy as they venture into the clinical domain. The department of anatomy is committed to provide quality education for students by its fully-equipped facilities. Cadaveric dissections & specimens, histology slides and VARIOUS models provide the ideal environment to learn anatomy during the 1st year of their course.

COURSE OBJECTIVES:

The objective of this subject is to provide an outline of anatomy to improve the students understanding the technical and diagnostic procedures used, with special emphasis on limbs, thoracic and abdominal viscera, osteology, neuro anatomy, endocrine system, basic radiology.

SYLLABUS

Credits: Theory 02 & Practical 1

Hours: Theory 30 & Practical 30

Theory:

UNIT	CONTENT	No. OF HOURS
I	The Nervous system Review Structure of neurons; CNS, ANS and PNS (Central, autonomic and peripheral) – Peripheral nerves , Brachial, Lumbar, Sacral plexus, Covering of brain, Surfaces and lobes of cerebrum white fibers of cerebrum, cranial nerves, brain stem, spinal cord - spinal nerves, functional areas of cerebral cortex, Ventricular system – formation, circulation, and drainage	9
II	Gastro Intestinal Tract Stomach morphology, blood supply, applied aspects Liver morphology, ligaments blood supply applied aspects, porta hepatitis Small and large intestine, appendix and appendicitis	5
III	The Excretory system & Reproductive system Morphology , relations and internal Structure of kidney, urethra Components of female reproductive system, Morphology of uterus and its supports Parts of Fallopian Tube, Layers of scrotum, Anatomy of Testis and its coverings Spermatic cord, Male urethra & its parts	7
IV	The Endocrine system Endocrine glands, Structure of Hypothalamus, Pineal Gland, Pituitary gland- Dwarfism Thyroid- Goiter, Parathyroid, Pancreas – Diabetes Mellitus, Adrenal glands, Gonads	5
V	The Sensory organs Receptors, Structure of skin, Eye - Anatomy of orbit and eyeball, Anatomy of Nose, Anatomy of ear, Anatomy of tongue	4

Practical:

UNIT	CONTENT	No. OF HOURS
I	Histology of Liver, Thyroid, Kidney	6
II	Liver, Stomach, Intestines	6

III	Spleen, Kidney	4
IV	Brain, Spinal card	6
V	Bony Pelvis, Skull, Normal X- Rays, Surface markings	8

COURSE OUTCOMES:

- This course is aimed to make the student to gain knowledge in basic anatomy of various regions like limbs, thoracic and abdominal viscera, osteology, neuro anatomy, endocrine system, basic radiology which provides foundation in completion of the course.
- Enable to understand about the Gastro Intestinal Tract, location, surfaces, lobes, relations, and blood supply of Liver.
- Enables to understand about the Endocrine glands and explain the morphology andblood supply of Thyroid gland.

References:

1. Anatomy and physiology –Vijaya D Joshi, Ashalatha N Nandedkar, Sadhana SMendhurwar
2. Anatomy and physiology- Indu Khurana and Arushi Khurana
3. Human anatomy &physiology for nursing -Mahindra KumarAnand & Meena Verma
4. Understanding human anatomy & physiology- William Davis(McGraw-Hill)

PHYSIOLOGY – II

23PSGY2001

INTRODUCTION

Physiology is the study of functions and mechanisms in a living system. Physiology focuses on individual organs, cells, and biomolecules carry out the chemical and physical functions in a living system. Physiological state is the condition of normal function and this course helps in understanding the functions of endocrine system, renal physiology and reproductive physiology.

COURSE OBJECTIVES:

- To know about functions and physiological anatomy of endocrine system – Thyroid, Adrenal, Parathyroid, Pituitary glands and Pancreas.
- To impart knowledge related to physiological structure of kidney and the nephron and its functions.
- To understand about reproductive system, process and methods of determination of ovulation.
- To know about types of joints, the structure and formation of cartilage and the structure and formation of bone.

SYLLABUS

Credits: Theory 04 & Practical 1

Hours: Theory 60 & Practical 30

Theory:

UNIT	CONTENT	No. OF HOURS
I	Describe the physiological structure of muscle tissue and its types Describe the parts of neuron and their functions, and the synapse and its function Describe the action potential, its basis, refractory period, latent period, etc. and neuromuscular transmission Describe briefly the autonomic nervous system and the functions and effects of the sympathetic and parasympathetic nervous systems Describe the physiological anatomy of the brain and functions of different lobes Describe briefly the structure and functions of spinal cord Describe briefly the subdivisions of brain stem and their functions Describe briefly the special senses and their pathways – vision, audition (& olfaction & taste) Describe the normal EEG, Describe briefly the CSF formation, circulation, properties, composition and functions	16
II	Describe the physiological anatomy of Thyroid gland, functions and its applied physiology Describe the physiological anatomy of Adrenal gland, functions and its applied physiology Describe the physiological anatomy of Parathyroid gland, functions and its applied physiology Describe the physiological anatomy of Pancreas, its functions and its applied physiology	10

	Describe the physiological anatomy of hypothalamus and the Pituitary gland, their8 functions and its applied physiology	
III	Describe the physiological structure of kidney and the nephron and its functions Describe the GFR and factors affecting GFR Describe the Substances absorbed and secreted from renal tubules Describe the various Renal function tests Describe briefly the Urinary bladder and its functions and the physiology of micturition	10
IV	Describe the Structure and functions of skin Describe the structure and formation of bone Describe the structure and formation of cartilage Describe the types of joints.	14
V	Describe the Physiology of Puberty Describe the process of menstruation, normal menstrual cycle, menarche and menopause. Describe briefly the process of Ovulation and methods of determination of ovulation Describe briefly the normal physiology of pregnancy and mention the diagnostic tests for pregnancy and their physiological basis Describe briefly the functions of placenta and pregnancy diagnostic tests List out the Contraceptive methods in male and female Describe the Spermatogenesis	10
Practical		
I	Demonstrate examination of heart – inspect JVP, localize apex beat, look for any abnormal pulsations, percuss cardiac dullness, auscultate heart for normal sounds	6
II	Demonstrate examination of respiratory system – inspect the chest for symmetry, movements, localize apical impulse and trachea, measure chest expansion, percuss the chest for lung resonance, liver dullness, auscultate lungs for breath sounds	6
III	Demonstrate examination of the cranial nerves Demonstrate examination of the motor system – bulk, tone, power of different groups of muscles, coordination, and gait	6
IV	Demonstrate the various sensory and motor reflexes - abdominal, plantar, biceps, triceps, supinator, knee, and ankle Demonstrate examination of sensory system – fine touch, pain, vibration	8
V	Record an ECG Measure weight and height and calculate Body Mass Index Assist in the recording of an EEG Perform spirometry in a given individual and interpret the values	4

REFERENCE BOOKS

- Human Anatomy & Physiology for Nursing – Mahindra Kumar Anand & Meena Verma Understanding Human Anatomy & Physiology – William Davis (McGraw Hill) Anatomy & Physiology – Kaarna Muni Shekhar
- Textbook of Physiology for BDS students - Dr Jain
- Textbook of Physiology for BDS students – Dr Sambulingam
- Handbook of Human Physiology – Vidya Ratan
- Concise Medical Physiology – Sujith K Choudhari

CONVENTIONAL RADIOGRAPHY PART II
23RADG2001
SYLLABUS
Credits: Practical 10 & Hours:300

COURSE OBJECTIVES:

- To know about X RAY of skull, chest, abdomen, bed-side x-rays independently.
- To train in assisting specialized radiological procedures.
- To know about how to do the image processing**.**

UNITS	CONTENT	HOURS
I	**Skull**: Techniques for cranium, facial bones, sella turcica, temporal Bone, martoids and optic foraminae, sinuses, mandible and temporo mandible joint.	50
II	**Chest**: Chest X-Ray, PA, AP lateral, decubitus	50
III	**Abdomen:** Routine and radiographs in acute condition	50
IV	**Bedside radiography:** techniques for acute chest conditions-intestinal obstruction, abdominal perforations-vertebral injuries-skull injuries-fractures immobilized	50
V	Soft tissue radiography Neck & C- Spine	100

COURSE OUTCOMES:

- Should be able to undertake X RAYS of skull, chest, abdomen, bed-side x-rays independently.
- Assist in specialized radiological procedures.
- Able to do the image processing.
- Should be able to handle all radiological and imaging equipment independently.

REFERENCES:

1. Textbook of radiology for residents and technicians – Satish K Bhargava- 5th edition
2. Handbook of Medical Radiography latest edition by C Ram Mohan
3. Radiographic positioning Niranjan Baghel

SEMESTER – III

PHARMACOLOGY – II

23PHCG1001

INTRODUCTION

Basic drug effect, classification of drugs acting on nerves, heart, blood pressure, respiratory system, gastrointestinal system, kidneys, hormones, musculoskeletal system and analgesics etc., Common drugs-effects and side effects and drug interactions.

COURSE OBJECTIVES:

This course will cover general pharmacology with special emphasis on common drugs used, route of administration, types of formulations, dose and frequency of administration, side effects and toxicity, management of toxic effect, drug interaction, knowledge of chemical and trade names, importance of manufacture and expiry dates and instructions about handling each drug.

SYLLABUS

Credits: Theory 01 & Practical 0.5

Hours: Theory 15 & Practical 15

Theory:

UNIT	CONTENT	No. OF HOURS
I	**General Pharmacology** Routes of drug administration. Pharmacokinetics – Absorption, Distribution, Metabolism, Excretion. Pharmacodynamics – Drug Receptor interactions, Factors modifying drug action, Adverse Drug Reaction, Pharmacovigilance.	3
II	**Autonomic Nervous system** Cholinergic and Anticholinergic drugs. Adrenergic Agonists and Antagonists. Skeletal Muscle Relaxants.	3
III	**Autacoids** Histamine and Antihistaminics. Prostaglandins and their analogues. Renin angiotensin aldosterone system.	3
IV	**Diuretics** Loop Diuretics. Thiazide diuretics. Potassium Sparing diuretics. Osmotic diuretics.	3
V	**Cardio Vascular System** Anti hypertensive drugs.	

	Anti anginal drugs. Pharmacotherapy of Myocardial infarction. **Blood** Oral and Parenteral anticoagulants. Anti platelets drugs. Fibrinolytics. Oral and Parenteral Iron preparations.	3
Practical		
I	Spotters (20)	5
II	Case based discussion (10)	10

COURSE OUTCOMES:

At the end of course, students should know about

- Pharmacokinetics and pharmacodynamic principles of drugs
- Drugs acting on autonomic nervous system
- Drugs modulating autacoids
- Drugs used in cardiovascular and hemodynamic disorders.
- Drugs acting on renal system

References:

- Essence of Pharmacology by K.D. Tripathi
- Pharmacology and Pharmacotherapeutics by Satoskar
- Text book of Pharmacology for Allied Sciences – Padmaja Udaykumar

MICROBIOLOGY – I

23MIBG1001

INTRODUCTION:

The goal of teaching Microbiology is to provide understanding of the natural history of infection and diseases in order to deal with the Etiology, pathogenesis, Pathogen city, laboratory diagnosis, treatment control and prevention of these infections and infectious diseases.

COURSE OBJECTIVES:

- Plan and interpret Laboratory investigations for diagnosis of infectious diseasesand correlate the clinical manifestations with the etiological agent.
- Perform simple laboratory test which help to arrive at rapid diagnosis.
- Understand methods of disinfection and sterilization and their application to
- Control and prevention of hospital acquired infections.

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

Theory:

UNIT	CONTENT	NO. OF HOURS
I	General Bacteriology	4
	Introduction- Brief history of Microbiology	
	Microorganisms in disease and health	
	Sterilization & disinfection including Spaulding's criteria (Physical Methods and Chemical methods)	
	Sterilization of instruments	
	Cleaning and disinfection protocols	
	Morphology of bacteria	
	Physiology of bacteria	
	Sample collection and transport	
	Culture media and culture methods	
	Identification of bacteria	
II	Infections due to Gram positive cocci & Gram negative cocci	3
	Staphylococcus	
	Streptococcus	

	Neisseria meningitidis and Neisseria gonorrhea	
III	Infection due to Gram positive bacilli including anaerobes	5
	Corynebacterium diphtheriae	
	Bacillus	
	Tetanus	
	Gas gangrene	
IV	Infections due to Mycobacteria	2
	Tuberculosis	
	Leprosy	
V	E.coli	16
	Klebsiella Species	
	Salmonella	
	Shigella	
	Vibrio cholerae	
	Hemophilus influenza	
	Pseudomonas aeruginosa	
	Syphilis	
	Leptospirosis	
	Borrelia	
	Yersinia pestis	
	Mycoplasma	
	Chlamydiae	
	Rickettsiaceae	
	Prevention of Health care associated infections.	
	Standard precautions	
	Transmission based precautions	
Practical		
I	Use of common Laboratory equipment Incubator, Hot Air Oven, Water Bath Anaerobic Jar, Centrifuge, Autoclave, Microscope	1
II	Collection, Transportation and processing of clinical samples for Microbiological investigations.	3
	Culture Media & Culture Methods, AST	
	Identification of Bacteria	
III	Standard precautions: Hand hygiene	3
	Biomedical waste Management	
	Blood & Body fluid Management, Spill Management, Dealing with sharps, NSI, PEP	
IV	Microscopy	6
	Hanging drop	

	Simple staining	
	Gram staining	
	Acid fast staining	
V	Disinfection – Cleaning protocols (Surface disinfection) Sterilization of Equipment	2

COURSE OUTCOMES:

- Knowledge about the association of Micro-organisms in Disease and Health Requirement and the common pathogens of Medical importance
- Know about the commonly used Microbiology Laboratory equipment and thecleaning of glassware
- Know about Collection, Transportation and processing of clinical samples forMicrobiological Investigations
- Knowledge about Sterilization and Disinfection practices
- Development of skills of Media pouring
- Slide and Smear preparation
- Performing Staining techniques in Microbiology (Simple staining, Gram'sstaining, AFB staining)

References:

- Ananthanarayan and Paniker's Textbook of Microbiology – 10th edition
- Textbook of Microbiology C P Baveja

PATHOLOGY – I

23PATH1011

INTRODUCTION

The goal of teaching Pathology is to provide comprehensive knowledge of the causes and mechanisms of the duties in order to enable to achieve complete understanding of the natural history and clinical manifestation of the diseases.

COURSE OBJECTIVES:

- To describe the rationale and principles of technical procedures of diagnostic laboratorytests.
- To know about basic diagnostic tests and correlate with clinical and morphologicalfeatures of diseases.
- To learn about commonly used bedside tests on blood, urine and other relevant samples.

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

UNIT	CONTENT	HOURS
UNIT I	Cell injury and death Cell injury - Definition, types of cell injury, Mechanisms of cell injury, cellular adaptations Pathological calcification. Cell death - Necrosis – types, morphology, Apoptosis- causes and mechanisms with morphology, Necrosis vs. Apoptosis and their pathogenesis, Gangrene	2 3
UNIT II	Inflammation & healing Definition, types and cardinal signs of inflammation. Acute inflammation – Causes, events, chemical mediators of inflammation, morphology. Chronic inflammation – Causes, examples, granulomatous inflammation, morphology, Repair	1 2
UNIT III	HEMODYNAMIC DISORDERS Hemorrhage, thrombosis, Embolism, Infarction Shock- definition, types, pathogenesis and morphology	2

UNIT IV	**NEOPLASIA** Definition, Differences between benign and malignant tumors, Terminology, nomenclature. Molecular basis of cancer – Oncogenes, Tumor suppressor genes, carcinogenesis, Invasion and metastasis. Laboratory diagnosis of cancer **INFECTIONS –** Bacterial, viral, parasitic, fungal infection – general outlines. Pathogenesis and laboratory diagnosis of Tuberculosis, Leprosy, Typhoid, HIV, Abscess, Amebiasis, malaria, candidiasis.	1 4 1 1 4
UNIT V	HEMATOLOGY RBC disorders - Definition, pathogenesis and laboratory diagnosis of Anemia – Iron Deficiency Anemia, Megaloblastic anemia, hemolytic anemia- thalassemia, sickle cell anemia, Aplastic anemia, polycythemia WBC disorders- Leucocytosis, Leukemoid reaction Platelet disorders- Thrombocytosis, Thrombocytopenia, Immune thrombocytopenic purpura, Hemophilia, Disseminated intravascular coagulation	9
Practicals (16hrs)		
	Microscopy Specimen collection and handling (blood), Peripheral smear staining Blood grouping Hemoglobin estimation Stool microscopy Common hematology and histopathological specimens and slides	1 1 2 1 2 1 7

COURSE OUTCOMES:

- At the end, the students shall be able to describe the rationale and principles of technical procedures of diagnostic laboratory tests.
- Interpret diagnostic laboratory test and correlate with clinical and morphologicalfeatures of diseases.
- Perform simple bedside tests on blood, urine and other biological fluid samples.

REFERENCES:

- Pathologic basis of disease – Robbins & Cotran 10th edition
- Pathology – Harshmohan 8th edition
- Textbook of Pathology for Allied Health Sciences – Ramdas Nayak
- Textbook on Pathology for DMLT and Paramedical courses – Dr. I.Clemen
- Essentials of Clinical Pathology – Shirish. M. Kawthalkar 2nd edition

COMMUNITY MEDICINE – I

23CMED1001

INTRODUCTION:

The art and science of application of technical knowledge and skills to the delivery of health care to given community, designed in collaboration with related professionals as well as human and social science on one hand and the community on the other hand. Preventive medicine is science and art of preventing disease, prolonging life and promoting physical and mental health and efficacy.

COURSE OBJECTIVES:

- To orient the students with national health programmes
- To learn categories and coding of hospital waste and their disposal methods.
- To know various occupational health hazards and prevention and control of them.
- To make the students aware of tabulation of data, measuring mean and SD

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

Theory:

UNIT	CONTENT	No. OF HOURS
I	**Concepts of disease:** Describe natural history of disease with diagram Determinants and dimensions of health Multifactorial causation of disease Epidemiological triad Explain concepts of prevention and modes of intervention with examples Risk factors and risk groups Ice berg phenomena of disease Screening of diseases.	8
II	**General epidemiology:** Describe various tools of measurement in epidemiology (rate, ratio, proportion) and measures of morbidity (incidence, prevalence etc). Classification of epidemiological methods and explain briefly each method	6
III	**Nutrition:** Classify foods and nutrients and describe concept of balanced diet Describe the common vitamin deficiency disorders and their preventive measures. Outline the common nutritional problems in India and their prevention –Protein Energy Malnutrition, Anaemia Describe role of nutritional factors in hypertension, diabetes, cardiovascular disorders and cancer food fortification, food adulteration ,Food safety standards &Acts	5
IV	**Occupational Health:** List out the occupational diseases	4

	Describe pneumoconiosis and preventive measures Prevention of occupational diseases Enumerate benefits under ESI act , Sickness absenteeism	
V	**Environment and health:** Safe and wholesome water House hold purification of water Water borne diseases Chlorination of water Sanitation barrier Air pollution Radiation hazard Noise pollution **Health education & communication:** Process of communication, Types of communication ,barriers Health education-Models, principles of health education Methods of health communication.	7
Practical (15hrs)		
I	Sensitivity , specificity ,Positive predicative value ,Negative Predictive Value of a diagnostic test and interpretation	2
II	Calculation of prevalence, Incidence, mortality rates	1
III	Nutritional spotters and public health importance: Rice, wheat, pulses, Soya bean, Milk, Egg, fruits and vegetables, Iodised salt. Growth chart interpretation, BMI calculation &classification, Glycaemic	1 1
IV	Case based scenarios on occupational health diseases	3
V	Chlorination method – Horrock's apparatus Soft Skills – time management matrix, group dynamics Case- based scenarios on communication in health care	1 3 3

COURSE OUTCOMES:

This course is aimed to make the student to understand national health programs, hospital waste management, occupational health hazards prevention and control of occupational diseases and calculation of measures of central tendency and diagrammatic representation of data.

REFERENCES:

- Park's Textbook of Preventive and Social Medicine – 26th edition
- Statistics and Research: Mahajan

BASICS OF PATIENT CARE & HOSPITAL ORIENTATION

23NURS1001

(THEORY: 15Hr and Non-Credit)

INTRODUCTION:

This course develops knowledge and skills basic to patient care undergoing radiographic procedures. Topics include patient communication, patient assessment, and safety of patient and healthcare provider in the health care facility. Focus extends to include proper body mechanics and patient positioning to promote comforting for patient. Basics of infection control and methods of medical asepsis were focused on especially when dealing with patients undergoing certain invasive procedures. Finally describe and perform basic procedures like injections, Ryle's tube, Foley's catheterization, taking blood samples, wound dressing etc.

COURSE OBJECTIVES:

1. Students will gain understanding of the fundamental concepts of patients care while in the hospital or undergoing a special procedure.
2. Students will become familiar with some procedures relevant to patient condition
3. Students will Be able to provide certain basic procedures and identify symptoms of altered cognition.
4. Students will be able to relate them to patient overall health and well being.
5. Relationship between certain procedures, radiographic procedure, and patient overall health will be emphasized.

SYLLABUS:

LEARNING OUTCOMES:

The main Intended Learning Outcome (ILO) that is measured throughout this course is "Critical Thinking." This ILO is conceptually defined as "a cognitive process that aims at using the rational and logical examination of ideas for the purposes of understanding, problem solving, and decision-making." Critical thinking will facilitate the process of teaching/ learning, which is originally a change in thinking or behaviour.

I- Caring

II- Communication

III- Critical thinking

IV- Therapeutic intervention

V - Leadership

VI- Employer's satisfaction

UNIT	CONTENT	HOURS
I	**Describe the principles of careof bedridden patient** - Care of a bedridden patient - Patient assessment - Assessing personal concerns of patient - Assessing physiological needs Assessing current physical status **Describe the basicprinciples of communication** Communication with patients and attendants - Communication skills - Communication with patients - Special circumstances in communication - Patient education - Communication with patient's families Dealing with death and loss	3
II	**Describe and demonstrate techniques to maintain patient hygiene** Patient hygiene - Cycle of infection - Body's defence against infection - Infectious diseases - Maintaining hygiene **Describe and practice infection control measures in the ward and ICU** Infection control measures in the ward and ICU - Microorganisms - Cycle of infection - Hand Washing Preventing disease transmission	3
III	**Describe and record vital data and basic clinicalparameters** Vital data and basic clinical parameters -Assessment of body temperature: sites,equipments and techniques, special considerations - Assessment of pulse: Sites, location ,equipments and technique, special consideration - Assessment of respirations: technique,special consideration Recording of vital signs **Describe and demonstrate howto monitor patients** Patients monitoring Assessing personal concerns of patient - Assessing physiological needs - History taking - Physical assessment	3
IV	**Describe the principles of patient safety** - Patient transfer - Restraints and immobilization - Accidents and incident reports - Fire hazards Other common hazards **Describe and demonstrate the principles of cleaning, disinfection and sterilization in thehospital wards/ ICU**	3

	- Hand washing: simple, hand antisepsis andsurgical antisepsis (scrub) - Isolation: source and protective -Sterile packs - Surgical scrubbing - Gowning and gloving -Sterilization - Fumigation Autoclaving **Describe the common routesfor drug administration** -Assess the patient's condition - Recognize different definitions associatedwith pharmacology - Recognize various classifications of drugs - Identify the ten rights of drug administration - List out common routes and methods ofdrug administration - Perform venipuncture using appropriateuniversal Precautions	
V	**Describe and perform basic procedures** -Injections, -Ryle's tube, -Foley's catheterization, -Taking blood samples, -Wound dressing **Describe and demonstrate documentation of patient related data in thecase sheet records** -History taking data sheet - Documentation: Purpose of Recording and reporting, Communication within the HealthCare Team, - Types of records; ward records, medical/nursing records, Common Record-keeping forms, Computerized documentation **Describe and demonstrate useof basic hospital equipment** Use of basic hospital equipment	3

COURSE OUTCOMES:

1. Perform basic infection control practices in the Healthcare setting.
2. Use effective skills to draw blood and accurately label tubes
3. Perform basic procedures using advanced technique and interpretation.
4. Perform basic patient care skills.
5. Communicate with a diverse patient population using written and oralcommunication and listening skills in interactions.

References:

1. Ehrlich, R., A., McCloskey, E. D., & Daly, J., A. (2004). *Patient Care in Radiography with an Introduction to Medical Imaging.* Mosby: An Affiliate of Elsevier. Sixth edition.
2. Adler, A., M., & Carlton, R., R. (2007). *Introduction to Radiologic Sciences and Patient Care*. Saunders: Elsevier. Fourth edition
3. Torres, L.,S. (1989). *Basic Medical Techniques and Patient Care for Radiologic Technologists*. J. B.Lippincott Company: Philadelphia. Third Edition.

CONVENTIONAL RADIOGRAPHY PART-III (RIT-I)

23RADG2011

INTRODUCTION:

B.Sc. Radiology & Imaging Technology meticulously structure to impart in depth advance knowledge of imaging methods and principles. The curriculum has been designed to meet the growing needs of professionals in the field of clinical radiography, imaging technology and radiation safety. Students benefit from doing the course as there is a large volume of work in allareas.

COURSE OBJECTIVES:

- Know about X RAY, Mammography procedures
- To train in assisting specialized radiological procedures.
- To know about how to do the image processing**.**

SYLLABUS

Credits: Theory 02 & Practical 11

Hours: Theory -30 & Practical 330

UNIT	CONTENT	No. OF HOURS
I	X-rays - Generation, Properties and Interaction: Electromagnetic radiation, spectrum and general properties: Wave and quanta concept, Processes of x-ray generation: General and characteristic radiation, X-ray spectrum, factors influencing the intensity of x-rays. Basic interactions between diagnostic x-rays and matter: Coherent scattering, photo electric effect and Compton Effect — probability of occurrence and its applications in radiology. Biological effects of radiation. Attenuation: Linear and mass attenuation coefficients, Half Value Layer, Factors affecting attenuation, practical aspects of these phenomenon in Radiology, scatter radiation.	5
II	Radiation Protection & Measurements: adiation quantities and units, Radiation measuring instruments: Gas-filled detectors: ionization chamber, proportional counter, Geiger-Muller counter, scintillation counter, solid-state detector, Personal monitoring devices: Film, Thermoluminescent and Pocket dosimeters. Aim of radiation protection, the concept of As Low As Reasonably Achievable, International Commission on Radiation Protection (ICRP) and Atomic Energy Regulatory Board (AERB) recommendations, maximum permissible dose, Principles of protection inX-ray department for patient, personnel and public, Time-Distance-Shielding, protective devices , X-ray room design	5
III	Radiographic photography: X-ray films, Screen — film cassette, Characteristic curve, Radiographic Image Quality, Automatic Film Processor, Laser camera: Wet and Dry, Computed Radiography & DigitalRadiography.	5

	Construction of dark room, dry bench, wet bench, processing of film, developer, fixer,hangers, and safelight	
IV	**Radiological Equipment:** **Electric Power & Transformers:** Generation and distribution of electric power, Single and Polyphase supply,Fuses, Earthling. Construction, types, working principle and losses of transformers. Auto transformer: Construction, Working principle and Applications. X-Ray equipment & units: Construction of diagnostic X-ray tube: Stationary and rotating anode type, Line — Focus principle, Heel effect, X-ray tube rating, Grid controlled and Metal - Ceramic X-ray tubes. Mammography, Mobile X-ray unit, Dental x-ray unit, Dual Energy X-ray Absorptiometry.	5
V	**Generators:** Filament and High Voltage circuits, Single phase generators. Self, Half wave and Full wave rectified, Three phase generators: 6 pulse — 6 rectifier, 6 pulse — **12** rectifier, **12** pulse — **12** rectifier circuits, Power Storage Generators, High Frequency Generators, Falling Load Generators, Exposure Switches and Timers. **Accessories in Fluoroscopy:** X-ray beam restrictors, filters: Inherent, added, k-edge filters. Grids: Types, grid-ratiogrid cut-off, moving grid. Air gap technique. Basic principle, construction and working principle of image intensifier tube. Image characteristics, Image display and recording devices.	10
Practical		
I	X-ray beam alignment test	50
II	Determination of magnification by changing Source to Image Distance	50
III	Determination of magnification by changing Object to Image Distance	50
IV	Radiation Protection Survey Leakage radiation test	80
V	Mammography & Dental X-Ray.	100

COURSE OUTCOMES:

- Should be able to undertake X RAY, Mammography procedures independently.
- Assist in specialized radiological procedures.
- Able to do the image processing.
- Should be able to handle all radiological and imaging equipment independently.

REFERENCES:

4. Textbook of radiology for residents and technicians – Satish K Bhargava- 5th edition
5. Handbook of Medical Radiography latest edition by C Ram Mohan
6. Radiographic positioning Niranjan Baghel
7. Clarks procedures in diagnostic imaging by Whitley
8. Radiologic science for technologists 11th edition Elsevier

SEMESTER – IV

PHARMACOLOGY – II

23PHCG2001

INTRODUCTION:

Basic drug effect, classification of drugs acting on nerves, heart, blood pressure, respiratory system, gastrointestinal system, kidneys, hormones, musculoskeletal system and analgesics etc., Common drugs- effects and side effects and drug interactions.

COURSE OBJECTIVES:

This course will cover general pharmacology with special emphasis on common drugs used, route of administration, types of formulations, dose and frequency of administration, side effects toxicity, management of toxic effect, drug interaction, knowledge of chemical and trade names, importance of manufacture and expiry dates and instructions about handling each drug.

SYLLABUS

Credits: Theory 01 & Practical 0.5

Hours: Theory 15 & Practical 15

Theory

UNIT	CONTENT	No. OF HOURS
I	**Central Nervous System:** General Anesthetics. Local Anesthetics. Sedative – Hypnotics. Anti Epileptic drugs. Treatment of Parkinson's disease. Opioid analgesics. Non Steroidal anti Inflammatory drugs. (NSAIDs)	3
II	**Gastro intestinal system:** Emetics and Antiemetics. Drug for Peptic Ulcer.	2
III	**Respiratory System:** Drugs for Bronchial Asthma. Drugs for Cough.	2
IV	**Hormones:** Thyroid and Antithyroid drugs. Corticosteroids. Insulin and Oral Antidiabetic drugs. Drugs acting on Uterus.	5
V	**Chemotherapy – I:** Sulfonamides. F luoroquinolones. Penicillins. Cephalosporins. **Chemotherapy – II:** Aminoglycosides. Macrolides.	3

	Tetracyclines. Chloramphenicol. Anti Viral drugs.	
Practical		
	Spotters (20)	5
	Case based discussion (10)	10

COURSE OUTCOMES:

At the end of course, students should know about

- Drugs acting on central nervous system
- Drugs used in treatment of bronchial asthma
- Drugs used as anti emetics and in peptic ulcer diseases.
- Drugs used in the treatment various endocrine disorders.
- Chemotherapeutic drugs.

REFERENCES:

- Essence of Pharmacology by K.D. Tripathi
- Pharmacology and Pharmacotherapeutics by Satoskar
- Text book of Pharmacology for Allied Sciences – Padmaja Udaykumar
- Pharmacology for Nurses Tara V.Shanbhag, 2nd edition

MICROBIOLOGY – II

23MIBG2001

INTRODUCTION:

The goal of teaching Microbiology is to provide an understanding of the natural history of infection and diseases in order to deal with the Etiology, pathogenesis, Pathogenicity, laboratory diagnosis, treatment control and prevention of these infections and infectious diseases.

COURSE OBJECTIVES:

- Plan and interpret Laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.
- Perform simple laboratory test which help to arrive at rapid diagnosis.
- Understand methods of disinfection and sterilization and their application to control and prevention of hospital acquired infections

SYLLABUS

Credits: Theory 02 & Practical 01

Hours: Theory 15 & Practical 30

UNIT	CONTENT	HOURS
I	Immunology	3
	Antigens and antibodies	
	Antigen and antibody reactions	
	Hypersensitivity	
	Immunohematology	
	Autoimmunity	
II	Virology	2
	Virology : Introduction to viruses and lab diagnosis of viral infections	
	Common viral infections	
III	HIV	2
	Hepatitis viruses	
	Dengue virus	
	Rabies virus	
IV	Parasitology	3
	Parasitology : Definition General Characteristics of Parasite	

	Classification of Parasite Mode of transmission	
	Entamoeba histolytica and protozoan diarrheal pathogens	
	Malarial parasites	
	Helminths	
	Cysticercosis	
V	Mycology	5
	Mycology : Common mycological infections and lab diagnosis	
	Candida	
	Superficial fungal infections	
	Systemic mycosis , Cryptococcus	
	Opportunistic mycoses	
	Infection control and prevention	
	Infection control and prevention	
	Safety in laboratory	

UNIT	PRACTICAL	HOURS
I	Specimen collection and Handling	2
II	Sputum examination	4
	Acid fast staining	
	Gram staining	
III	Lab diagnosis of Viral infections	8
	Serology	
	ELISA	
	ICT Test	
IV	Stool examination	4
V	Lab diagnosis of fungal infections	12
	Molecular methods for the diagnosis of infectious diseases	
	Good laboratory practices	
	Safe infusion practices	

COURSE OUTCOMES:

- Knowledge about the Basics of Immunology
- Know about the Common viral infections and their Specimen collection and Handling
- Know about the Common parasitic infections and their Specimen collection and Handling
- Know about the Common fungal infections and their Specimen collection andHandling
- Knowledge about Good laboratory practices, Safe infusion practices and Safetyin laboratory
- Knowledge about the commonly performed serological tests in the diagnosis of various diseases
- Knowledge about the commonly performed Rapid diagnostic tests in the diagnosis of various diseases

REFERENCES:

1. Ananthanarayan and Paniker's Textbook of Microbiology – 10th edition
2. Textbook of Microbiology C P Baveja

PATHOLOGY – II

23PHCG2001

INTRODUCTION:

The goal of teaching Pathology is to provide comprehensive knowledge of the causes and mechanisms of the duties in order to enable to achieve complete understanding of the natural history and clinical manifestation of the diseases.

COURSE OBJECTIVES:

- To describe the rationale and principles of technical procedures of diagnostic laboratorytests.
- To know about diseases of Haematology, GI tract respiratory system, cardiovascular system and endocrinology.

SYLLABUS

Credits: Theory 01 & Practical 01

Hours: Theory 15 & Practical 15

UNIT	CONTENT	HOURS
I	Heart & Blood vessels: Atherosclerosis, Ischemic heart disease, Pathogenesis and morphology of Myocardial Infarction, Rheumatic fever and Hypertension	2
II	Lung - Asthma, COPD, Bronchiectasis.	1
III	GIT & liver: Barrett`s esophagus, Peptic ulcer, Gastritis, Inflammatory bowel disease. Hepatitis, Alcoholic liver disease, cirrhosis Pancreatitis Splenomegaly - causes	3
IV	Kidney Kidney- Mechanisms of glomerular injury, Glomerulonephritis- Nephrotic Syndrome (Minimal change disease, Focal segmental glomerulosclerosis) Nephritic syndrome (Post streptococcal Glomerulonephritis, Membranoproliferative Glomerulonephritis, Membranous nephropathy), HIV associated nephropathy, Lupus nephritis, Diabetic nephropathy, Chronic Glomerulonephritis, Chronic kidney disease, Renal calculi, Acute tubular necrosis, Renal Tumors.	1 1 1 1 1 1
V	CNS – Meningitis, cerebrovascular diseases. Endocrine disorders Thyroid- Hypothyroidism, Hyperthyroidism, Goitre- Pathogenesis, diffuse and	4

	nodular goiter, morphology, Hashimoto's thyroiditis Diabetes mellitus.	
Practicals		
	Reception and handling of tissue specimens	3
	Urine examination	2
	Staining -Hematoxylin and Eosin, Papanicolau staining	3
	Body fluid analysis	3
	Common histopathological slides and specimens.	4

COURSE OUTCOMES:

- To impart knowledge on various common infectious diseases with its lab diagnosis andHematological malignancies.
- Make student familiar with predisposing factors, etiopathogenesis, morphology andcomplications of common diseases of kidney, lung, liver, git, heart and thyroid.
- To demonstrate few special staining techniques and body fluid analysis.
- To acquire knowledge about handling of tissue specimens, histopathology techniques,automated processors and few specimens and slides in histopathology

REFERENCES:

- Pathologic basis of disease – Robbins & Cotran 10th edition
- Pathology – Harshmohan 8th edition
- Textbook of Pathology for Allied Health Sciences – Ramdas Nayak
- Textbook on Pathology for DMLT and Paramedical courses – Dr. I.Clemen
- Essentials of Clinical Pathology – Shirish. M. Kawthalkar 2nd edition

COMMUNITY MEDICINE – II

23CMED2001

INTRODUCTION:

The art and science of application of technical knowledge and skills to the delivery of health care to given community, designed in collaboration with related professionals as well as human and social science on one hand and the community on the other hand. Preventive medicine is science and art of preventing disease, prolonging life and promoting physical and mental health and efficacy.

COURSE OBJECTIVES:

- To orient the students with levels of health care, primary health centre andcommunity health centre.
- To understand about ethics in professionalism.
- To know acts like PCPNDT, Organ transplantation etc.
- To make the students aware of tabulation of data, measuring mean and SD

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

Theory:

UNIT	CONTENT	No. OF HOURS
I	**Infectious diseases epidemiology:** Define terms- infection, contamination, infectious disease, contagious disease, communicable disease, epidemic, endemic, sporadic, pandemic, zoonotic, nosocomial, iatrogenic, eradication, control, surveillance, incubation period, isolation, quarantine. Dynamics of disease transmission in terms of chain of infection, direct &indirect transmission, mode of disease transmission. Methods of control of disease with examples	7
II	Immunization, types of vaccines, immunization schedule , cold chain Disinfection, properties of ideal disinfectant, types, examples , recommended disinfecting procedures. Disinfection and sterilization at health care centre level	3
III	Epidemiology of Communicable diseases: Tuberculosis, HIV, Tetanus, Rabies, vector borne diseases (Malaria, Dengue), food poisoning, Acute Diarrhoea, Acute Respiratory Infections Non-communicable diseases: Epidemiology, preventive measures for Hypertension, Diabetes, Cardiovascular Diseases, obesity, accidents . Epidemiology and preventive measures for common cancers	7
IV	**National Health Programs :** A) National Tuberculosis Elimination Program B) National Vector Borne Disease Control Program	5

	C) National AIDS Control Program D) Reproductive and Child Health Program , Universal Immunization Program	
V	Primary health care- definition, principles of primary health care Health care delivery system **Biomedical waste management :** Biomedical waste – Sources, hazards, categories &coding, disposal	4
	Demography and Family planning: Factors influencing population growth , Birth rate, death rate Methods of contraception –Types , mechanism of action, advantages, disadvantages, side effects Principles of medical ethics and common ethical issues, Medical negligence, Consumer Protection Act	4
Practical		
I	Hand washing technique	1
II	Vaccines, Cold chain equipment , disinfectants	2
III	Entomology spotters, case- based scenarios on communicable and non-communicable diseases	3
IV	Types of data &Bio-statistics	4
V	Biomedical waste management -spotters	1
	Family planning spotters – Oral Contraceptive pills , Condom, IUCD, Emergency contraceptive pill Communication skill – Gather, ICTC-Provider initiated, Client initiated	4

COURSE OUTCOMES:

After completing this course, the student should be able to

1. Understand levels of health care and elements & principles of primary health care
2. Know about functions of PHC and CHC
3. Understand and apply measures of central tendency and dispersion
4. Understand and apply statistical tests related to diagnosis

REFERENCES:

1. Park's Textbook of Preventive and Social Medicine – latest edition
2. Statistics and Research: Mahajan 9th edition
3. Sunderlal textbook of preventive and social medicine 6th edition
4. Suryakanha Recent advances in community medicine 6th edition

ULTRASONOGRAPHY (RIT-II)

23RADG2021

INTRODUCTION:

B.Sc. Radiology & Imaging Technology meticulously structure to impart in depth advance knowledge of imaging methods and principles. The curriculum has been designed to meet the growing needs of professionals in the field of clinical radiography, imaging technology and radiation safety. Students benefit from doing the course as there is a large volume of work in allareas.

COURSE OBJECTIVES:

- To train regarding techniques, Preparation, Instruction, Positioning of patient for Contrast radiography in the imaging.
- To know about cath lab procedures .
- To know about positioning of the patient in ultrasound and patient preparation for cath lab procedures.

SYLLABUS

Credits: Theory 02 & Practical 11

Hours: Theory 30 & Practical 330

of skull, chest, abdomen, bed-side x-rays independently.

Theory:

UNIT	CONTENT	No. OF HOURS
I	Contrast Media Types, composition, uses, contraindications A. Definitions: Air, Gasses. Radiopaque: Barium Compounds, Aqueous Iodine Compounds, Oily Iodine Compounds, Other. B. Pharmacology: Barium Compounds & Iodine Compounds : Patient History/Allergy, Chemical Composition,Patient Precautions, Patient Reactions, Emergency Care. C. Methods of Administration: Systemic: Oral, Rectal, Tube, Catheter, Inhalation. Parental: Intravenous, Intra-Arterial, Intra Spinal. D. Administration Technic: Oral (Spoon, Cup, Capcule),Tube/Catheter, Nasogastric, Urinary, Enema, Other.	5
II	Barium Swallow-Barium meal series- small bowel enema, double and single contrast, sinograms, fistulograms, IVU, retrogrde pyelogram, MCU	5
III	Basic Acoustics, Ultrasoundterminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. Basic Acoustics,	5

	Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance,speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients	
IV	Piezoelectricity, Medical ultrasound transducer: Principle,Construction and Working, Characteristics of US beam Ultrasound display modes: A, B, M, T-M mode, B-scan, Scan-converters: Analog and Digital, US Machine Controls, US focusing. Real-timeultrasound: Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, Ultrasound Artifacts	10
V	USG Contrast agents Harmonic imaging Extended FOV imaging 3D US imaging: acquisition methods & reconstruction 4D & 5D US imaging	5
Practical		
I	Techniques In Ultrasonography: Techniques for imaging different anatomic areas.	50
II	**Patient preparation** for Doppler, Vascular sonography, Neurosonogram,	50
III	Sonohysterography, Sonourethrography, Elastography, Musculoskeletal USG.	46
IV	**CATH LAB POSTING** : Theatre radiography-introduction to C-arm image intensifier- exposure & training.	24
V	Barium Swallow-Barium meal series- small bowel enema, double and single contrast Sinograms, fistulograms, IVU, retrogrde pyelogram, MCU	160

PRACTICALS:

- Basic Ultra sound techniques, Practicals based on theory
- Contrast Procedures in fluoroscopy and cath lab..

COURSE OUTCOMES:

- To be able to assist and perform in preparations, Instructions, Positioning of patient for contrast radiography and ultrasound.
- To assist in cath lab procedures.

REFERENCES:

- Textbook of radiology for residents and technicians – Satish K Bhargava- 5th edition
- Handbook of Medical Radiography latest edition by C Rammohan
- Radiographic positioning Niranjan Baghel
- Clarks proedures in diagnostic imaging by Whitley
- Radiologic science for technologists 11th edition Elsevier

SEMESTER – V

GENERAL MEDICINE

23GMED1001

SYLLABUS

Credits: Theory 01 & Practical 01

Hours: Theory 15 & Practical 30

Theory

UNIT	CONTENT	THEORY HOURS
I	**PSYCHIATRY** ANXIETY NEURO DEPRESSION	**1**
II	**RESPRATORY** BRONCHIAL ASTHMA: Etiology clinical features and management , status asthmatics RESPIRATORY FAILURE: Types Etiology clinical features and management	**2**
III	**HEMATOLOGY:** IRON DEFICIENCY ANEMIA: Etiology, iron metabolism, clinical features and management MEGALOBLASTIC ANEMIA: Etiology, clinical features and management	**2**
IV	**GIT:** APD: Etiology, clinical features and management, H. pylori infection ASCITIS: Etiology, clinical features differential diagnosis and management CIRRHOSIS: Etiology, clinical features(signs of liver cell failure)and management and complications (hepatic encephalopathy, types of hepatorenal syndrome, SBP) PANCREATITIS: Etiology, clinical features management	**4**
V	**KIDNEY:** AKI: Perennial , renal, post renal Etiology, clinical features management CKD: Definition staging Etiology, clinical features management NEPHROTIC SYNDROME: Etiology, clinical features management NEPHRITIC SYNDROME: Etiology, clinical features management UTI: Etiology, clinical features management	**4**
	SKIN & TOXICOLOGY: SCABIES: Etiology, clinical features management and prevention TINEA: Types, Etiology, clinical features management STD: Types, Etiology, clinical features management OP POISONING SNAKE BITE	**2**

Practical:

UNIT	CONTENT	THEORY HOURS
I	Recording History	4
	Recording Vitals	2
II	Writing & Maintaining Records	4
	Heart Examination & Recognizing murmurs 2 - 3	4
III	Lung Examination & Recognizing added sounds	4
	Examination of Gastrointestinal System	4
IV	Basic Examination of nervous system	4
V	Case based discussion	2
	Record of cases/Exercises	2

GENERAL SURGERY

23GSUR1001

SYLLABUS

Credits: Theory 01 & Practical 01

Hours: Theory 15 & Practical 30

Theory		
UNIT	**CONTENT**	**HOURS**
I	Malignancy – stomach, lung, kidney, prostate, breast, skin, pancreas, liver,brain, parotid tumor	4
II	GIT – liver abscess, intestinal obstruction, appendicitis, perforation	3
III	Hydrocele, hernia, filariasis	1
IV	Orthopedics: Fractures, tumors, osteoarthritis of knee, cervical / lumbar spondylosis,	3
V	Eye – cataract, injury, corneal ulcer, glaucoma, ENT – tonsillitis, sinusitis, ASOM, CSOM	3
	Postoperative care,	1

Practical		
I	Eliciting history of patient & recording , Maintaining case records	5
II	Writing requisitions, Recording vitals	5
III	Initial care of trauma patient, Communicating with patient	5
IV	Basic surgical skills of examining lump / ulcer & recording, Pre-op evaluation	5
V	Post-op care, Assisting in basic surgical cases & basic surgical skills (suturing, sutureremoval, dressing etc.)	5
	Others & elective, Record of cases & exercises	5

BASICS & ADVANCES IN CT IMAGING PHYSISCS (RIT – III)

23RADG3001

COURSE OBJECTIVES:

- Know about basic principle of working of CT .
- To train in various protocols techniques in CT procedures.
- To know about how to do the image processing and image reconstruction in CT**.**
- To know basic principle of working of PET CT.

SYLLABUS

Credits: Theory 02 & Practical 06

Hours: Theory 30 & Practical 180

Theory:

UNIT	CONTENT	HOURS
I	**CT Imaging - Principle:** Basic principle of Computed Tomography, Comparison of CT with Conventional Radiography and Tomography, Generations of CT	10
II	**Instrumentation** Gantry, Patient couch, X-ray tube, Filters, Collimators, Detectors, Data Acquisition System **Advances in CT :** Image Formation in CT, CT Image Reconstruction, Hounsfield Unit, Windowing, CT image display, CT Image Quality, CT artifacts	5
III	**Recent methods in CT Imaging:** Helical CT scan: Slip ring technology, Advantages, Multi Detector CT, Cone — Beam geometry, Reconstruction of helical CT images	5
IV	CT Fluoroscopy, HRCT, Post Processing Techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose	5
V	Nuclear Medicine	5

DOPPLER & SPECIAL RADIOGRAPHIC PROCEDURES (RIT – IV)

23RADG3011

COURSE OBJECTIVES:

- Know about basic principle of working of Doppler studies.
- To train in various special contrast fluoroscopic procedures.
- To be able to do image processing for special contrast fluoroscopic procedures.

SYLLABUS

Credits: Theory 02 & Practical 06

Hours: Theory 30 & Practical 180

Theory:

UNIT	CONTENT	HOURS
I	**Doppler Ultrasonography Physics:** Doppler Effect, Doppler ultrasound techniques: Continuous Wave Doppler, PulsedDoppler,	10
II	Duplex scanning, Doppler spectrum, Color Doppler, Power Doppler	5
III	Barium enema-double contrast barium enema, ERCP, PTBD,	5
IV	Urethrogram, Dacrography, Sialogram.HSG	5
V	T-Tube cholangiogram	5
Practical:		
I	Barium enema-double contrast barium enema, ERCP, PTBD,	60
II	Urethrogram, Dacrography, Sialogram.HSG	90
III	T-Tube cholangiogram, operative cholangiogram (on table in theatre).	90
IV	Patient positioning for doppler.	60
V	Nuclear medicine postings.	60

COURSE OUTCOMES:

- To be able to assist and perform in preparations, Instructions, Positioning of patient forspecial contrast radiography and doppler studies.
- To assist in cath lab procedures.

REFERENCES:

- Textbook of radiology for residents and technicians – Satish K Bhargava- 5th edition
- Handbook of Medical Radiography latest edition by C Rammohan
- Radiographic positioning Niranjan Baghel
- Clarks proedures in diagnostic imaging by Whitley
- Radiologic science for technologists 11th edition Elsevier

SEMESTER – VI

BASICS & ADVANCES IN MRI IMAGING PHYSISCS (RIT – V)

23RADG3021

COURSE OBJECTIVES:

- To know about basic working principles of MRI.
- To train in assisting basic pulse sequences of MRI.
- To know about how to do the image processing**.**
- To know the about MR contrast media and MR artifacts.

SYLLABUS

Credits: Theory 08 & Practical 10

Hours: Theory 120 & Practical 300

Theory:

UNIT	CONTENT	HOURS
I	**MRI Imaging - Principle:** Basic principle and concepts of MRI, the need for MRI, Role of hydrogen in MR Imaging, Advantages and disadvantages of MRI.	30
II	**Instrumentation:** MR architecture, magnet system and gradient system, patient screening before scanning, Safety aspects, types of magnets and RF coils.	20
III	**Image Formation:** Fourier transformation, K space imaging, Image formation in MRI, Gating mechanism in MRI.	20
IV	MR Contrast media, MR artifacts, factors influencing image quality	20
V	Basic types of pulse sequence and advanced pulse sequences	30

TECHNIQUES IN CT & MRI (RIT – VI)

23RADG3031

COURSE OBJECTIVES:

- To know about the protocols of CT.
- To train in assisting contrast procedures of CT.
- To know about how to do the image processing**.**
- To know the about CT contrast media and CT artifacts.

SYLLABUS

Credits: Theory 02 & Practical 01

Hours: Theory 30 & Practical 30

Theory:

UNIT	CONTENT	HOURS
I	**Techniques In CT Scan Imaging :** Patient preparation, Imaging techniques and protocols for various parts of body, Image documentation: Filing, Maintenance.	6
II	CT contrast enhanced protocols	6
III	CT angiography: Aortogram,	6
IV	Selective angiogram of head, neck and peripheral vessels.	6
V	Carotid angiogram	6

INTERVENTIONAL CT PROCEDURES & CONTRAST RADIOGRAPHY (RIT – VII)

23RADG3041

COURSE OBJECTIVES:

- To know about basic working principles of DSA.
- To train in assisting special sequences of MRI.
- To know about how to do the image processing**.**
- To know the preparation and positioning of the patient in interventional procedures.

SYLLABUS

Credits: Theory 02 & Practical 01

Hours: Theory 30 & Practical 30

UNIT	CONTENT	HOURS
I	**Interventional Procedures and Angiography** Principle & Instrumentation: Digital Subtraction Angiography: Instrumentation, Principle of Digital Subtraction Angiography, Various Digital Subtraction Techniques **Invasive Monitoring** Cardiac resuscitation measures, Management of shock. **Adult & Paediatric Invasive Cardiology:** Basics of cardiac catheterization Coronary angiogram	5
II	**Basics Of Invasive Radiology:** Procedure of image guided biopsies and drainage procedure. **Invasive Angiography & Venography** 4 Vessel DSA, Aortogram, Selective Angiogram, Venogram	5
III	**Interventional Procedures & Angiography** Stenting, PTA + stenting, stent graft, Embolisation	5
IV	**Neuro Interventional Procedures** Embolisation, GDC Glue embolisation Vertebroplasty	5
V	**Techniques in MRI :** **P r o t o c o l s :** Protocols in MRI for whole Body **Advanced MRI techniques:** MR Angiography, (TOF, phase contrast and dynamic contrast MR angiography), Functional MR, MR Spectroscopy, Recent advancement in MRI and open MM, MRCP, DWI, SWI, perfusion	10
Practical		
I	**Patient preparation** for CT Imaging and protocols for various parts of body	80
II	**Patient preparation** for CT contrast enhanced protocols.	60
III	**Patient preparation** for CT angiography, Aortogram, Selective angiogram head, neck and peripheral.	70
IV	**Patient preparation** for MRI Imaging and protocols for various parts of body. MRCP, DWI,	70

	SWI, perfusion.	
V	MR Angiography, (TOF, phase contrast and dynamic contrast MR angiography), Spectroscopy.	80

COURSE OUTCOMES:

- To be able to assist and perform in preparations, Instructions, Positioning of patient for contrast studies of CT.
- To assist in planning of various MRI protocols.
- To position and preparation of the patient in interventional procedures.

REFERENCES:

- Textbook of radiology for residents and technicians – Satish K Bhargava- 5thedition
- Handbook of Medical Radiography latest edition by C Rammohan
- Radiographic positioning Niranjan Baghel
- Clark's procedures in diagnostic imaging by Whitley
- Radiologic science for technologists 11th edition Elsevier