(12)

SYLLABUS

BACHELOR IN RADIOTHERAPY TECHNOLOGY

4 Years (VIII Semesters)

(3 Years+1 Year (VII-VIII Semester) Internship)

SEMESTER –I									
Course Code	**Course Category**	**Paper Title**	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Human Anatomy	4	3	1	-	20	80	100
	Core	Human Physiology	4	3	1	-	20	80	100
	Core	General Biochemistry	4	3	1	-	20	80	100
	Core	Basic computers and information Science&Medical Law & Ethics	4	3	1	-	20	80	100
	Practical	Practical for all subjects / Clinical Posting	5	- / - / -	- / - / -	10	50	150	200
	Ability Enhancement Course	Environmental Science and Health	2	2	-	-	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/ College/University.	2	2	-	-	20	80	100
Total Credit- 25			**Total Contact Hours- 30**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER –II									
Course Code	**Course Category**	**Paper Title**	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	General Microbiology	4	3	1	-	20	80	100
	Core	General Pathology	4	3	1	-	20	80	100
	Core	General Pharmacology	4	3	1	-	20	80	100
	Core	Introduction to Healthcare Delivery System in India	4	3	1	-	20	80	100
	Practical	Practical for all subjects / Clinical Posting	5	- / - / -	- / - / -	10	50	150	200

	Ability Enhancement Course	Medical terminology and Record keeping	2	2	-	-	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/ College/University.	2	2	-	-	20	80	100
Total Credit- 25			**Total Contact Hours- 30**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER –III

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Introduction to Quality and Patient safety; Professionalism and values; Principles of Management	4	3	1	-	20	80	100
	Core	Elementary Mathematics and Physics	4	3	1	-	20	80	100
	Core	Radiographic Anatomy	4	3	1	-	20	80	100
	Core	Oncology Science- I	4	3	1	-	20	80	100
	Practical	Practical for all subjects / Clinical Posting	5	-	-	10	50	150	200
	Discipline Specific Elective	General Principles and Practices of Public Health/ Forensic Psychology	2	2	-	-	20	80	100
	Ability Enhancement Course	Computer/BASIC EMERGENCY MANAGEMENT	2	2	-	-	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/	2	2	-	-	20	80	100

		College/University.							
Total Credit- 27			**Total Contact Hours- 32**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER –IV									
Course Code	**Course Category**	**Paper Title**	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiotherapy Equipment -I	4	3	1	-	20	80	100
	Core	Principles of radiotherapy and radiotherapy techniques	4	3	1	-	20	80	100
	Core	Radiation Quantities, Units and Detection/Measurement	4	3	1	-	20	80	100
	Core	Basic Radiation Physics	4	3	1	-	20	80	100
	Practical	Practical for all subjects / Clinical Posting	5	- - - -	- - -	10	50	150	200
	Discipline Specific Elective	Communication skill for Health care professional/ introduction to national healthcare system	3	3	-		20	80	100
	Skill Enhancement Course	MEDICAL LAW/ Ethics in public health	2	2	-	-	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/ College/University.	2	2	-	-	20	80	100
Total Credit- 28			**Total Contact Hours- 33**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER –V

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Oncology Science-II	4	3	1	-	20	80	100
	Core	Radiation Safety	4	3	1	-	20	80	100
	Core	Patient care, positioning and immobilization	4	3	1	-	20	80	100
	Core	Radiotherapy Equipment -II	4	3	1	-	20	80	
	Practical	Practical for all subjects / Clinical Posting	5	-	-	10	50	150	200
	Discipline Specific Elective	Medical psychology/ Biostatics and Research methodology	3	-	-	3	20	80	100
	Ability Enhancement	Entrepreneurship development/ Introduction to quality and patient safety	2	-	-	2	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/ College/University.	2	2	-	2	20	80	100
Total Credit- 28			**Total Contact Hours- 33**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER –VI

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Clinical Radiobiology &Mould Room /Motion Management Techniques	4	3	1	-	20	80	100
	Core	Quality Assurance in Radiotherapy	4	3	1	-	20	80	100

	Core	Radiological/Nuclear Medicine/Other Imaging Techniques in Radiotherapy Planning; Radiotherapy treatment delivery;	4	3	1	-	20	80	100
	Core	Basic Radiotherapy Physics &Biological Effects of Radiation; Operational Issues in Radiation Therapy	4	3	1	-	20	80	100
	Practical	Practical for all subjects / Clinical Posting	5	-	-	10	50	150	200
	Discipline Specific Elective	HOSPITAL MANAGEMENT/ Basics of clinical Skill Learning	3	3	-	-	20	80	100
	Skill Enhancement Course	BASIC AND ADVANCE LIFE SUPPORT/ ORGANIZATIONAL BEHAVIOUR	2	2	-	-	20	80	100
	*Generic Elective	*Students have to opt any one of the open elective courses offered by Institute/ College/University.	2	2	-	-	20	80	100
Total Credit- 28			**Total Contact Hours- 33**						
***Credits of MOOC, SWAYAM and NEPTEL will be considered similar to the credits of Open Elective /General Elective**									

SEMESTER – VII& VIII INTERNSHIP				
Subject Code	**Course category**	**Course title**	Evaluation	
			Internal	External
VII Sem	Core	Internship	20	80
VIII Sem	Core	Internship	20	80
Internship is for 12 months,				

SEMESTER	CREDIT
I	25

II	25
III	27
IV	28
V	28
VI	28
VII	20
VIII	20
TOTALCREDITS	**201**

Exit: Honours' RADIOTHERAPY Technology

SEMESTER-1

HUMAN ANATOMY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Human Anatomy	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describe the anatomy & terminology of cell, tissues of body Skin & its Blood supply.	Remember
2	Explain the blood circulation system & skeleton system with Classification of bones, Parts of developing long bone.	Understand
3	Determine the muscular system, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back & joints.	Apply

4	Analyse the respiratory system with Bronchopulmonary segments & circulatory system: Types of blood vessels, Heart& Pericardium.	Analyze
5	Assess the digestive system, role of digestive juices & enzymes & reproductive system: spermatogenesis & oogenesis.	Evaluate
6	Formulate the excretory system Pathway of glomerulus filtration rate with structure & structure of nephrons.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcomes	1. To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system 2. Demonstrate and understand the basic anatomy of Respiratory and Circulatory system 3. Demonstrate and understand the basic anatomy of Digestive and Excretory system 4. Knowledge of basic concept of human body anatomical structure. 5. Knowledge of interrelationships, gross, functional and applied anatomy of various structures in the human body.

UNIT-I

1. Introduction to anatomy, anatomical terms, planes, organization of human body- cell, tissue, organ and organ system.
2. Musculo-skeletal system:
   Types of bones, structure & divisions of the skeleton system, name of all the bones and their parts, joints- classification. Structure and types of muscles
3. Anatomy of the Nervous system
   Central nervous system & Peripheral nervous system- different components

UNIT-II

1. Anatomy of Circulatory system:
   General plan of circulatory system and its components.
2. Heart- size, location, coverings, chambers, blood supply, nerve supply, the blood vessels
   General plan of circulation, pulmonary circulation
3. Name of arteries and veins and their positions Lymphatic system - general plan Anatomy of the Respiratory system:
   Organs of Respiratory System (Brief knowledge of parts and position)

UNIT-III

1. Anatomy of the Digestive system:
2. Anatomy of alimentary tract; Parts of the tract
3. Accessory glands of digestion; Pancreas, Liver, Gall Bladder

4. Anatomy of Excretory system Kidneys- location, gross structure, excretory ducts, ureters, urinary bladder, urethra

UNIT-IV

1. Reproductive system: Male Reproductive System, Female Reproductive System

UNIT-V

1. Anatomy of the endocrine system: Name of all endocrine glands their positions
2. Hormones and their functions- Pituitary, Pituitary, Thyroid, Parathyroid, Adrenal glands, Gonads & Islets of pancreas

PRACTICALS

1. Demonstration of parts of microscope and its uses
2. Demonstration of skeleton and joints.
3. Demonstration of deltoid and gluteus maximus, Cubital fossa.
4. Clinical Examination of Arterial Pulse
5. Demonstration of body temperature.

Reference Books:

a. Human Anatomy Regional and Applied Vol. 1, Vol.2 & Vol.3, B.D.Chaurasia C.B.S.Publishers, New Delhi- 9th edition -2022
2. Hand Book of General Anatomy B.D.Chaurasia, C.B.S.Publishers, New Delhi-9th edition -2022
3. Text Book of Human Histology Inderbir Singh, Jaypee Brothers, Medical
4. Publishers, Delhi -7th edition - 2021
5. Gray's Anatomy Susan Standring, Elsevier Churchill Livingstone, Edinburg – 42nd edition- 2021

HUMAN PHYSIOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Human Physiology	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describe the basic physiology of hematology, Homeostasis, Hemopoiesis, Hemogram, Anemia, Body Fluid, Immunity.	Remember
2	Explain the basic physiological concept of cardiovascular system, functions, properties of cardiac muscle, Origin of Cardiac	Understand

	Impulse.	
3	Determine the nerve – muscle physiology, neuromuscular junction & Mechanism of muscle contraction & central nervous system.	Apply
4	Analyze the Physiologic anatomy, functions of respiratory system, Mechanism of respiration & circulatory system.	Analyze
5	Assess the physiology of digestive system Composition and functions of all Digestive juices, Movements.	Evaluate
6	Formulate the physiological concept of excretory system, structure & function of excretory organs.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning outcomes	1. To understand the basic physiological concepts of General physiology 2. To understand the basic physiological concepts of Hematology 3. To understand the basic physiological concepts of Nerve-Muscle physiology. 4. To understand the basic physiological concepts of Respiratory physiology. **5.** To understand the basic physiological concepts of Cardiovascular physiology

UNIT-I

1. General Physiology
2. Cell, Transport across cell membrane, homeostasis, resting membrane potential, action potential
3. Blood: Composition and functions of Blood, RBC, WBC, Platelet count, Hemoglobin
4. Blood Groups - ABO and RH grouping
5. Hemostasis & Anticoagulants

UNIT-II

1. Cardio vascular system
2. Cardiac muscle, Pacemaker & conducting tissue
3. Cardiac Cycle, Cardiac output, Heart rate, ECG, Arterial blood pressure
4. Respiratory System: Functions of Respiratory system, Mechanism of respiration, lung volumes & capacities

UNIT-III

1. Nerve & Muscle physiology
2. Neuron structure & properties, Neuromuscular junction
3. Skeletal muscle structure mechanism of contraction
4. Cerebrospinal Fluid (CSF): Composition, functions & Circulation.
5. Central & autonomic Nervous system Organization of CNS
6. Functions of various parts of Brain, in brief
7. Composition, functions and circulation of CSF
8. Differences between sympathetic and parasympathetic division

UNIT-IV

1. Digestive system: Functional Anatomy, organization & innervations
2. Composition and functions of all Digestive juices
3. Digestion & Absorption of carbohydrates, proteins and fats

UNIT-V

1. Excretory System
2. Kidneys: Functions, Nephron, Juxta-glomerular Apparatus
3. Renal circulation
4. Mechanism of Urine formation, GFR
5. Endocrine and Reproductive systems Endocrine glands & hormones secreted
6. Functions of Reproductive system: Male Reproductive System: spermatogenesis, Testosterone, Female reproductive system: Ovulation, Menstrual cycle, Pregnancy test

PRACTICALS

1.Estimation of Hemoglobin Concentration
2.Determination of Bleeding Time and Clotting Time
3.Determination of Blood Groups
4.Recording of normal Blood Pressure
5.Determination of Vital Capacity

Reference Books:

1. A.K.Jain, Textbook of Physiology (Volume I & II) -9th edition -2021.

2. Dr. Venkatesh.D and Dr. Sudhakar H.S.Basic of Medical Physiology- Wolter-Kluwer Publication- edition – 4th edition - 2018

3. Chaudhari (Sujith K) Concise Medical Physiology - New Central Book- 7th edition - 2016

GENERAL BIOCHEMISTRY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	General Biochemistry	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describe the biomolecules Introduction and scope of biochemistry, Chemistry of carbohydrates, proteins, lipids.	Remember
2	Explain the metabolism of glucose, fats & amino acids & their regulatory pathways.	Understand
3	Determine the structure & function of enzymes & its clinical importance	Apply
4	Analyze the RDA, Sources of Vitamins and Minerals, functions and deficiency of fat-soluble vitamins.	Analyze
5	Assess the balanced diet, Satiety value, Energy imbalance-obesity, starvation, Limitations of the daily food guide.	Evaluate
6	Formulate the conventional & specialized lab investigation, Principle and applications of Colorimeters, pH Meter.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning outcome	1. To identify the five classes of polymeric biomolecules and their monomeric building blocks. 2. Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action. 3. Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP. 4. Describe how fats and amino acids are metabolized, and explain how they can be used for fuel.

UNIT-I

1. Cell: Morphology, structure & functions of cell, cell membrane, Nucleus, chromatin, Mitochondria, Endoplasmic Reticulum, Ribosomes.
2. Carbohydrates: Definition, chemical structure, functions, sources, classifications, Monosaccharides, Disaccharides, Polysaccharides, mucopoloysaccharide and its importance, glycoproteins

UNIT-II

1. Lipids: Definition, function, sources, classification, simple lipid, compound lipid, derived lipid, unsaturated and saturated fatty acid. Essential fatty acids and their importance, Blood lipids and their implications, cholesterol with its importance.
2. Proteins: Definition, sources, amino acids, structure of protein, their classification, simple protein, conjugated protein, derived proteins and their properties.

UNIT-III

1. Enzymes: Definitions, mechanism of action, factors affecting enzyme action, enzyme of clinical importance.
2. Nutrition 1) Vitamins: Types, functions and role. 2) Principal minerals and their functions (Ca, P, Mg, Na, K, Cl) 3) Balanced diet, Diet for Chronically and terminally ill patients, post-operative patients

UNIT- IV

1. Carbohydrate Metabolism: Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis, Maintenance of Blood Glucose. Diabetes Mellitus and its complications.
2. Lipid Metabolism: Beta oxidation, Ketone bodies, Cholesterol and atherosclerosis, obesity.

UNIT-V

1. Protein metabolism: Transamination, Deamination, Fate of ammonia, urea synthesis and its inborn errors.
2. Water and Electrolyte, Fluid compartment, daily intake and output sodium and potassium balance

PRACTICALS

1.Introduction of Laboratory apparatus
2.Instruments (Theory & demonstration)
3. Urine Analysis
4. Analysis of blood sugar c.
5. RFTs (Estimation of blood urea, serum creatinine, creatinine clearance, and their implications)

Reference Books:

1: Essentials of Biochemistry – U.Satyanarayan , U.Chakrapani – 4th edition-2021

2: A textbook of Biochemistry – Dr S Anatomy of the endocrine system Anatomy of the endocrine system K Gupta – 2nd edition-2019

3: Concise textbook of Biochemistry for paramedical students – DM Vasudevan, Sukhas Mukherjee – 2nd edition.-2021

4: Essentials of Biochemistry - Pankaj Naik -6th edition.-2022

MEDICAL ETHICS & COMPUTER SKILLS RELATED TO RADIOLOGY TECHNOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Medical Ethics & Computer Skills related to Radiology Technology	4	3	1	-	20	80	100

Course Outcomes:

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Legal and ethical challenges in healthcare.	Receive
2	Students explore the legal, ethical and moral issues in healthcare professionals. Identify issues related to potential legal liability in the workplace.	Respond
3	To introduce students to the discipline of public health.	Value
4	To give an overview of the methods of prevention and health promotion	Organize
5	To understand the determinants and measures of disease and health related states.	Characterize
6	To understand the status of health and disease at global and national levels.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome	1. To develop ability to design and implement strategies to enhance public health and strengthen the health systems 2. To develop the critical ability to analyze and understand the impact of public health policies on health status and indicators Medical ethics is a practical application of moral standards that are meant to benefit the patient. 3. Able to understand complex healthcare public policy from all sides of an issue, regardless of your personal beliefs.

UNIT- I

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia

UNIT- II

1. Organ transplantation
2. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects
3. Professional Indemnity insurance policy
4. Development of standardized protocol to avoid near miss or sentinel events.
5. Obtaining an informed consent
6. Ethics in the profession of Medical Laboratory Science

UNIT- III

Computer applications related to Cardiology lab technician; various software's used in Cath Lab; interpretation of various laboratory parameters with computer software; advantages of using computers in Cath labs.

Suggested readings:

1. Medical Law and Ethics by Bonnie F Fremgen
2. Medical Law and Ethics by Jonathan Herring

ENVIRONMENTAL SCIENCE & HEALTH

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Ability Enhancement Course	ENVIRONMENTAL SCIENCE & HEALTH	2	2	-	-	20	80	100

Course Outcomes:

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describes the components of Environment, basic concepts of Ecosystem & interaction of man & environment.	Receive
2	Discuss the Global environment problems, biodiversity loss, deforestation & desertification.	Respond
3	Demonstrate the environmental pollution with impact & control strategies of pollution in urban, rural & industrial areas.	Value
4	Define the environmental management, concept of health sanitation, environmental disease.	Organize
5	Revise the Environmental Protection Act, Environmental laws, National movements, environmental ethics.	Characterize
6	Follow the IUCN – role in environmental protection, aims & objectives of human right policies.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome	1. Current environmental issues and highlights the importance of adopting an interdisciplinary approach. 2. Sample an ecosystem to determine population density and distribution. 3. Create food webs and analyse possible disruption of feeding relationship

UNIT-I

Components of Environment – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;

Ecosystem: Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems.

UNIT-II

National Health Program-Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Program.

UNIT-III

Introduction toAYUSHsystemofmedicine-IntroductiontoAyurveda;Yogaand Naturopathy;Unani;Siddha;Homeopathy;Needforintegrationofvarioussystemofmedicine.

UNIT-IV

Environmental Management – Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.

UNIT-V

Environmental Protection Act – Environmental Laws, national movements, environmental ethics – holistic approach of environmental protection and conservation, IUCN – role in environmental protection. Concept with reference to UN – declaration, aim and objectives of human right policies with reference to India, recent north-south debate on the priorities of implementation, Environmental Protection Agency Bioremediation – Oil spills, Wastewater treatment, chemical degradation, heavy Metals.

Reference books:

1.National Health Programmes & Policies 2020-2021 – Samta Soni- 2nd edition.
2.Practical & Viva Community Medicine – J Kishore, Sneha Kumari- 5th edition.-2021
3.Textbook of Environmental Science – Dr Aruna Kumari Nakkella – 2022
4.Environmental Studies – Purnima Das - 2023

SEMESTER-2

GENERAL MICROBIOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	General Microbiology	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describes the Classification of microorganisms, size, shape and structure of bacteria & Use of microscope in the study of bacteria.	Remember
2	Explain the classification & different methods with advantages and disadvantages of the various methods infection control measures.	Understand
3	Determine the immunology & perform serological tests or microbiological laboratory procedures.	Apply
4	Analyse the etiological agents of global infectious diseases, causative agents, transmission methods, investigation, prevention & control.	Analyse
5	Assess the clinical relevance of bacteriology, parasitology mycology & virology.	Evaluate
6	Formulate the causative agents & guidelines to stop the spread of infection in healthcare system.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcome	Upon completion, students should be able to demonstrate: 1. Knowledge of microorganisms and the disease process as well as aseptic and sterile techniques. 2. Perform microbiological laboratory procedures according to appropriate safety standards

UNIT-I

Microorganisms

(a) Classification-Prokaryotes, Eukaryotes, Viruses, Fungi

(b) Morphology-size, shape, arrangement
(c) Special characteristics–spores, capsules, enzymes, mortality, reproduction
(d) Gram staining, ZN staining
(e) Different types of microscopes.

UNIT-II

Sterilization
(a) Definition.
(b) Different methods of sterilization including – Gaseous sterilization Plasma sterilization
(c) Advantage and disadvantage of various methods and their controls
(d) Sterilization of different instruments used in patients
(e) Preparation of materials for Autoclaving: packing, loading, holding time, unloading

UNIT-III

Disinfection
(a) Definition
(b) Different type of methods including High level disinfectants
(c) Disinfection of patient care unit and rooms(O.T., Wards, ICUs & Laboratories)
(d) Central supply department Areas and floor plan for instrument cleaning high level disinfection & sterilizing area

UNIT-IV

Asepsis
(a) Universal Precautions
(b) Use of aseptic precautions to prevent infection,
(c) Safety mechanisms including vaccination in prevention of blood borne infections
Hospital acquired infections

UNIT-V

Virology with special reference to hepatitis, poliomyelitis, HIV & Influenza
Immunity – Non-specific
- Natural & Acquired
- Allergy and Anaphylaxis

PRACTICALS:

1. Compound microscope and its application in microbiology.
2. Demonstration of sterilization equipment: hot air oven, autoclave.
3. Demonstration of commonly used culture media, nutrient broth, nutrient agar, blood agar, chocolate agar, Mac conkey medium, L J media.
4. Grams staining.
5. Acid fast staining

Reference books:

1: Complete Microbiology – 7 th edition -2022

2: Text & Practical Microbiology – CP Bveja & V Baveja – 3rd edition - 2022
3: Essentials of Medical Microbiology- Apurba S Sastry & Sandhya Bhat – 3rd edition-2021
4: Textbook of Microbiology – 12th edition- 2022

GENERAL PATHOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	General Pathology	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Describes basis of systemic pathology & morphology of common disorders.	Remember
2	Explain the general principles of hematology & histopathology techniques.	Understand
3	Determine the general principle of cytopathology techniques & universal safety precaution.	Apply
4	Analyse the general principles of clinical pathology techniques, autopsy & museum.	Analyse
5	Assess the clinical information of accurate pathology diagnosis.	Evaluate
6	Formulate the pathological laboratory procedures according needed for final pathologic report.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcomes	1. The student should submit the appropriate tissue sections per protocol to demonstrate the lesion and other clinically-relevant information needed for the final pathologic report. 2. To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult.

UNIT: I

Cell injury, cellular adaptation and cell death

- Causes of cell injury
- Reversible and Irreversible cell injury (Necrosis and its types with examples & morphology)
-Apoptosis
-Calcification
-Hyperplasia, Hypertrophy, Atrophy Metaplasia (Definition with examples).

UNIT-II

Inflammation and Repair

-Definition and type of inflammation
-Granulomatous inflammation with examples
-Chemical mediators of inflammation.
-Wound healing by 1st & 2nd intention.

UNIT-III

Fluid and Hemodynamic disturbances

-Oedema (Pathogenesis)
-Shock (Definition, Types)
-Thrombosis (Definition & Pathogenesis)
-Embolism (Definition & Pathogenesis)
-Infarction (Definition & Pathogenesis)

UNIT-IV

Neoplasia

-Definition and types of Neoplasia (Benign & Malignant neoplasms)
-Charactisties of Neoplasia.
-Pathogenesis of Neoplasia.
-Routes of spread

UNIT-V

Blood

Blood groups-ABO system, Rh system, Blood transfusion- Indication, transfusion reactions.

- Anaemias-classification, morphological and Etiological, effects of anaemia on body.

PRACTICALS

1. Collection of blood Samples
2. Various instruments used in Haematology
3. H b estimation.
4. Blood grouping

5. Urine complete examination

Reference Books:

1: Review of Pathology – Sparsh Gupta – 12th edition - 2020
2: Textbook of Haematology – Dr Tejinder Singh -2017
3: Essentials in Hematology & Clincal Pathology – 2nd edition - 2017
4: A textbook of Pathology–Harsh Mohan– 8th edition.-2019

PHARMACOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Pharmacology	4	3	-	2	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall and identify the major drug classifications and their pharmacological properties	Remember
	Understand the mechanisms of drug action and their effects on various physiological systems	Understand
	Apply knowledge of pharmacological principles to assess and select appropriate drug therapies for specific medical conditions	Apply
	Analyse drug interactions and potential contraindications in clinical scenarios	Analyse
	Evaluate the efficacy and safety of drug therapies based on evidence-based medicine principles	Evaluate
	Create individualized pharmacotherapy plans for patients based on their specific needs and medical conditions.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcomes	1. Students will be proficient in Pharmacology with proficient knowledge about the different drugs / medicines to be given in various cardiovascular diseases, dose calculation and mode of administration. 2. Also, recent advances in pharmacology will play a key role in research aspect of the students

UNIT- I

General Pharmacology

a) Absorption, distribution, metabolism and elimination of drugs,

b) routes of drug administration.

c) Adverse reactions to drugs.

d) Factors modifying drug response

UNIT- II

Autonomic nervous system & Peripheral nervous system

a) Sympathetic nervous system - sympathomimetics, sympatholytics

c) Parasympathetic - Cholinergics, Anticholinergics Drugs

d) Skeletal muscle relaxants

e) Local anaesthetics

UNIT- III

Central nervous system

b) Drug therapy of various CNS disorders like epilepsy, depression.

c) Non-steroidal anti-inflammatory drugs

d) General anesthetics

AUTOCOIDS

a) Histamine and antihistaminics

UNIT- IV

(E) Cardiovascular system

a) Drug therapy of hypertension, shock, angina, cardiac arrhythmias

c) Diuretics

d) Coagulants and anticoagulants, antiplatelet drugs

e) Hypo-lipidemics

(F) Gastrointestinal and respiratory system

c) Drug treatment of peptic ulcer

d) Drug therapy of bronchial asthma

UNIT- V

(G) Hormones

a) Drug therapy of Diabetes

d) Corticosteroids

b) Chemotherapeutic agents - b- Lactam Antibiotics, fluoroquinolones, aminoglycoside, tetracyclines, chloramphericol

PRACTICALS

a) Study of laboratory animals and their handling (a. Frogs, b. Mice, c. Rats, d. Guinea pigs, e. Rabbits).
b) Study of laboratory appliances used in experimental pharmacology.
c) Study of use of anesthetics in laboratory animals.
d) Effects of skeletal muscle relaxants using rota-rod apparatus.
e) Effect of drugs on locomotor activity using actophotometer.
f) Anticonvulsant effect of drugs by MES and PTZ method.
g) Study of local anesthetics by different method

Reference Books:

1: Padmaja Udaykumar – Pharmacology for Dental & Allied Health Sciences – 4th edition, 2017.
2: Joginder Singh Pathania,Rupendra Kumar Bharti,Vikas Sood-Textbook of Pharmacology for Paramedical Students 2019
3: KD Tripathi- Essentials of Pharmacology – 8th edition, 2018.
4: HL Sharma & KK Sharma – Principles of Pharmacology – 3rd edition, 2017.

INTRODUCTION TO NATIONAL HEALTHCARE SYSTEM

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Introduction to healthcare delivery system	4	3	-	2	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Retain basic facts and figures related to healthcare infrastructure, resources, and policies in India.	Remember
	Understand the roles and responsibilities of various stakeholders, such as government agencies, healthcare providers, and insurance companies.	Understand
	Apply critical thinking skills to identify and propose potential solutions to healthcare system challenges.	Apply
	Analyze healthcare data and statistics to identify trends, patterns, and areas for improvement.	Analyze
	Critically evaluate the ethical and legal considerations in healthcare decision-making.	Evaluate
	Design and propose new healthcare policies or interventions to enhance the overall healthcare system in India.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

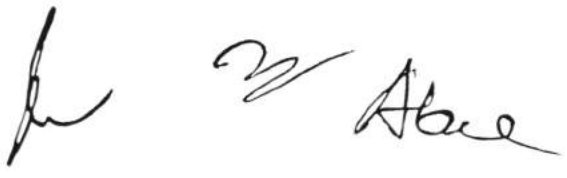
Learning Outcomes	1. Students will be proficient inbasic facts and figures related to healthcare

	infrastructure 2. critical thinking skills 3. healthcare data and statistics

1. Introduction to healthcare delivery system
a. Healthcare delivery system in India at primary, secondary and tertiary care
b. Community participation in healthcare delivery system
c. Health system in developed countries.
d. Private Sector
e. National Health Mission
f. National Health Policy
g. Issues in Health Care Delivery System in India
2. National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.
3. Introduction to AYUSH system of medicine
a. Introduction to Ayurveda.
b. Yoga and Naturopathy
c. Unani
d. Siddha
e. Homeopathy
f. Need for integration of various system of medicine
4. Health scenario of India- past, present and future
5. Demography & Vital Statisticsa. Demography – its concept
b. Vital events of life & its impact on demography
c. Significance and recording of vital statistics
d. Census & its impact on health policy
6. Epidemiology
a. Principles of Epidemiology
b. Natural History of disease
c. Methods of Epidemiological studies
d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Reference Books:

1. "Indian Healthcare: Inside Out" by B.S. Ajaikumar
    - This book provides insights into the challenges and opportunities in the Indian healthcare system, covering topics such as healthcare delivery models, healthcare financing, technology advancements, and policy considerations.
2. "Healthcare Delivery in India: Critical Perspectives" edited by K.R. Nayar and R. Raman
    - This book offers a multidisciplinary perspective on the Indian healthcare system, covering topics such as healthcare policy, healthcare delivery models, healthcare workforce, healthcare technology, and healthcare financing.



MEDICAL TERMINOLOGY AND RECORD KEEPING

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Skill Enhancement Course	Medical terminology and record keeping	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describes the basic importance of medical terms into their component parts.	Receive
	Analyze and spell words correctly.	Respond
	Identify combining forms, prefixes, suffixes and terminology associated with each of the body systems.	Value
	Understand the importance and types of medical records along with its management	Organize
	Revise to compose records in hospitals	Characterize
	Follow the values and skills required in medical audit	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcomes:

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

1. Ensuring successful learning of basic and advance medical terminology

2. Student will able to read, write, spell and understand the medical terminology

3. Understand the types, importance and role of medical records and its management techniques.

UNIT-I

Commonly Used Prefixes, Suffixes and root words in Medical Terminology, Common Latin Terms used in Prescription Writing, Study of Standard Abbreviations.

UNIT-II

Medical Records Management: Meaning, functions, principles of record keeping, Importance of medical records to patients, doctors, and hospitals, classification of records like coding system, indexing system, types of forms basic and special, legal aspects of medical records.

UNIT-III

International Classification of Diseases (ICD), Electronic Medical Record (EMR), Records Management: Registers, forms, retention and preservation of MR, Role of MRD personnel.

UNIT-IV

Medical Registers: Meaning, types, advantages of Medical Registers, registers used in various departments, Statutory registers and reports to be maintained- specimens.

UNIT-V

Medical Audit: its process, role and importance in hospitals.

Reference Books:

- Davies, Juanita. Essentials of Medical Terminology. 3rd edition. New York. Delmar. 2008.
- Mogli. J.D. Medical Records: Organization & Management 2ndedition New Delhi: Jaypee Brothers.
- The body by Bilbirson Agreed for Occupance

SEMESTER-3

INTRODUCTION TO QUALITY AND PATIENT SAFETY; PROFESSIONALISM AND VALUES; PRINCIPLES OF MANAGEMENT

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Introduction to quality and patient safety; professionalism and values; principles of management	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall key concepts, theories, and principles related to quality and patient safety, professionalism and values, and principles of management	Remember
	Comprehend the principles, theories, and models of quality and patient safety in healthcare.	Understand
	Apply management principles and techniques to effectively lead and manage healthcare teams and organizations.	Apply,
	Analyze ethical dilemmas and conflicts in healthcare practice and propose appropriate solutions.	Analyze
	Evaluate the impact of professionalism, values, and ethics on patient care and organizational culture.	Evaluate
	Design management plans and approaches to optimize healthcare delivery and organizational performance.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1professionalism and values

2 principles of management

Introduction to Quality and patient safety

1. Quality assurance and management - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.

a. Concepts of Quality of Care
b. Quality Improvement Approaches
c. Standards and Norms
d. Quality Improvement Tools
e. Introduction to NABH guidelines

2. Basics of emergency care and life support skills - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:

a. Vital signs and primary assessment
b. Basic emergency care – first aid and triage
c. Ventilations including use of bag-valve-masks (BVMs)
d. Choking, rescue breathing methods
e. One- and Two-rescuer CPR
f. Using an AED (Automated external defibrillator).
g. Managing an emergency including moving a patient

At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

3. Bio medical waste management and environment safety- The aim of this section will be to help prevent harm to workers, property, the environment and the general public. Topics to be covered under the subject are as follows:

a. Definition of Biomedical Waste
b. Waste minimization
c. BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
d. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
e. BMW Management & methods of disinfection
f. Modern technology for handling BMW

g. Use of Personal protective equipment (PPE)
h. Monitoring & controlling of cross infection (Protective devices)
4. Infection prevention and control - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip
MODEL CURRICULUM HANDBOOK OF RADIOTHERAPY TECHNOLOGY
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AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –
a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
b. Prevention & control of common healthcare associated infections,
c. Components of an effective infection control program, and
d. Guidelines (NABH and JCI) for Hospital Infection Control
5. Antibiotic Resistancea. History of Antibiotics
b. How Resistance Happens and Spreads
c. Types of resistance- Intrinsic, Acquired, Passive
d. Trends in Drug Resistance
e. Actions to Fight Resistance
f. Bacterial persistence
g. Antibiotic sensitivity
h. Consequences of antibiotic resistance
i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals
6. Disaster preparedness and management- The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should includea. Fundamentals of emergency management,
b. Psychological impact management,
c. Resource management,
d. Preparedness and risk reduction,
e. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.

Professionalism and values

The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.
1. Professional values- Integrity, Objectivity, Professional competence and due care,

Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behavior- professional behavior, treating people equally
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts
6. Cultural issues in the healthcare environment

Principals of Management

The course is intended to provide a knowledge about the basic principles of Management.

1. Introduction to management
2. Strategic Management
3. Foundations of Planning
4. Planning Tools and Techniques
5. Decision Making, conflict and stress management
6. Managing Change and Innovation
7. Understanding Groups and Teams
8. Leadership
9. Time Management
10. Cost and efficiency

Reference Books:

1. "Professionalism in Health Care: A Primer for Career Success" by Sherry Makely
2. "Principles of Management for Quality Projects: Smart Strategies" by George Ecke

ELEMENTARY MATHEMATICS AND PHYSICS

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Elementary Mathematics and Physics	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall fundamental mathematical and physical concepts, formulas, and equations. Remember key definitions, theorems, laws, and principles in mathematics and physics. Retain essential mathematical and physical formulas, calculations, and problem-solving techniques	Remember
	Understand the mathematical and physical laws, principles, and their applications. Grasp the concepts of mathematical modeling and its relevance to physics.	Understand
	Apply mathematical concepts and formulas to analyze and interpret physical phenomena	Apply,
	Analyze mathematical and physical relationships to derive conclusions and solutions.	Analyze
	Evaluate the accuracy and precision of measurements and experimental data.	Evaluate
	Create innovative solutions to mathematical and physical problems.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

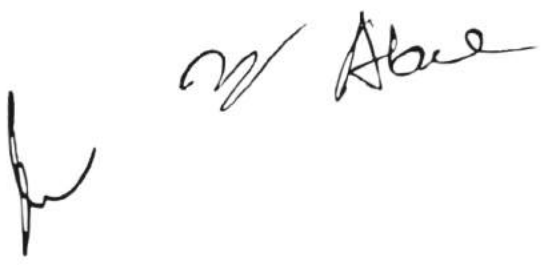
After completion of the course, students would be able to:

1. mathematical and physical laws

2. accuracy and precision

3. innovative solutions to mathematical and physical problems.

techniques.



1. Elementary Mathematics

a. Calculation of percentage, Profit & Loss, Simple interest, compound interest, time & work ,Ratio & proportion, Surds, Indices, Logarithm, Inverse Square Law,

b. Geometry of triangles, similar triangles, Properties of Triangles.

c. Trigonometry: Height & Distance.

d. Graphical Representation of Exponential and Inverse exponential functions, Linear and semi log graphs.

2. Basic Physics, Electrostatics, Magnetism & Current Electricity

a. Units & Dimension, Newton's Laws of Motion, Velocity & Speed, Force, Momentum etc.

b. Coulomb's Law, Electric field & potential, Capacitance, Ohm's Law, Heating effect of current, Biot–Savart law, Definition of Tesla and Gauss, Magnetic field due to circular coil. Elementary Principles of-Magnetization of Materials by electric current, Electromagnets. Lorentz force. Magnetic flux. Electromagnetic induction, mutual and self-inductance. Transformer, Eddy current. Alternating Current, RMS and Average Current. Variation of Voltage and current in AC circuit consisting only Resistor, Only Induction and Only Capacitor. Power factor of the AC circuit.

c. Instruments: Electrometer, Galvanometer, Ammeter, & Voltmeter

Reference Books:

1. Elementary Mathematics and Physics
2. Conceptual Physics" by Paul G. Hewitt

RADIOGRAPHIC ANATOMY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiographic anatomy	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Remember key anatomical landmarks and features relevant to radiographic positioning.	Remember
	Understand the principles of radiographic imaging techniques and their applications.	Understand
	Apply principles of radiographic anatomy to identify normal and abnormal structures on radiographic images.	Apply,
	Analyze radiographic images for signs of pathology or abnormalities.	Analyze
	Evaluate the quality and diagnostic utility of radiographic images based on anatomical structures depicted	Evaluate
	Develop effective patient positioning techniques and strategies to obtain optimal radiographic images	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 radiographic positioning

2. principles of radiographic anatomy

3. radiographic images

Emphasis on plain and cross-sectional radiographic anatomy

1. Surface anatomy
2. Plain film / conventional radiographs

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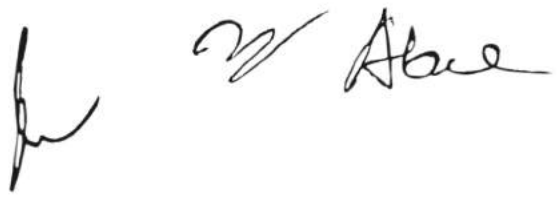
3. Mammography
4. Computed Tomography (CT)
5. Magnetic Resonance Imaging (MRI)
6. Ultrasound
7. Nuclear medicine
8. Digitally Reconstructed Radiographs (DRR)
9. Portal imaging

Reference Books:

1. "Bontrager's Handbook of Radiographic Positioning and Techniques" by Kenneth L. Bontrager and John Lampignano
2. "Radiographic Anatomy, Positioning, and Procedures: Unit 1: Upper Limb and Thorax" by Philip W. Ballinger and Eugene D. Frank



ONCOLOGY SCIENCE- I

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Oncology Science- I	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall key concepts, terminology, and principles related to oncology science.	Remember
	Comprehend the etiology and pathophysiology of cancer.	Understand
	Apply principles of cancer treatment modalities, such as surgery, chemotherapy, radiation therapy, immunotherapy, and targeted therapy.	Apply,
	Analyze clinical and research data related to oncology to identify trends, patterns, and potential advancements.	Analyze
	Critically evaluate ethical considerations in oncology, such as end-of-life care, clinical trials, and access to treatment.	Evaluate
	Design research studies and protocols to investigate new treatment options and advancements in oncology.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1terminology, and principles related to oncology science.

2 potential advancements

1. Pathology- general pathology of tumours
2. Malignancies- local and general effects of tumours and its spread
3. Carcinogenesis
4. Co-morbidities
5. Etiology and epidemiology
6. Genetics
7. Prevention
8. Early detection
9. Signs and symptoms
10. Public awareness on early signs and symptoms
11. High risk groups
12. Staging of tumours

Reference Books:

1. "Principles and Practice of Oncology" edited by Vincent T. DeVita Jr., Theodore S. Lawrence, and Steven A. Rosenberg
2. "Oxford Handbook of Oncology" edited by Jim Cassidy, Donald Bissett, and Roy A. J. Spence

DISCIPLINE SPECIFIC ELECTIVE

GENERAL PRINCIPLES AND PRACTICES OF PUBLIC HEALTH

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline Specific Elective	General Principles and Practices of Public Health	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	To provide students an insight into core concepts, theories and accounting practices which are adapted and practice on day to day basis in the organization.	Receive
	It also helps to develop analytical and problem-solving skills which are required by administrators.	Respond
	To learn Patient's record keeping preoperatively, during anesthesia and post-operatively.	Value
	To learn Principles and techniques of temperature monitoring.	Organize
	Positioning during surgical procedures	Characterize
	Able to manage Indenting, Record keeping and inventory maintenance	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. To acquire understanding of the functions of management and administration of the healthcare business.
2. To understand healthcare delivery systems.
3. To acquire and practice leadership and managerial skills that will positively affect performance as a healthcare manager
4. Learn the basic nursing skills of various surgical procedures including the surgical instruments used in the surgical procedures
5. Assist in various invasive and non-invasive procedures

UNIT-I

Introduction to Patient Care:

a)Principles of patient care b)Types of patients (gender, age, diseases, severity of illness, triage)

Communication:

Communication with doctors, colleagues and other staffs.

b)Non-verbal communication, Inter-personnel relationships.

c)patient contact techniques, communication with patients and their relatives

Documentation:

a.Importance of documentation,

b.initial and follow up notes;

c.documentation of therapy, procedures and communication.

UNIT-II

Universal Precautions and Infection Control:

a)Hand washing and hygiene. b)Injuries and Personal protection, Insulation and safety procedures. c)Aseptic techniques, sterilization and disinfection. d)Disinfection and Sterilization of devices and equipment e)Central sterilization and supply department f)Biomedical Medical waste management.

UNIT-III

Medication Administration:

a) Oral / Parenteral route
b) Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous,intra dermal routes, Intra venous Infusion
c) Aerosol medication administration, Oxygen therapy
d) Intravenous fluids,e)Blood and blood component transfusion Position and Transport of patient:
a) Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep.
b) Lifting and transporting patients: lifting patients up in the bed, transferringfrom bed to wheel chair, transferring from bed to stretcher.
c) Transport of ill patients (inotropes, intubated /ventilated patients)

UNIT-IV

Bedside care:

a) Methods of giving nourishment: feeding, tube feeding, drips, transfusion.b)Recording of pulse, blood pressure, respiration, saturation and temperature.c)Bedside management: giving and taking bed pan, urine container.d)Observation of stools, urine, sputum, drainse)Use and care of catheters and rubber goods.f)Care of immobile/bed ridden patients, bed sore and aspiration prevention

Monitoring of Patient:

a)Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure,Respirationb)Multi parameter monitors, Capnography and End Tidal CO2 (ETCO2)c)Hydration, intake and output monitoringd)Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures,Compliance, Resistance

UNIT-V

Dressing and wound care:

a)Bandaging: basic turns, bandaging extremities, triangular bandages and theirapplication.b)Surgical dressing: observation of dressing procedures.c)Suture materials and suturing techniquesd)Splintinge)Basic care of patient with burns.

Reference books:

1.Hospital and patient care management – Dr.Vidhya Srinivasan & Dr.Akshay Ch.Deka-2022
2.Principles of hospital practice and patient care – P Srinivasulu Reddy – 1st edition -2019
3.Principles & Practice of Critical Care – P.K Verma – 3rd edition- 2019.
4.Standard treatment guidelines – a manual of medical therapeutics- Sangeeta Sharma & GR Sethi – 6th edition – 2021.

FORENSIC PSYCHOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline Specific Elective	Forensic Psychology	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Develop understanding about the interplay of various psychological factors.	Receive
	Respond & familiarize with basics of psychology.	Respond
	Understand the psychology of offenders & defenders.	Value
	Apply psychological knowledge to the legal system.	Organize
	Learn the psychology of eyewitness testimony.	Characterize
	Receive complex ethical issues and resolve ethically.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome — On completion of this course, the students will be able to do the following:

1. Cognitive Thinking.
2. Analyze complex & diverse concepts
3. Think critically.

UNIT-I

The Psychology of Criminal Conduct
Offender Profiling

UNIT-II

Eyewitness Testimony and Identification
Investigative Interviewing of Children

UNIT-III

Investigative Interviewing of Suspects
The Psychology of Lying and the Detection of Deception

UNIT-IV

The Psychology of False Confessions
Famous Miscarriages of Justice

UNIT-V

Jury and Decision-Making
Juvenile Delinquency and Underage Crimes
The Psychologist as Expert Witness: Practical and Ethical Issues

Reference books:

1.The Forensic Psychology of Criminal Minds- Katherine Ramsland – 1st edition -2010
2.Forensic Psychology Workbook- Connor Whiteley – 2018
3.Forensic Psychology- Avery short introduction-David Canter – 2010.
4.Forensic Psychology-Dr Lakshmaeshwar Thakur-2019.

ABILITY ENHANCEMENT COURSE

COMPUTER

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Ability Enhancement Course	Computer	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Aim at imparting a basic level appreciation programme for the common man. Able to the use the computer for basic purposes of preparing his personnel/business letters, viewing information on Internet (the web), sending mails, using internet banking services etc.	Receive
	Make digitally literate.	Respond
	Understand to aid the PC penetration program.	Value
	Helps the small business communities, housewives to maintain their small account using the computers and enjoy in the world of Information Technology.	Organize
	Characterize Cultural and Global Awareness.	Characterize
	Receive knowledge of Professional Practice.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

On completion of this course, the students will be able to do the following:

1. Systems Thinking.
2. Problem-Solving.
3. Communication.
4. Teamwork.
5. Context Awareness.

UNIT-I

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional componentsof a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, BarCode Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD,ASCII and EBCDIC Codes.

UNIT-II

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY. **Introduction of Internet:** History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

UNIT-III

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and pointsize, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Insertingobjects, Page setup, Page Preview, Printing a document, Mail Merge.

UNIT-IV

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Textwrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs,Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.MS Power Point: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database.

UNIT-V

MS-POWERPOINT: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using

Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents.

BASIC EMERGENCY MANAGEMENT

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Ability Enhancement Course	Basic Emergency Management	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Emergency plan during crisis & knowledge of emergency equipment's.	Receive
	Emergency plan specifies procedures for handling sudden or unexpected situations.	Respond
	Recognize common,urgent and emergent problems	Value
	Organize planning of special resuscitative procedures.	Organize
	Characterize medical & surgical emergencies.	Characterize
	Receive knowledge of emergency drugs or medicines.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome — On completion of this course, the students will be able to do the following:

1. Emergency planning
2. Prevent fatalities & injuries
3. Complex medical and surgical emergencies management.

UNIT-I

Emergency Equipment

1. Laryngoscopes
2. Endo-tracheal tubes (ETT), boogie
3. Ambu bag and mask
4. Airway adjuncts, supra-glottic airway devices including Laryngeal mask airway

(LMA)
5. Types of oxygen masks, venturi etc.
6. Oropharyngeal and nasopharyngeal airways (OPA and NPA)
7. ICD tubes, bags, jars, instrument tray
8. Suction apparatus
9. Pulse oximeter
10. EtCO2 monitor
11. Oxygen pipe-line and medical gas cylinders, pipelines and manifold
12. Ambulance (Cervical) Collar, Philadelphia Collar

UNIT-II

Introductions to Emergency Services

Principles of resuscitation
1. Sudden cardiac death
2. Cardiac, respiratory arrest
3. Basic cardiopulmonary resuscitation in adults, neonates,Paediatrics& pregnancy.
4. Advanced cardiac life support

UNIT –III

Specific resuscitative procedures
1. Airway management
2. Breathing and ventilation management
3. Venous and intraosseous access
4. Defibrillation and cardioversion
5. Fluid and blood resuscitation
6. Vasoactive agents in resuscitation
7. Arrhythmias

UNIT-IV

1. Medical emergencies
2. Fluids and electrolytes
3. Respiratory Emergencies
4. Gastrointestinal Emergencies
5. Cardiovascular Emergencies
6. Central Nervous System Emergencies
7. Genito urinary emergencies
8. Hematological Disorders
9. Endocrine and Metabolic Emergencies

UNIT-V

Emergency Drugs - Drug introduction, indication, contra-indications, side – effects and routes of administration with doses of following drugs:
Toxicology
Emergencies due to venomous bites and stings:

Industrial Hazards
Obstetrical emergencies
Mental Health Emergencies
Paediatric emergencies

Reference books:

1. Medical Emergencies in general practice-S.P.Gupta & O.K.Gupta-2011
2. Manual of Emergency Medicine-Lippincott & Williams & Wilkins-6th edition-2011
3. Handbook of casualty and Emergency –Rajiv-2nd edition-2019.
4. Emergency medicines-SN Chugh & Ashima Chugh-5th edition-2019

SEMESTER-4

RADIOTHERAPY EQUIPMENT -I

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiotherapy Equipment -I	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Recall the basic principles and functions of radiotherapy equipment.	Remember
2	Comprehend the different types of radiotherapy machines and their applications.	Understand
3	Apply knowledge of radiotherapy equipment to perform basic setup and operation procedures.	Apply
4	Analyse treatment plans and verify their feasibility and appropriateness for patients.	Analyze
5	Critically evaluate the adherence to safety protocols and quality assurance measures in radiotherapy	Evaluate
6	Develop educational materials and training programs to enhance the understanding and utilization of radiotherapy equipment.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcomes	1. To introduce the students to the concepts related to radiotherapy equipment 2. treatment plans and verify their feasibility

1. Brachytherapy- Design features, Radiation sources, Technique, High dose rate (HDR),Low Dose rate (LDR),Pulsed dose rate (PDR), and various types of applicators.
2. Teletherapy Machines & Accessories:
a. Telecobalt Machines
b. Medical linear accelerators.
c. Tomotherapy
d. Machine properties.
e. Beam directing, modifying, and defining devices.
f. Other accessories.

Reference Books:

1. "The Physics of Radiation Therapy" by Faiz M. Khan
2. "Clinical Radiotherapy Physics" by Subramania Jayaraman

PRINCIPLES OF RADIATION AND RADIOTHERAPY TECHNIQUES

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Principles of radiation and radiotherapy techniques	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
1	Recall the fundamental principles of radiation physics and its interaction with matter.	Remember
2	Understand the principles of radiation production, characteristics, and measurements	Understand
3	Apply principles of radiation safety and protection for patients and healthcare professionals.	Apply
4	Analyse radiation dose distributions and assess their conformity to treatment targets.	Analyze
5	Develop innovative radiation treatment plans to optimize treatment outcomes.	Evaluate
6	Design educational materials and resources to enhance understanding and awareness of radiation therapy techniques.	Create

Taxonomy: Remember, Understand, Apply, Analyse, Evaluate, Create

Learning Outcomes	1. awareness of radiation therapy techniques 2. principles of radiation safety

1. Effects of various radiation on normal tissues and malignant tumor: Early and late reaction on Skin, Mucous membrane, GI tract, Genito urinary system, respiratory system, CNS
2. Application of radiotherapy in benign conditions
3. Application of radiotherapy in malignant condition
4. Single and multiple field techniques for all treatment sites (from Head to Feet) with appropriate immobilizing device(s).
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5. Fix, Rotation, Arc and Skip therapy procedures.
6. Use of Rubber traction, POP, Orfit, Body Frame in treatment technique.
7. Evaluation of patient setup for simple techniques.
8. Use of Beam Modifying devices, such as wedges, Tissue compensators, Mid Line Block (MLB) in the treatment of respective sites.
9. Customized shielding blocks and its properties.
10. Asymmetric jaws
11. Motorized wedges
12. Simulation procedures including CT simulation

Reference Books:

1. "Radiation Therapy Planning" by Bentel, Gunilla C.
2. "Principles and Practice of Radiation Therapy" by Charles M. Washington and Dennis T. Leaver

RADIATION QUANTITIES, UNITS AND DETECTION/MEASUREMENT

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiation Quantities, Units and Detection/Measurement	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the fundamental radiation quantities and units used in radiation detection and measurement	Remember
	Understand the principles and concepts of radiation quantities and units, such as exposure, dose, and dose equivalent.	Understand
	Apply knowledge of radiation quantities and units to perform calculations and conversions.	Apply,
	Analyze the performance and limitations of radiation detectors in different scenarios.	Analyze
	Evaluate the accuracy and reliability of radiation measurement techniques and instruments.	Evaluate
	Create protocols and guidelines for radiation safety and quality assurance in detection/measurement practices.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1fundamental radiation quantities.

2protocols and guidelines for radiation safety

1. Radioactivity, Flux, Fluence, Kerma, Exposure, Absorbed Dose, Equivalent Dose, Weighting Factors, Effective Dose, Natural Background Radiation, Occupational Exposure Limits, Dose limits to Public.

2. Detection and measurement of radiation - Ionisation of gases, Fluorescence and phosphorescence, Effect on photographic emulsion, Ionisation chambers, Proportional Counters, G.M. Counters, Scintillation Detectors, Liquid scintillator, Pocket Dosimeters, TL Dosimeters and their use in personnel monitoring badges. Advantages and disadvantages of various detectors, appropriateness of different types of detectors for different types of radiation measurement.

3

Reference Books:

1. "Radiation Detection and Measurement" by Glenn F. Knoll
2. "Radiation Protection in Medical Radiography" by Mary Alice Statkiewicz Sherer, Paula J. Visconti, and E. Russell Ritenou

BASIC RADIATION PHYSICS

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Basic Radiation physics	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the fundamental principles of radiation physics, including the nature and properties of radiation.	Remember
	Understand the fundamental concepts and theories of radiation physics.	Understand
	Apply principles of radiation protection and safety in various settings.	Apply,
	Analyse the interactions of radiation with matter and their effects on biological systems.	Analyze
	Critically evaluate the accuracy and limitations of radiation measurement techniques and dosimetry calculations.	Evaluate
	Design experiments and procedures to optimize radiation measurement and dosimetry techniques.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 radiation physics.

2 accuracy and limitations of radiation measurement

1. Atomic Structure, Nucleus, Atomic No., Mass No., Electron orbit and energy levels, Isotopes and isobars, Radioactivity, Radioactive decay, Half-life, Particle radiation, Electromagnetic Radiation, Production of X-rays, Continuous X-ray spectrum, Bremsstrahlung radiation Characteristic X-rays, Filters, Quality of X-rays, Effect of voltage and current on the intensity of X-rays, Properties of X-rays.

2. Interaction of Radiation with Matter: Photoelectric effect, Compton Effect, Pair production, Ionisation of matter, Energy absorbed from X-rays, X-rays Scattering, X rays transmission through the medium, linear and mass attenuation coefficient, HVT and TVT, Interaction of charged particle and neutrons with matter.

Reference Books:

1. "Radiation Physics for Medical Physicists" by Ervin B. Podgorsak
2. "Introduction to Radiological Physics and Radiation Dosimetry" by Frank H. Attix

DISCIPLINE SPECIFIC ELECTIVE

Communication skill for Health care professional

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline Specific Elective	Communication skill for Health care professional	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Explain and describe effective and non-effective communication techniques	Receive
	Differentiate between verbal and non-verbal communication.	Respond
	Identify behaviors that interfere with effective communication	Value
	Understand interview techniques and demonstrate or explain appropriate patient education practices	Organize
	Characterize relationships among various health care professionals and patients of various educational levels.	Characterize
	Follow elements of active listening and benefits of professional communication	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. The purpose of this course is to prepare students with basic interpersonal and communication skills needed by the Medical Assistants in the medical office or clinic setting

UNIT-I

Identify practices for effective verbal communication with patients and other healthcare providers .Develop skills for listening and paraphrasing. Demonstrate methods of questioning the patient

UNIT-II

Explain how low health literacy may impact a patient's health. Describe strategies that will facilitate communication between a healthcare professional and a patient who is visually impaired, hearing impaired, or speaks a different language

UNIT-III

Identify the benefits of patient education. Distinguish the three types of learning styles. Describe the benefits of using visual aids and written materials

UNIT-IV

Explain how telecommunication, fax, and email differ from face-to-face communication. Discuss the guidelines for the effective use of the telephone in the healthcare setting. List the symptoms and conditions that require immediate medical help

UNIT-V

Explain the purposes of the parts of speech and punctuation. Illustrate correct sentence grammar

Reference books:

3. Communication Skills for the Healthcare Professional, First edition
4. McCorry, L., Mason, J, Lippincott Williams & Wilkins, Copyright 2011

3.Textbook of radiological safety- GK Rath – 1st edition – 2010

4.Aids to radiological differential diagnosis- Stephen Davies- Elsevier -6th edition -2013

	Discipline Specific Elective	INTRODUCTION TO NATIONAL HEALTHCARE SYSTEM	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describes &Orient the students towards the Hospital Personnel Management and Legal Aspects in Hospitals	Receive
	Discuss the parameters of Hospital Operations Management	Respond
	Demonstrate theRecent Trends in Healthcare Systems	Value
	Define the Do's and Don'ts for Occupational Health	Organize
	Revise the Role of Planning and Organization of Utility Services in hospital	Characterize
	Follow the skills for Inventory and Stores Administration Fundamentals of Financial Management	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Course Objective

1. To familiarise with the healthcare environment ¬ To understand the concepts of management with relevance to hospitals

UNIT I

Introduction – Theoretical frame work - Environment - Internal and External – Environmental Scanning – Economic Environment – Competitive Environment – Natural Environment – Politico Legal Environment – Socio Cultural Environment - International and Technological Environment.

UNIT II

A Conceptual Approach to Understanding the Health Care Systems – Evolution – Institutional Setting - Out Patient services – Medical Services – Surgical Services – Operating department – Pediatric services – Dental services – Psychiatric services – Casualty & Emergency services – Hospital Laboratory services – Anesthesia services – Obstetrics and Gynecology services – Neuro – Surgery service – Neurology services.

UNIT III

Overview of Health Care Sector in India – Primary care – Secondary care – Tertiary care – Rural Medical care – urban medical care – curative care – Preventive care – General & special Hospitals-Understanding the Hospital Management – Role of Medical, Nursing Staff, Paramedical and Supporting Staff - Health Policy - Population Policy - Drug Policy – Medical Education Policy

UNIT IV

Health Care Regulation – WHO, International Health regulations, IMA, MCI, State Medical Council Bodies, Health universities and Teaching Hospitals and other Health care Delivery Systems

UNIT V

Epidemiology – Aims – Principles – Descriptive, Analytical and Experimental Epidemiology - Methods - Use

Reference books:

1. Seth,M.L. MACROECONOMICS, Laksminarayana Agrawal, Edu,Pub.Agra.1996
2. Peter,Z & Fredrick, B. HEALTH ECONOMICS, Oxford Pub., New York, 1997
3. Shanmugansundaram, Y., HEALTH ECONOMICS, Oxford Pub. New York, 1997

SKILL ENHANCEMENT COURSE

MEDICAL LAW

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Skill Enhancement Course	Medical Law	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Introduces learners to the linkages between the fields of law and health in order to assist them in taking informed	Receive
	Contextualizes the constitutional dimension to 'right to health'	Respond
	Relevant for doctors	Value
	Identify and value legal sources and norms in the field of medical law at both a national, and international, level	Organize
	Characterize the rules of medical law in a qualified manner and to identify possible solutions to biomedical legal problems	Characterize
	Receive the interplay and differences between different types of legal responsibilities and sanctions in medical law	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. The students are expected after the conclusion of the course to be able to:
2. Understand the interplay between ethics and law in the field of biomedicine
3. To identify and analyse the conflicts of interest and legal problems that are relevant in different areas of medical law

UNIT-I

Medical ethics - Definition - Goal – Scope
Introduction to Code of conduct

UNIT-II

Basic principles of medical ethics –Confidentiality
Malpractice and negligence - Rational and irrational drug therapy

UNIT-III

Autonomy and informed consent - Right of patients
Care of the terminally ill- Euthanasia

UNIT-IV

Organ transplantation
Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

UNIT-V

Professional Indemnity insurance policy
Development of standardized protocol to avoid near miss or sentinel events
Obtaining an informed consent

Reference books:

1.Law relating to medical negligence and compensation- Dr.K.P.D.A. Prabakar & Dr.J.Paulraj Joseph – 2023
2.A textbook of medical jurisprudence and toxicology – Justice K Kannan -25th edition – 1st edition – 2016
3.Law the doctor must know- Hitesh J Bhatt & Geetebdra Sharma – 2017
4.Law on medical negligence and legal remedies – Dr.Annu Bahl Mehra & Harshit Kiran-2022

ETHICS IN PUBLIC HEALTH

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Skill Enhancement Course	Ethics in public health	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describe how the ethical principles/virtues of autonomy, justice, trust, caring beneficence, and normal efficiency apply to the delivery of health care	Receive
	Use a foundation in moral philosophy to make and support ethical decisions as a health care leader	Respond
	Apply an ethical decision-making process to various contemporary and complex health care issues	Value
	Influence decision-making among peers; use and model self-reflection, listening, empathy, and awareness as an ethical leader	Organize
	Recognize the importance of and bring to bear ethical principles, virtues, values and theory in professional discourse.	Characterize
	Receive of human rights in ethics.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcomes The students will develop:

1. Clinical ethical Competency.
2. Ethical awareness, Empathy

UNIT-I

Introduction to Public Health Ethics
Theories of Justice and Distribution of Public Health Resources
Principle for Public Health Ethics

UNIT-II

Priority-Setting and Resource Allocation at the Macro Level
Priority-Setting and Resource Allocation at the Micro Level

UNIT-III

Medical Ethics, Legal Aspects and Medical Terminology
1) Role Definition and Interaction, Ethical, Moral, and Legal Responsibilities
2) Medical terminology
3) Medical waste Management

UNIT-IV

Contemporary Ethical and Legal Issues In Health Care: Legal regulation of a standalone diagnostic center, medico-legal cases and medical negligence, ethical aspects of health care.
Balancing Individual and Community Interests
Ethics and Health Promotion

UNIT-V

Role of Human Rights in Public Health
Ethics of Health Promotion and Disease Prevention

Reference books:

1.Ethics and Public Health – Archana Rani Sahoo & Patitapaban Das -2017
2.Public Health,Ethics and Equity-Sudhir Anand, Fabienne Peter and Amartya Sen – 2006
3.Nursing and healthcare ethics-Robinson & Doody-6th edition -2022
4.Ethics- William K.Frankena – 2nd edition-2015

SEMESTER-5

ONCOLOGY SCIENCE- II

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Oncology Science- II	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall advanced concepts, theories, and principles related to oncology science.	Remember
	Comprehend the principles and techniques of advanced imaging and molecular diagnostics in oncology	Understand
	Apply advanced knowledge of oncology science to analyze complex clinical cases and develop individualized treatment plans.	Apply,
	Analyse advanced imaging studies, genetic profiles, and molecular markers to guide treatment decisions	Analyze
	Evaluate the ethical considerations and implications of personalized medicine approaches in oncology.	Evaluate
	Design research studies and proposals to investigate novel therapeutic approaches and advancements in oncology.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 terminology, and principles related to oncology science.

2 potential advancements

1. Clinical examination
2. Biopsy
3. Laboratory tests
4. Imaging methods
5. Staging and grading
6. TNM staging system, other commonly used systems
7. Treatment intent- radical, adjuvant, palliative
8. Non-malignant diseases
9. Primary management of malignancy
10. Performance status

Reference books:

Oncology Science- II

1. "Principles and Practice of Radiation Oncology" edited by Carlos A. Perez, Luther W. Brady, and Edward C. Halperin
2. "Clinical Radiation Oncology" by Leonard L. Gunderson and Joel E. Tepper

RADIATION SAFETY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiation safety	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Remember the sources of radiation exposure and their potential health effects.	Remember
	Grasp the principles of radiation shielding and dose reduction techniques.	Understand
	Apply critical thinking skills to identify and mitigate radiation hazards.	Apply,
	Analyze radiation monitoring data and assess compliance with safety regulations	Analyze
	Critically evaluate the adherence to radiation safety regulations and protocols.	Evaluate
	Design innovative radiation protection strategies and devices	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 sources of radiation exposure.

2 radiation monitoring

3 Rooms layout and its construction and calculations.

1. Radiation Hazard evaluation and control
Philosophy of radiation protection, Effect of Time, Distance and Shielding, Calculation of workload, Calculation of Weekly dose to the radiation worker and general public, good work practices in diagnostic radiology and/or radiotherapy practices (including teletherapy and Brachytherapy), Planning consideration for radiology and/or radiotherapy installation including work load, use factor & occupancy factors, effect of different shielding material.
2. Radiation Emergency Preparedness
Safety and security of radiation sources, case histories of emergency situations and preparedness, equipments and tools including role of Gamma Zone Monitor, Regulatory requirements and prevention of emergency, Preventive maintenance and Safety Culture, Role of RTT in handling radiation emergencies.
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3. Regulatory requirements
National Regulatory Body, Responsibilities, organization, Safety Standards, Codes and Guides, Responsibilities of licensees, registrants and employers and Enforcement of Regulatory requirements.
4. Demonstration:
- Time, Distance and Shielding, measurement of HVT & TVT
- Familiarization of radiation survey meters and their functional performance checks
- Radiological Protection Survey of Radiotherapy, Simulator and CT Simulator Installations
- QA on X-ray, Simulator and Radiotherapy Equipment(s)
- Procedures followed for calibration of measuring and monitoring instruments

Reference books:

1. "Radiation Protection in Medical Radiography" by Mary Alice Statkiewicz Sherer, Paula J. Visconti, and E. Russell Ritenou
2. "Radiation Protection in the Health Sciences" by Marilyn E. Noz and David A. Jaffray

PATIENT CARE, POSITIONING AND IMMOBILIZATION

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Patient care, positioning and immobilization	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the fundamental principles and techniques of patient care, positioning, and immobilization in radiation therapy.	Remember
	Understand the principles of patient positioning and immobilization for accurate and reproducible treatment delivery.	Understand
	Apply principles of patient care and communication to provide compassionate and safe care during treatment.	Apply,
	Analyze patient comfort and compliance during treatment and propose adjustments as necessary.	Analyze
	Evaluate the impact of patient care practices on patient satisfaction and treatment outcomes.	Evaluate
	Design educational materials and resources to enhance understanding and training in patient care practices.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 terminology, and principles related to oncology science.

2 potential advancements

1. Hospital procedure: Hospital staffing and organization; records relating to patients and departmental statistics, professional attitude of the technologist to patients and other members to the staff; medico-legal aspects accidents in the department's appointments organization; minimizing waiting time, out –patient and follow-up clinics; stock-taking and stock keeping.
2. Care of the patient: First contact with patients in the department, management of chair and stretcher patients and aids for this, management of the unconscious patient, elementary hygiene, personal cleanliness, hygiene in relation to patients (for example clean linen and receptacles, nursing care, temperature pulse and respiration, essential care of the patient who has a tracheotomy, essential care of the patients who has a colostomy, bedpans and urinals, simple application of a sterile dressing. First aid, Infection (Bacteria, spread of infections, auto-infection etc.).
3. Drugs in the department: Storage: Classification; labelling and checking, regulations regarding dangerous and other drugs, unit of measurement, special drugs, anti-depressive, anti-hypertensive etc.
4. Principles of positioning and immobilization
a. Positioning Aids-Breast boards, Lung boards, Belly boards, Head-and-neck fixation devices, Vacuum packs, Stereotactic systems
b. Internal organ motion control- Bite blocks, Gating systems, Active breathing control, Diaphragm compression, Prostate immobilization, Tracking systems. Laser/ positioning systems
c. Marking systems
d. Isocenter determination
e. Reference points
f. Treatment couch
g. Image acquisition for planning (and/or verification)
h. Modalities for image acquisition for planning
i. Simulation- Conventional Simulation, CT Simulation, Virtual Simulation
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(Intellectual property of Ministry of Health and Family Welfare) Page 77 of 150
j. Image processing and archiving
k. Treatment verification
l. Protocols- Imaging protocols: development and implementation, Non-action levels (NAL), On-line/off-line corrections, Matching/co-registration procedures, Geometric uncertainties, Documentation, Adaptive radiotherapy, Information management35

Reference books:

1. Radiation Therapy Study Guide: A Radiation Therapist's Review" by Amy Heath
2. "Radiation Therapy Planning: Including Problems and Solutions" by Edward C. Halperin, Carlos A. Perez, and Luther W. Brad

RADIOTHERAPY EQUIPMENT -II

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiotherapy Equipment -II	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the technical specifications and features of advanced radiotherapy equipment.	Remember
	Comprehend the role of different components and accessories in the radiotherapy treatment process.	Understand
	Apply principles of equipment troubleshooting and maintenance.	Apply,
	Analyse equipment performance data and identify deviations or inconsistencies.	Analyze
	Evaluate the adherence to radiation safety protocols and quality assurance measures in equipment usage.	Evaluate
	Design procedures and training materials for effective and safe utilization of radiotherapy equipment.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 terminology, and principles related to oncology science.

2 potential advancements

1. Familiarization with treatment planning systems-external beam planning and brachytherapy
2. Various types of phantoms including the water-phantoms, RFA
3. Various types of dosimeters including in-vivo dosimeters
4. EPID and other on-board imaging systems
5. Record and Verify Systems, Oncology Information Systems, Image/Patient data archiving, storage and transfer.

Reference books:

1. "Clinical Radiotherapy Physics" by Subramania Jayaraman
2. "Physics for Radiation Protection: A Handbook" by James E. Martin

DISCIPLINE SPECIFIC ELECTIVE

MEDICAL PSYCHOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline Specific Elective	Medical Psychology	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Thiscoursecoversvariousaspectsofmedicalpsychology.	Receive
	Understand different aspectsofmedicalpsychologyessentialin medical professional.	Respond
	Applymedical psychology in clinicalscenarioduringclinical postings.	Value
	Use of scientific methods for assessment.	Organize
	Identify behaviors & experiences that promote health	Characterize
	Follow the skills adapting changes in vision	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcomes

1. Cognitive thinking
2. Demonstrate skills in communication.
3. Ethical behavior

UNIT-I

Introduction to psychology
Intelligence, Learning, Memory, Personality, Motivation

UNIT-II

Body integrity- one's body image
Patient in his Milan

UNIT-III

Self-concept of the therapist, Therapist patient relationship-some guidelines
Illness and its impact on the patients.

UNIT-IV

Maladies of the age and their impact on the patient's own and others concept of his body image.

UNIT-V

Adapting changes in vision
Why Medical Psychology needs / demands commitment?

Reference book:

1.Fundamentals of Psychology for graduate nurses- P Prakash-1st edition- 2016
2.Modern clinical psychology-Sheldon J.Korchin-2004
3.Psychology – Robert A .Baron & Girishwar Misra-5th edition – 2000
4.Applied psychology for nurses – R Sreevani– 4th edition- 2021

BIOSTATISTICS & RESEARCH METHODOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline Specific Elective	Biostatistics & Research Methodology	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	To enable students to present, analyze and interpret data.	Receive
	To enable students to use concepts of probability in business situations.	Respond
	To enable students to make inferences from samples drawn from large datasets.	Value
	To enable students to apply univariate and multivariate statistical techniques	Organize
	Revise the issues in ethical research	Characterize
	Follow the basic concepts of biostatistics.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. To understand the importance & Methodology for research
2. To learn in detail about sampling, probability and sampling distribution, significance tests correlation and regression, sample size determination, study design and multivariate analysis.

UNIT-I

Introduction to research methods.
Sampling methods

UNIT-II

Identifying research problem
Developing a research proposal

UNIT-III

Ethical issues in research

UNIT-IV

Research design
Types of Data

UNIT-V

Basic Concepts of Biostatistics
Research tools and Data collection methods

Reference books:

1.Research methodology- CR K othari & Gaurav Garg – 4th edition – 2019
2.Introduction to research methodology – Bhanwar Lal Garg, Renu Kavdia, Sulochana Agarwal & Umesh kumar Agarwal – 2019
3.Research methodology for health professionals – RC Goyal – 2nd edition – 2023
4.Research Methodlogy and applied statistics – DN Sansanwal - 2020

ABILITY ENHANCEMENT COURSE

ENTREPRENEURSHIP DEVELOPMENT

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Ability Enhancement course	Entrepreneurship Development	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

CO Number	CO Statement	Taxonomy
	Inspire students and help them imbibe an entrepreneurial mind-set.	Receive
	Respond entrepreneurship impacted the world and their country.	Respond
	Introduced to key traits and the DNA of an entrepreneur	Value
	Organize the opportunity to assess their own strengths	Organize
	Understand the DNA of an entrepreneur and assess their strengths and weaknesses from an	Characterize
	Receive knowledge of Entrepreneurial perspective	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcomes

1. Develop awareness about entrepreneurship and successful entrepreneurs.
2. Develop an entrepreneurial mind-set by learning key skills such as design, personal selling, and communication.
3. Understand the DNA of an entrepreneur and assess their strengths and weaknesses from an
4. Entrepreneurial perspective.

UNIT-I

Introduction to Entrepreneurship

Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, agencies in entrepreneurship management and future of entrepreneurship types of entrepreneurs.

UNIT-II

The Entrepreneur

Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.

UNIT-III

E-Cell

Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell

UNIT-IV

Communication Importance of communication, barriers and gateways to communication, listening to people, the power of talk, personal selling, risk taking & resilience, negotiation.

UNIT V

Introduction to various forms of business organization (sole proprietorship, partnership, corporations, Limited Liability Company), mission, vision and strategy formulation.

Reference Books:

1:Title Entrepreneurial DevelopmentAuthor S S Khanka Edition reprint Publisher S. Chand Publishing, 2006

2: Entrepreneurship Development and Business Ethics Paperback – 1 January 2019by Abhik Kumar Mukherjee and Shaunak Roy Author

3: Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for deliveringhealth services. Joney& Bartlett learning, 2014

4: Taxmann's Enterpreneurship development – CA(Dr.)Abha Mathur- 2021.

INTRODUCTION TO QUALITY & PATIENT SAFETY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Ability Enhancement course	Introduction to Quality & Patient Safety	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describes the Quality assurance and management	Receive
	Discuss the Basics of emergency care and life support skills	Respond
	Demonstrate the processes used in developing communication &Impact of communication skills on Organizational design	Value
	Define the Infection prevention and control	Organize
	Revise the Antibiotic Resistance	Characterize
	Follow the skills required for Disaster preparedness and management - Fundamentals of emergency management,	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

Use healthcare data and analytics to measure healthcare quality and patient safety and plan improvement measures.
Participate in research projects that can lead to quality improvement, risk reduction and enhanced patient safety within the healthcare system.

UNIT-I

Quality assurance and management – Concepts of Quality of Care, QualityImprovement Approaches,StandardsandNorms,IntroductiontoNABHguidelines

UNIT-II

Basics of emergency care and life support skills- Basic life support (BLS), Vitalsignsandprimaryassessment,Basicemergencycare–firstaidandtriage,Ventilations Including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One-andTwo-rescuerCPR

UNIT-III

Bio medical waste management and environment safety -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/ Chemicals / Drug waste, BMW Management & methods of disinfection, Modern Technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)

UNIT-IV

Infection prevention and control -Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated Infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control

UNIT V

Antibiotic Resistance - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance.
Disaster preparedness and management - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.

Reference books:

1.Handbook of healthcare quality & patient safety- Girdhar J Gyani & Alexander Thomas – 2nd edition- 2017

2.Total quality management in the healthcare industry:An efficient guide for healthcare management- Balasubramanian Mahadevan – 2022

3.Step by step Quality Hospital Care- Farooq Jan- 1st edition – 2013

4.Patient safety and healthcare improvement Willey Blackwell- 1st edition - 2014

SEMESTER-6

CLINICAL RADIOBIOLOGY AND MOULD ROOM /MOTION MANAGEMENT TECHNIQUES

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Clinical radiobiology and mould room /motion management techniques	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Comprehend the principles and techniques of mould room processes, including immobilization and custom device fabrication.	Remember
	Apply radiobiological principles to optimize treatment planning and dose calculation.	Understand
	Analyse radiobiological data and treatment plans to assess the expected treatment response and normal tissue toxicity.	Apply,
	Evaluate the effectiveness of radiobiological models and dose-response relationships in treatment planning.	Analyze
	Develop innovative approaches for individualized treatment planning based on radiobiological considerations.	Evaluate
	Critically evaluate the impact of motion management techniques on treatment outcomes and organ sparing.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 terminology, and principles related to oncology science.

2 potential advancements

Clinical Radiobiology

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1. Cell kinetics
2. Cell cycle control mechanisms
3. Tumour biology
4. The five 'R's of radiobiology
5. The five 'H's of radiobiology
6. Tissue structure and radiation effect
7. The Linear Quadratic (LQ) model
8. Tumour control probability (TCP), Normal Tissue Complications Probability (NTCP) models
9. Acute and late side effects
10. Sensitizers/protectors/side effect reduction
11. Fractionation
12. Treatment combinations
13. Treatment scheduling

Mould Room /Motion Management Techniques

1. Historical evolution of the mould materials and techniques to make molds
2. Thermoplastic moulds
3. Breath hold, motion reduction, tracking and gating techniques

Reference books:

1. "Radiobiology for the Radiologist" by Eric J. Hall and Amato J. Giaccia
2. "Radiation Oncology: A Question-Based Review" by Borislav Hristov and Hiram A. Gay

QUALITY ASSURANCE IN RADIOTHERAPY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Quality Assurance in Radiotherapy-I	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Remember the importance of quality assurance in ensuring accurate and safe treatment delivery.	Remember
	Comprehend the various aspects of treatment planning and delivery that require quality assurance.	Understand
	Apply knowledge of quality assurance techniques to detect and correct errors and deviations in treatment processes.	Apply,
	Analyse treatment planning data, imaging studies, and treatment delivery parameters to identify potential quality issues.	Analyze
	Evaluate the adherence to quality assurance guidelines and protocols in radiotherapy practice.	Evaluate
	Design strategies and resources to enhance the effectiveness and efficiency of quality assurance practices.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 potential quality issue

2 quality assurance practices.

3 QA & QC protocols

Quality assurance (QA) refers to the systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention and provides accuracy of treatment. The following topics will be covered: Accessories and tools used for QA tests in Radiotherapy such as Front pointer, Back pointer, Laser Alignment etc. Optical and radiation field congruence, Beam shaping blocks, Beam shaping jaws, Delineator/Diaphragm movements, Isocentre alignment, Patient support system, Beam on and off mechanisms, Technician's role in QA tests on telecobalt /Linear Accelerator / Brachytherapy/ Gamma knife/Simulator/CT Simulator machines.

Reference books:

1. "Quality and Safety in Radiotherapy" by Todd Pawlicki, Arno J. Mundt, Peter Dunscombe, and Pierre Scalliet
2."Practical Radiotherapy Planning" by Ann Barrett

RADIOLOGICAL/NUCLEAR MEDICINE/OTHER IMAGING TECHNIQUES IN RADIOTHERAPY PLANNING AND RADIOTHERAPY TREATMENT DELIVERY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Radiological/Nuclear Medicine/Other Imaging Techniques in Radiotherapy Planning And Radiotherapy treatment delivery	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the different imaging techniques used in radiotherapy planning and treatment delivery	Remember
	Comprehend the role of different imaging techniques in target delineation, treatment planning, and treatment verification.	Understand
	Apply imaging guidance and verification techniques during radiotherapy treatment delivery.	Apply,
	Analyse the impact of imaging artifacts, uncertainties, and limitations on treatment planning and delivery	Analyze
	Critically evaluate the integration of imaging data into the overall radiotherapy treatment process and its impact on treatment outcomes.	Evaluate
	Design strategies and resources to enhance the integration of imaging data into the treatment delivery process.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:

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

1 different imaging techniques

2 the treatment delivery process

Radiological/Nuclear Medicine/Other Imaging Techniques in Radiotherapy Planning

1. 2D (radiography, fluoroscopic, USG), 3D (CT, MRI) and functional (PET/SPECT) imaging and their application in radiotherapy planning. Treatment simulation using conventional simulator, Simulator CT, CT simulator and virtual simulator. Treatment verification using port films, electronic portal imaging devices. Corrections for surface irregularities; effective SSD method, TAR/TMR method, isodose shift method. Corrections for internal tissue inhomogeneities: for beam attenuation and scattering using TAR method, power law TAR method, equivalent TAR method, isodose shift method, typical correction factor. Absorbed dose withininhomogeneity: bone, bone tissue interface, tissue surrounding bone, lung tissue, and air cavity. Tissue compensator, bolus, patient positioning.

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2. ICRU 50 & 60 to Understand Gross Tumor Volume (GTV), Clinical Target Volume (CTV), Internal Target Volume (ITV), Planning Target Volume (PTV), Organs at Risk (OAR) delineation

3. Conduct image fusion at the treatment machine console

4. Do bony matching

5. Do soft tissue matching for estimating the preliminary data for applying shifts

6. Prepare documentation

7. The RTT should understand the principles of: Four-dimensional (4D) planning and be familiarized with IMRT and IGRT planning.

Radiotherapy treatment delivery

1. Orthovoltage / superficial

2. Super voltage / Megavoltage

3. Brachytherapy Techniques

4. Stereotactic radiotherapy- Stereotactic radiosurgery, Stereotactic radiotherapy, Cranial Extra cranial (Stereotactic body radiotherapy SBRT), Total Body Irradiation (TBI), Total Skin Electron Irradiation (TSEI), Radiation therapy with neutrons, protons, and heavy ions

Reference books:

1. "Principles and Practice of Radiation Oncology" edited by Edward C. Halperin, Carlos A. Perez, and Luther W. Brady
2. "Image-Guided Radiation Therapy: A Clinical Perspective" by J. Daniel Bourland and James A. Purdy

BASIC RADIOTHERAPY PHYSICS AND BIOLOGICAL EFFECTS OF RADIATION AND OPERATIONAL ISSUES IN RADIOTHERAPY.

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Basic Radiotherapy Physics and Biological Effects of Radiation And Operational Issues in Radiotherapy.	4	3	1	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Recall the fundamental principles and concepts of radiotherapy physics.	Remember
	Understand the principles of radiation physics and their application in radiotherapy	Understand
	Apply the principles of radiotherapy physics to optimize treatment planning and delivery.	Apply,

	Analyse the biological effects of radiation on normal tissues and tumor cells to optimize treatment outcomes.	Analyze
	Critically evaluate operational issues and their impact on patient safety and treatment efficiency.	Evaluate
	Design strategies and resources to address operational issues and improve workflow in radiotherapy clinics.	Create

Taxonomy: Remember, Understand, Apply, Analyze, Evaluate, Create

Learning Outcomes:
After completion of the course, students would be able to:
1 terminology, and principles related to radiotherapy physics.
2 radiotherapy clinics

Basic Radiotherapy Physics

Historical developments in Radiotherapy, Physical components of Telecobalt Unit / Linear Accelerator Unit / Remote After Loading Brachytherapy Unit / Gamma Knife Unit / Simulator /Brachytherapy units and their descriptions, Various types of sources used in Radiotherapy and their properties, Physics of Photons, electrons, protons and neutrons in radiotherapy,

Dose distribution and scattering in medium: Properties ofphantom materials and various types of phantoms, depth dose distribution, dose build-up, percentage depth dose and its influencing factors. Back scatter factor, tissueair-ratio and influencing factors. Relation between TAR and PDD. Scatter-air-ratio. Dose calculation of irregular fields using Clarkson's method

Dosimetric calculations: Dose calculation parameters,collimator scatter factor (Sc), phantom scatter factor (Sp), Tissue phantom ratio (TPR), tissue maximum ratio (TMR), and their influencing factors. Relationship between TMR and PDD. Scatter maximum ratio (SMR). Dose calculations for linear accelerator and Co-60 unit using Sc, Sp factors for SSD and SAD methods, irregular fields, asymmetric fields etc.

Isodose distribution of phantom beam: Isodose charts,measurement of isodose curves, parameters of isodose curves: beam quality, source size, SSD and SDD – penumbra effect, collimation and flattening filter, field size, Wedge filters: wedge angle, wedge transmission factor, wedge systems, effect of beam quality, design of wedge filters. Bolus, tissue compensators, shielding blocks

Electron beam therapy: Electron interactions, rate of energy liss, collisional losses (ionization and excitation) radiation losses (bremsstrahlung), polarization, stopping power, absorbed dose, electron scattering, most probable energy, mean energy, energy at depth. Determination of absorbed dose, output calibration, phantom, reference depth and field size, absorbed dose calculation, depth dose distribution, central axis depth dose curves, isodose curves

for different electron energies. Field flatness and symmetry, beam collimation, field size dependence, electron source, x-ray contamination.

Special techniques in Radiotherapy such as SRS, SRT, IMRT, IGRT and Tomotherapy.

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Biological Effects of Radiation

The Cell, Effect of ionizing radiation on Cell, Chromosomal aberration and its application for the biological dosimetry, Somatic effects and hereditary effects, stochastic and deterministic effects, Acute exposure and
Chronic exposure, LD50/60. Role of RTT in managing the acute effects of radiation.

Operational Issues in Radiotherapy.

Course content is designed to focus on various radiation therapy operational issues. Accreditation,
CQI development and assessment techniques will be presented. Human resource issues and regulations impacting the radiation therapist will be examined. Topics include the role of network
information systems within the radiation oncology department.

Reference books:

1. Basic Radiotherapy Physics and Biological Effects of Radiation And Operational Issues in Radiotherapy.
2. "Operational Radiation Safety Program for Astronauts in Low-Earth Orbit" by National Research Council

BASICS OF CLINICAL SKILL LEARNING

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Core	Basics of clinical Skill Learning	3	3	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describes the After successful accomplishment of the course, the students would be able to Measure Vital Signs	Receive
	Discuss the Do basic physical Examination of the patients, NG tube basics, Administration of Medicines	Respond
	Demonstrate the students will learn about Asepsis and the Cleanliness	Value

	related to asepsis and on mobility of the patients.	
	Define the They will also learn on the Basics of Nasal-Gastric Tube	Organize
	Revise the Also they will know about clean lines in the Asepsis	Characterize
	Follow the skills required for They will also learn on the Basics of Nasal-Gastric Tube.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. To Understand and the basic ideas on how to check for Vital Signs of the Patient
2. They will also learn on the Basics of Nasal-Gastric Tube.
3. This course the student will learn how to handle the patients and their positioning

UNIT- I

MEASURINGVITALSIGNS: Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale

UNIT-II

PHYSICAL EXAMINATION: Observation, Auscultation (Chest), Palpation, Percussion, History Taking.

UNIT- III

FEEDING: ENTRAL FEEDINGNG TUBE: Measurement, Procedure, Care, Removal of Nasal-
Gastric Tube, Nasal-Gastric Tube Feeding, and Parenteral Nutrition

UNIT- IV

ASEPSIS: Hand wash Techniques, (Medical, Surgical) Universal Precaution, Protecting Equipment's: Using Sterile Gloves, opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire, Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment

UNIT- V

MOBILITYANDSUPPORT: Moving and positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints.

Reference books:

1.Basic surgical skills and techniques – Sudhir Kumar -3rd edition – 2018
2.Essentials of clinical diagnosis – Sunil K Sen-9th edition – 2019
3.Manual of clinical methods – P.S.Shankar – 4th edition – 2017
4.Communication skills in clinical practice – KR Sethuraman- 2nd edition - 2018

SKILL ENHANCEMENT COURSE

BASIC AND ADVANCE LIFE SUPPORT

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Skill Enhancement Course	Basic and Advance Life Support	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Demonstrate how to open a casualty's airway and check for breathing	Receive
	Demonstrate how to place an unresponsive casualty in the recovery position	Respond
	Perform Cardiopulmonary Resuscitation using a manikin	Value
	Identify safety considerations when using an automated external	Organize

	defibrillator (AED)	
	Be able to safely use an automated external defibrillator	Characterize
	Follow the skills need to commence Cardiopulmonary Resuscitation (CPR).	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Course Objective

1. Demonstrate how to open a casualty's airway and check for breathing
2. Demonstrate how to place an unresponsive casualty in the recovery position
3. Perform Cardiopulmonary Resuscitation using a manikin
4. Identify safety considerations when using an automated external defibrillator (AED)
5. Be able to safely use an automated external defibrillator

Learning Outcomes

1. Recognize the need to commence Cardiopulmonary Resuscitation (CPR)
2. Assess a casualty's level of consciousnes

UNIT- I

Review of anatomy and physiology of blood and cardio vascular system, Assessment-History and Physical assessment • Etiology, Path physiology, clinical manifestations,

UNIT- II

- **Diagnosis, treatment modalities of:**
  - Vascular system
  - Heart Congenital and acquired - Rheumatic Heart diseases

UNIT- III

- **Diagnosis, treatment modalities of:**
  - Infective Endocarditic, congenital heart Diseases
  - Cardiac emergencies and arrest
  - Cardio Pulmonary Resuscitation (CPR)

Drugs used in treatment of blood and cardio vascular disorders

UNIT- IV

Basic Life Support

- Airway Management
- Anaphylaxis

- Approach to Shock

Initial Management of Shock

UNIT- V

Basic Life Support

- Approach to Syncope
- Approach to Restless Patient
- Approach to Pediatric Patients
- Safe transfer of patients to definitive care areas
- Approach to Trauma Patients

Reference books:

1.Basic Life Support-Manual – AHA- 2016
2.Advance Emergency Life Support Protocols – Gireesh Kumar KP – 1st edition – 2015
3.First aid for nurses – TK Indrani- 2nd edition – 2018
4.ACLS Study Guide – Barbara Aehlert – 6th edition - 2022

ORGANIZATIONAL BEHAVIOUR

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Skill Enhancement Course	Organizational Behaviour	2	2	-	-	20	80	100

Course Outcomes

After completing this course, the student will be able to:

	CO Statement	Taxonomy
	Describes the organizational behavior, types, importance& Fundamental concepts of OB	Receive
	Discuss the individual behavior related to motivation and rewards &Characteristics of motives.	Respond
	Demonstrate the processes used in developing communication &Impact of communication skills on Organizational design	Value

	Define the management of resolving destructive conflicts &Strategies for encouraging constructive conflict.	Organize
	Revise the group dynamics, Models and theories of Leadership Styles.	Characterize
	Follow the skills required for working in groups (team building) &Importance of Leadership Styles.	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Outcome

1. To analyze and compare different models used to explain individual behaviour related to motivation and rewards.
2. To identify the processes used in developing communication and resolving conflicts. to explain group dynamics and demonstrate skills required for working in groups (team building)

UNIT-I

OrganizationalBehavior-Definition-Importance -HistoricalBackground-FundamentalconceptsofOB-21stCenturycorporate-DifferentmodelsofOBi.e.autocratic,custodial, Supportive

UNIT-II

Organization Structure and Design- Authority and Responsibility Relationships - DelegationofAuthorityandDecentralization-InterdepartmentalCoordination-Emerging Trends in Corporate Structure, Strategy and Culture - Impact of TechnologyonOrganizationaldesign-Mechanisticvs AdoptiveStructures –FormalandInformalOrganization

UNIT-III

Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management. Learning-ProcessofLearning-PrinciplesofLearning-OrganizationalRewardSystems –Behavioral Management

UNIT-IV

Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity – Morale Indicators

UNIT V

Leadership - Definition - Importance -Leadership Styles - Models and Theories ofLeadership Styles.

Conflict Management -Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructive conflict

Reference Books:

1:Human Relations & Organizational Behaviour - R.S.Dwivedi 2007
2:Organizational Behaviour - Uma Sekaran 2005
3:Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services.Joney& Bartlett learning, 2014
4:HumanBehaviour at Work - Keith Davis 2004

SEMESTER – VII & VIII

INTERNSHIP

Course Code	Course Category	Paper Title	Evaluation	
			Internal	External
	Core	INTERNSHIP	20	80

Guidelines:

1. The internship shall commence after the student has completed and passed all subjects up to VI semesters.
2. The internship is compulsory.
3. The duration of the internship shall be one year.
4. The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

Evaluation of Internees:

Formative Evaluation: Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned.

The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide a demonstrable evidence of the processes of training but more importantly of the internee's own acquisition of competence as related to performance.

Summative Evaluation: It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns.

Based on these two evaluations, the Head of the Department shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him/her eligible for it. To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.