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SYLLABUS

BACHELOR IN CATH LAB TECHNOLOGY

4 Years (VIII Semesters)

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



W. Abu

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Bachelor of Cath Lab Technology

Learning Objectives:

At the end of the B.Sc. in Cath Lab Technology course, the student should be able to:

- 1) Test patients for heart problems.
- 2) Understand care of patients suffering from cardiovascular disease.
- 3) Use and maintain medical equipment and machines used in the field.
- 4) Apply basic and advanced life support skills.
- 5) Study emergency invasive procedures that could save an individual's life.
- 6) Assist in Catheterization procedure.
- 7) Learn about pacemaker and devices and their programming
- 8) Study cardiac-related procedures.
- 9) Observe the correct way to perform cardiac procedures before applying practical skills.

Expectations from the future graduate in providing patient care

The goal of B.Sc. in Cath Lab Technology course is to produce a competent cath lab technician who:

- 1) Are trained to assist interventional cardiologists in performing diagnostic and therapeutic invasive cardiac procedures with the help of cardiac and coronary imaging.
- 2) Are trained to assist doctors during procedures such as coronary imaging including angiography, IVUS, FFR etc., percutaneous coronary interventions (PCI), rotational atherectomy, peripheral angiography, and interventions for structural heart disease.
- 3) Also be able to interpret basic ECG's and recognize cardiac arrhythmias.
- 4) Understand Electrophysiological procedures equipment.
- 5) Understand programming of pacemakers and other cardiac devices

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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	Medical Ethics & Computer Skills related to CVT	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	Preventive Cardiology	4	3	1	-	20	80	100
	Practical	Practical for all subjects/ Clinical Posting	5	-	-	10	50	150	200
	Skill Enhancement Course	Medical terminology and Record keeping	2	2			20	80	100
	*Generic Elective	*Students have to opt any one of the open	2	2			20	80	100

elective courses
offered by Institute/
College/University.

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	Cardiac Medicine	4	3	1	-	20	80	100
	Core	Cardiac Disease - I	4	3	1	-	20	80	100
	Core	Electrocardiography	4	3	1	-	20	80	100
	Core	Catheters and Instruments	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/ College/University.	2	2	-	-	20	80	100

Total Credit- 27

Total Contact Hours- 30

***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
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				L	T	P	Internal	External	Total
	Core	Radiology	4	3	1	-	20	80	100
	Core	Basic Cardiac Care Technology	4	3	1	-	20	80	100
	Core	Echocardiography-I	4	3	1	-	20	80	100
	Core	Cardiac Disease-II	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	Cardiac Catheterization-I	4	3	1	-	20	80	100
	Core	Echocardiography –II	4	3	1	-	20	80	100
	Core	Invasive and Non – Invasive Cardiology	4	3	1	-	20	80	100
	Core	Immunology	4	3	1	-	20	80	100
	Practical	Practical for all subjects/ Clinical Posting	5	-	-	10	50	150	200
	Discipline Specific Elective	Medical psychology/ Biostatistics and Research methodology	3	-	-	3	20	80	100
	Ability Enhancement	Entrepreneurship development/ Introduction to quality and patient safety	2	-	-	2	20	80	100

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	*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	Cardiac Catheterization -II	4	3	1	-	20	80	100
	Core	Basics of Cardiac Surgery	4	3	1	-	20	80	100
	Core	Cardiac Care Technology-Clinical	4	3	1	-	20	80	100
	Core	Professionalism and values	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
	Core	Internship	20	80
	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' Cath Lab Technology

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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 Statement	Taxonomy
Describe the anatomy & terminology of cell, tissues of body Skin & its Blood supply.	Remember
Explain the blood circulation system & skeleton system with Classification of bones, Parts of developing long bone.	Understand
Determine the muscular system, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back & joints.	Apply
Analyse the respiratory system with Bronchopulmonary segments & circulatory system: Types of blood vessels, Heart & Pericardium.	Analyse
Assess the digestive system, role of digestive juices & enzymes & reproductive system: spermatogenesis & oogenesis.	Evaluate
Formulate the excretory system Pathway of glomerular filtration rate with structure & structure of nephrons.	Create

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

Learning Outcomes	
	<ol style="list-style-type: none"> 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

Introduction to Anatomy Anatomical terms, planes, organization of human body- cell, tissue, organ & organ system.

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

Anatomy of the Nervous system

Central nervous system & Peripheral nervous system- different components

UNIT-II

Anatomy of Circulatory system:

General plan of circulatory system and its components-

Heart- size, location, coverings, chambers, blood supply, nerve supply, the blood vessels

General plan of circulation, pulmonary circulation

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

Anatomy of the Digestive system:

Anatomy of alimentary tract; Parts of the tract

Accessory glands of digestion; Pancreas, Liver, Gall Bladder

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

UNIT-IV

Reproductive system

Male Reproductive System

Female Reproductive System Anatomy of the endocrine system

UNIT-V

Name of all endocrine glands their positions

Hormones and their functions- 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 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 Statement	Taxonomy
Describe the basic physiology of hematology, Homeostasis, Hemopoiesis, Hemogram, Anemia, Body Fluid, Immunity.	Remember
Explain the basic physiological concept of cardiovascular system, functions, properties of cardiac muscle, Origin of Cardiac Impulse.	Understand
Determine the nerve – muscle physiology, neuromuscular junction & Mechanism of muscle contraction & central nervous system.	Apply
Analyze the Physiologic anatomy, functions of respiratory system, Mechanism of respiration & circulatory system.	Analyze
Assess the physiology of digestive system Composition and functions of all Digestive juices, Movements.	Evaluate
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

General Physiology

Cell, Transport across cell membrane, homeostasis, resting membrane potential, action potential
Blood

Composition and functions of Blood

RBC, WBC, Platelet count, Hemoglobin

Blood Groups - ABO and RH grouping

Hemostasis & Anticoagulants

UNIT-II

Cardio vascular system

Cardiac muscle, Pacemaker & conducting tissue

Cardiac Cycle

Cardiac output, Heart rate, ECG

Arterial blood pressure

Respiratory System

Functions of Respiratory system

Mechanism of respiration, lung volumes & capacities

UNIT-III

Nerve & Muscle physiology

Neuron structure & properties

Neuromuscular junction

Skeletal muscle structure mechanism of contraction

Cerebrospinal Fluid (CSF): Composition, functions & Circulation.

Central & autonomic Nervous system Organization of CNS

Functions of various parts of Brain, in brief

Composition, functions and circulation of CSF

Differences between sympathetic and parasympathetic division

UNIT-IV

Digestive system

Functional Anatomy, organization & innervations

Composition and functions of all Digestive juices

Digestion & Absorption of carbohydrates, proteins and fats

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UNIT-V

Excretory System

Kidneys: Functions, Nephron, Juxta-glomerular Apparatus

Renal circulation

Mechanism of Urine formation

GFR

Endocrine and Reproductive systems Endocrine glands & hormones secreted

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 Statement	Taxonomy
Describe the biomolecules Introduction and scope of biochemistry, Chemistry of carbohydrates, proteins, lipids.	Remember
Explain the metabolism of glucose, fats & amino acids & their regulatory pathways.	Understand
Determine the structure & function of enzymes & its clinical importance	Apply
Analyze the RDA, Sources of Vitamins and Minerals, functions and deficiency of Fat soluble vitamins.	Analyze
Assess the balanced diet, Satiety value, Energy imbalance- obesity, starvation, Limitations of the daily food guide.	Evaluate
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

Cell: Morphology, structure & functions of cell, cell membrane, Nucleus, chromatin, Mitochondria, Endoplasmic Reticulum, Ribosomes.

Carbohydrates: Definition, chemical structure, functions, sources, classifications, Monosaccharides, Disaccharides, Polysaccharides, mucopolysaccharide and its importance, glycoproteins

UNIT-II

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.

Proteins :Definition, sources, amino acids, structure of protein, their classification, simple protein, conjugated protein, derived proteins and their properties.

UNIT-III

Enzymes: Definitions, mechanism of action, factors affecting enzyme action, enzyme of clinical importance.

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

Carbohydrate Metabolism: Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis, Maintenance of Blood Glucose. Diabetes Mellitus and its complications. 9. Lipid Metabolism: Beta oxidation, Ketone bodies, Cholesterol and atherosclerosis, obesity.

UNIT-V

Protein Metabolism: Transamination, Deamination, Fate of ammonia, urea synthesis and its inborn errors.. 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 SK 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 CATH LAB TECH

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

Course Outcomes:

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

CO Statement	Taxonomy
legal and ethical challenges in healthcare.	Receive
Students explore the legal, ethical and moral issues in healthcare professionals. Identify issues related to potential legal liability in the workplace.	Respond
To introduce students to the discipline of public health	Value
To give an overview of the methods of prevention and health promotion	Organize
To understand the determinants and measures of disease and health related states	Characterize
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

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

UNIT- VI

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.

Reference books:

1. Medical Ethics – CM Francis – 4th edition – 2020
2. Medical Ethics challenges and prospects in India –Subrata Sharma– 2012
3. Medical Ethics – a very short introduction – Michael Dunn & Tony Hope- 2nd edition – 2018
4. Textbook of medical bioethics attitude and communication for medical students – Motilal C Tayade– 2020



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 Statement	Taxonomy
Describes the components of Environment, basic concepts of Ecosystem & interaction of man & environment.	Receive
Discuss the Global environment problems, biodiversity loss, deforestation & desertification.	Respond
Demonstrate the environmental pollution with impact & control strategies of pollution in urban, rural & industrial areas.	Value
Define the environmental management, concept of health sanitation, environmental disease.	Organize
Revise the Environmental Protection Act, Environmental laws, National movements, environmental ethics.	Characterize
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 Programme-Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

UNIT-III

Introduction to AYUSH system of medicine-Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various systems of medicine.

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 –II

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 Statement	Taxonomy
	Describes the Classification of microorganisms, size, shape and structure of bacteria & Use of microscope in the study of bacteria.	Remember
	Explain the classification & different methods with advantages and disadvantages of the various methods infection control measures.	Understand
	Determine immunology& perform serological tests or microbiological laboratory procedures .	Apply
	Analyse the etiological agents of global infectious diseases, causative agents, transmission methods, investigation, prevention & control.	Analyse
	Assess the clinical relevance of bacteriology, parasitology mycology & virology.	Evaluate
	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

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-III

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-IV

Virology with special reference to hepatitis, poliomyelitis, HIV & Influenza

UNIT-V

Immunity – Non specific

- Natural & Acquired
- Allergy and Anaphylaxis

PRACTICALS:

1. Compound microscope and its application in microbiology.
2. Demonstration of sterilization equipments: 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
	Describes basis of systemic pathology & morphology of common disorders.	Remember
	Explain the general principles of hematology & histopathology techniques.	Understand
	Determine the general principle of cytopathology techniques & universal safety precaution.	Apply
	Analyse the general principles of clinical pathology techniques, autopsy & museum.	Analyse
	Assess the clinical information of accurate pathology diagnosis.	Evaluate
	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)
- Characteristics of Neoplasia.
- Pathogenesis of Neoplasia.
- Routes of spread

UNIT-V

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

- Anemias-classification, morphological and Etiological, effects of anemia on body.

PRACTICALS

1. Collection of blood Samples
2. Various instruments used in Hematology
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 & Clinical 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
Describe the mechanism of anti-anginal drugs, hypertension, arrhythmias & partial or complete heart failure.	Remember
Explain the pharmacotherapy of insomnia & importance of new generation anti-histaminic drugs over old generation antihistamines.	Understand
Determine the corticosteroids & drugs which inhibit acid formation to prevent acidity and stomach/peptic ulcer.	Apply
Analyse the anti-thrombotic agents, lipid lowering agents & anti-atherosclerotic agents.	Analyse
Assess the antibacterial drugs & Narcotics with indications & contraindication in day to day life	Evaluate
Formulate the types of anesthesia and mechanism of action of local & general anesthetic drugs.	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

- b) 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 anaesthetics

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, chloramphenicol

PRACTICALS

Practical based on the topics mentioned in the theory syllabus

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.

PREVENTIVE CARDIOLOGY

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

Course Outcomes

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

CO Statement	Taxonomy
Describe the structure and function of the heart including the electrical activity involved in the normal and abnormal cardiac cycle.	Remember
Describe the structure and function of the myocytes & function of the peripheral and coronary circulatory systems at rest and during physical activity.	Understand
Discuss Anatomy of Coronaries of Heart	Apply
Discuss the primary preventions – factors involved in it.	Analyse
Describe the secondary preventions & factors involved in it.	Evaluate
Describe the tertiary preventions and factors affecting it.	Create

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

Learning Outcomes

1. To understand Coronary Anatomy
2. To enable students, differentiate between normal heart sounds and murmurs.
3. To enable students, a preliminary understanding of the circulatory system from a physiological and functional perspective, as well as related terminologies.
4. 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.




UNIT-I

1) Cardiovascular disease-
Types
Causes
Risk factors
Preventive measures & treatment.

UNIT-II

Primary Prevention
1) Smoking
2) Diet
3) Exercise

UNIT-III

Secondary Prevention –
1) Weight management
2) Blood Pressure
3) Alcohol
4) Drug Therapy

UNIT-IV

Health Education & Promotion –
Lifestyle modification,
Physical & Psychological status,
work environment,
stress, prevention at population level

UNIT-V

Tertiary Prevention –
Coronary interventional procedures –
coronary angioplasty, stent, bypass surgery, pacemakers, defibrillators, LVAD.

Reference books

1. Essentials of clinical cardiology – Adithya Udupa K -1st edition – 2017
2. Prevent and Reverse Heart Disease-Caldwell B. Esselstyn- 2020
3. Cardiology update – PP Mohanan & MN Krishnan – 2020
4. Preventive cardiology – Jennings Catriona – 2009.



SKILL ENHANCEMENT COURSE
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 2nd edition New Delhi: Jaypee Brothers.
- The body by Bilbirson Agreed for Occupance

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SEMESTER III

CARDIAC MEDICINE

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

Course Outcomes

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

	CO Statement	Taxonomy
	Describes the cardiovascular system , cardiovascular diseases, pathophysiology, etiology & management.	Remember
	Explain the laboratory test to diagnose blood diseases & bleeding disorders.	Understand
	Determine the Pulmonary Function Test & its interpretation to diagnose respiratory disease.	Apply
	Analyse renal system, role of dialysis & renal transplantation.	Analyse
	Assess Autonomic Nervous System, CNS disorders & their etiology.	Evaluate
	Formulate disease/disorders affecting cardiac system & medicine relevant to it.	Create

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

Learning Outcomes

1. Develop and strengthen professional skills, adhere to ethical principles, and demonstrate sensitivity to a diverse patient population.
2. Develop an awareness of and responsiveness to the larger context and system of health care and demonstrate the ability to effectively call on system resources to provide care that is of optimal value.
3. Develop the ability to investigate and evaluate their patient care practices, and appraise and assimilate scientific evidence to improve their patient care practices.



UNIT-I

Ischemic heart diseases
Rheumatic heart disease
Congenital heart disease
Hypertension
Aortic Aneurysms

UNIT-II

Cardiomyopathy
Peripheral vascular disease
Pulmonary edema and LV failure
Bleeding disorders
Laboratory tests used to diagnose bleeding disorders

UNIT-III

Chronic obstructive airway diseases (COPD)
Concept of obstructive versus restrictive pulmonary disease
PFT and its interpretation

UNIT-IV

Acute Renal Failure & Chronic Renal Failure
End stage renal disease
Role of dialysis and renal transplantation in its management
CNS disorders

UNIT-V

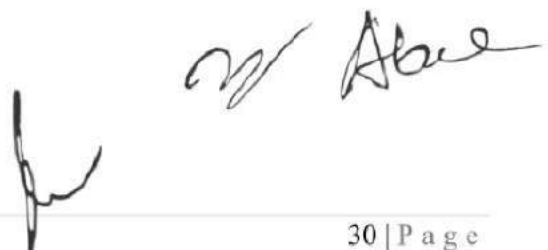
Diabetes Mellitus
Obesity
Pregnancy
Paediatric Patient (neonate/Infant)
Elderly patient

PRACTICALS:

Practicals based on above syllabus

Reference Books:

- 1: Clinical Cardiology & Examination – Dr Rajesh S. Roy - 2021
- 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: Manual of Cardiovascular Medicine – Sanjay Kumar Chugh – 5th edition - 2022



CARDIAC DISEASE-I

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

Course Outcomes

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

CO Statement	Taxonomy
Define cardiovascular Diseases , Pericardial Diseases ,Pericardial effusion, Constrictive pericarditis &Cardoactamponade	Remember
Explain the normal cardiac, cardiovascular, pericardial diseases anatomy & disease associated with it.	Understand
Determine the electrical disturbances of heart:Sinus node dysfunction Arrhythmias and conduction disturbances.	Apply
Classify the normal & abnormal range of blood pressure, pulmonary hypertension, Primary pulmonary hypertension.	Analyse
Justify normal peripheral vascular anatomy & Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection.	Evaluate
Formulate the congenital heart diseases & Congenital valvular disease, Acyanotic heart disease, Atrial & Ventricular septal defect.	Create

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

Learning Outcomes This course will cover common Cardiovascular Diseases, their related pathology and microbiology. •Along with outline of clinical presentation and management of these conditions it also includes Medical and Surgical interventions




UNIT-I

Heart failure

Causes, Types, symptoms and signs, diagnosis, management, prevention. Arrhythmias

Brady and Tachyarrhythmias, causes, diagnosis and management.

UNIT-II

Atherosclerosis. Brady and Tachyarrhythmias, causes, diagnosis and management

Atherosclerosis. Definition, risk factors, pathogenesis, Clinical significance and prevention.

UNIT-III

Coronary artery disease Types, Causes, Symptoms and signs, diagnosis, investigations, management, complications. VI. Hypertension

Definition, causes, signs and symptoms, diagnosis, evaluation, management.

UNIT-IV

Pulmonary Hypertension

Definition, Causes, diagnosis and treatment.

Rheumatic fever, Rheumatic Heart disease, Mitral valve and aortic valve disease. Infective endocarditis.

UNIT-V

Congenital Heart Diseases

Common CHD, Diagnosis and management ASD, VSD, PDA, PS, AS,

Coarctation of aorta, Dextrocardia.

Cardiomyopathies

Dilated Cardiomyopathy, Hypertrophic Cardiomyopathy, Restrictive Cardiomyopathy

PRACTICALS:

Practical's based on above syllabus

Reference Books:

1: P Syamasundar Rao, Reema Chugh – A Comprehensive Approach to Congenital Heart Diseases – 1st edition – 2018

2: Barry London, Knu Chatterjee, Donald Heistad, Richard E Kerber – Kanu Chatterjee's Cardiology an illustrated textbook – 2nd edition-2021

3: A Text book of Cardiovascular Medicine. Dr. Bruanwald's. -2007

4: A Text book of Medicine. Davidsons.-2018

ELECTROCARDIOGRAPHY

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

Course Outcomes

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

CO Statement	Taxonomy
Define the basic physiological concepts of arrhythmias: Brady and Tachy Arrhythmias & the pacing techniques.	Remember
Explain the normal and abnormal heart impulse activity/ conductivity & septal defect closure materials.	Understand
Determine the electrophysiological studies for arrhythmias & Radio Frequency Ablation for Arrhythmia's.	Apply
Classify the basic anatomy & physiological concepts of Cardiovascular diseases : Cardiac tamponade & Cardiac Trauma	Analyse
Justify emergency drugs and tools according to appropriate safety standards & management of anaphylactic reactions.	Evaluate
Formulate the factors which impact the normal cardiac activity & management: Hypotension / Hypertensive Crisis.	Create

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

- Learning Outcomes
1. To develop understanding regarding Electrocardiography and its procedure.
 2. Describe the proper hook-up procedure for a 12-Lead ECG
 3. Identify basic normal ECG waveform morphology and common interpretation.
 4. Enumerate the measures to be taken before, after and during ECG procedure.




UNIT-I

Basic principles, Electrocardiographic paper The Electrocardiograph,
The Electrical field of Heart
The leads, standard limb lead, Precordial lead, 'V' lead & 'AV' lead Basic ECG deflections.

UNIT-II

Normal ECG The 'P' wave The 'QRS' complex T wave, the S-T segment, P-R segment The 'U' wave
Rate & rhythm Rotation of the heart, The Q-T interval.
Abnormal ECG
Exercise stress Testing, Exercise protocols,

UNIT-III

Electrocardiographic measurements, Exercise testing-Indication and techniques. ECG in myocardial infarction
Study of various major ECG abnormalities including types of conduction blocks, Hypertrophy, WPW, COPD, Valvular diseases, SSS, Tachycardia, its varieties, Pre-mature beats.
Coronary Artery Disease

UNIT-IV

Effect of various Cardio-toxic drugs on ECG,
Effects of Electrolyte disturbance of ECG effect of hyper hypothermia. Disease of Heart & ECG

UNIT-V

Interpretation of TMT report- Criteria for TMT positive test, contra indication of TMT, conditions where TMT is not useful, complications that may occur in TMT room and its management
Myocardial perfusion scan- procedures & usefulness of Myocardial perfusion scan. Holter Monitoring- procedure & and usefulness.

PRACTICALS:

Practicals based on above syllabus

Reference Books:

- 1: Textbook of Echocardiography – V Amuthan – Satish K Parashar – 2nd edition – 2022.
- 2: ECG Made Easy – Atul Luthra - 6th edition - 2020
- 3: Leoschamroth: An introduction to Electrocardiography – CalamburN. , Johnson Francis – 8th edition- 2018
- 4: Navin C Nanda – Comprehensive Text book of Echocardiography – 2nd edition-2020



CATHETERS & INSTRUMENTS

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

Course Outcomes

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

	CO Statement	Taxonomy
	To introduce Biomedical applications of different transducers used.	Remember
	To introduce the student to the various sensing and measurement devices of electrical origin.	Understand
	To provide awareness of electrical safety of medical equipment.	Apply
	To provide the latest ideas on devices of non-electrical devices.	Analyse
	To bring out the important and modern methods of imaging techniques.	Evaluate
	To provide latest knowledge of medical assistance / techniques and therapeutic equipment.	Create

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

Learning Outcome

1. The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance.
2. The fundamental principles of equipment that are actually in use at the present day are introduced.
3. To train the student in various recording techniques of the machines which will increase their efficiency in the healthcare industry or they will be the best helping hand for biomedical engineers.



UNIT - I

- Types of catheters & Cath lab equipment's.
- Hemodynamic monitoring technique, recognition, indication, complications

Introduction to medical physics

Blood pressure recording

Pressure transducers

UNIT-II

- Arterial Blood Gases (ABG): Techniques and interpretation

- X-ray imaging in lab

Defibrillators

Impedance plethysmography

UNIT-III

Cathode ray tubes and physiological monitors

- Fluid and electrolytes

- Intra-Aortic Balloon Pulsation (IABP): Indication, Technique and complications

Medical ultrasound and Doppler

UNIT-IV

- Extra corporeal membrane oxygenator (ECMO)

- Artificial ventilation

- C-arm

- oximetry

Ionic currents and Electrocardiography

Electrocardiographic processing and display system

UNIT-V

Instrumentation:

Types of catheters

Catheter cleaning and packing

Techniques of sterilization-advantages and disadvantages of each

Setting up the cardiac catheterization laboratory for a diagnostic study

Table movement

Image intensifier movement

Image play back

Reference books:

- 1.Introductory guide to cardiac catheterization – Arman T.Askari& MehdiH.Shishehbor -2nd edition – 2012
- 2.Essential Cardiac Catheterization – Rob Butler & Mark Gunning – 1st edition – 2007
- 3.Textbook of biomedical instrumentation – K N Scott & AK Mathur – 2019
- 4.Advanced instrumentation techniques- Dr S Ravi Sankar -2021.

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, transferring from bed to wheelchair, 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, drains
- e) 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, Respiration
- b) Multi parameter monitors, Capnography and End Tidal CO₂ (ETCO₂)
- c) Hydration, intake, and output monitoring
- d) Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance

UNIT-V

Dressing and wound care:

- a) Bandaging: basic turns, bandaging extremities, triangular bandages and their application.
 - b) Surgical dressing: observation of dressing procedures.
 - c) Suture materials and suturing techniques
 - d) Splinting
- e) 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 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 components of 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, inserting objects, 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 notepages, preparing audience handouts, printing presentation documents. **MS – Access:** creating tables and databases.

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.



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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 equipments.	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

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SEMESTER IV

RADIOLOGY

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

Course Outcomes

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

CO Statement	Taxonomy
Remember to operate imaging equipments.	Remember
Learn & operate advance radiological tools to diagnose & detect disease.	Understand
Demonstrate clinical competency required of an entry level radiographer	Apply
Analyse the special radiographic equipments.	Analyse
Assess the application of radioisotopes.	Evaluate
Formulate the radiosafety principles.	Create

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

Learning Outcome

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

1. Critical thinking
2. Problem solving skills
3. Recognize abnormal findings.
4. Understand interventional procedures.



UNIT-I

X ray - Principles of X-ray

Description and recognition of chest X-rays

MRI – Principles of MRI

Description of MRI

CT Scan – Principles of CT Scan

Description of CT Scan

Different views of chest for identification of cardiopulmonary structures

Ultrasonography: principles

UNIT –II

RADIO DIAGNOSIS

Radiography, Angiography, Fluoroscopy, Image Intensifier, Multi section radiography.

UNIT-III

SPECIAL RADIOLOGICAL EQUIPMENTS

Principle, Plane of Movement, Multi section Radiography, CAT. Principle of NMR, MRI

UNIT-IV

APPLICATION OF RADIOISOTOPES

Alpha, Beta and Gamma emission, Principle of radiation detectors, dot scanners, Nuclear angiogram,

Principles of Radiation therapy.

UNIT-V

RADIATION SAFETY

Hazardous effect of Radiation, Radiation protection Techniques, Safety Limits, Radiation Monitoring

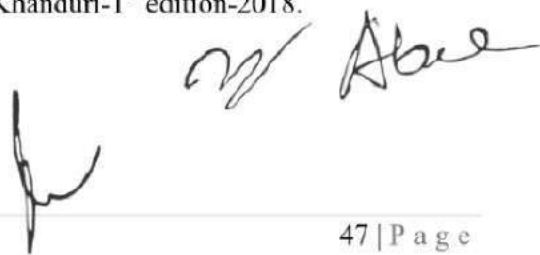
Reference books:

1. Concise textbook of Basic Radiography- Lalit Agarwal-2019

2. Textbook of Radiology for residents & technicians – Satish K Bhargava & Sumeet Bhargava-6th edition-2023.

3. Radiology of Positioning and Applied Anatomy for students and practitioners –GS Garkal- 4th edition- 2015

4. Textbook of Radiology for CT and MRI Technicians – Sachin Khanduri-1st edition-2018.

Handwritten signatures and initials in black ink, including a large signature that appears to be 'Abhishek' and several smaller initials.

BASIC CARDIAC CARE TECHNOLOGY

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

Course Outcomes

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

CO Statement	Taxonomy
Define Echocardiography & electromagnetic equipments.	Remember
Differentiate the Transesophageal echocardiography, Stress echocardiography, pharmacological 3D echocardiography.	Understand
Apply the common Cardiovascular disorders and its management.	Apply
Analyse the use of defibrillators & its mechanism.	Analyse
Justify the Congenital heart diseases, ASD, VSD, PDA, Coarctation of aorta & Pulmonary and aortic stenosis.	Evaluate
Formulate the objectives of Management of vasovagal attack, Management of coronary perforation.	Create

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

Learning Outcome

1. Knowledge of common Cardiovascular Diseases
2. Knowledge of pathology and microbiology of CVS disorders
3. Knowledge of clinical presentation and management of CVS diseases.
4. Knowledge of Medical and Surgical interventions



UNIT-I

Electricity & electro medical equipments & their safe guards
Basics of electricity & functioning of electro medical equipments
Earthing & care of apparatus, Static electricity

UNIT-II

Intensive coronary unit & recovery room concepts
Trans-oesophageal Cardiopulmonary resuscitation –Basic cardiac life support
Advanced cardiac life support

UNIT-III

Management of Cardiac arrest- definition, causes, external cardiac massage
artificial respiration & other drugs &
Procedures used in the management of cardiac arrest.

UNIT-IV

Cardiac monitoring –definition, purpose of cardiac monitoring,
How to recognize various arrhythmias

UNIT - V

Use of Defibrillator-Indications, how to use the defibrillator
Complications during the procedure & its management
Radiation Hazard & safety

PRACTICALS:

Based on the topics mentioned in the theory syllabus

Reference books:

- 1.Essentials of clinical cardiology – dithya Udupa K-1st edition-2017
- 2.Textbook of cardiac nursing-Reena George-1st edition-2017
- 3.Clinical Cardiology and examination-Dr.Rajesh S. Roy-2021
- 4.Handbook on cardiac critical care-Santanu Guha-1st edition-2016



ECHOCARDIOGRAPHY – I

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

Course Outcomes

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

CO Statement	Taxonomy
Describes the basic principles of electrocardiography, ECG deflection & basic action of electrocardiography.	Remember
Explain the normal EG, rate & rhythm the electrical axis, pattern of ECG, general principles of right, left & hemi block.	Understand
Determine the principles of echocardiography & instrumentation.	Apply
Analyse the echocardiographic examination.	Analyse
Assess the Doppler echocardiography, principles, clinical applications & Doppler effect.	Evaluate
Formulate the contrast ECHO, echo measurements – ASE recommendation.	Create

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

- Learning Outcome
1. To develop an understanding regarding Echocardiography.
 2. To train students to perform Echocardiography examinations by explaining the position of transducers.
 3. To make students aware of recent advances in Echocardiography.
 4. To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.



UNIT-I

Echocardiography- Basic principles of ultrasound, M-Mode Echocardiography, Two dimensional Echocardiography, Doppler Echocardiography, colour flow, Echocardiography Instrumentation: Basic pulse Echo system, Transducer, Pulse generation, Echo detection, Echo displays, A mode, B mode, M-mode, Display & recording

UNIT-II

Echo-cardiographic Examination: Selecting transducers, Position of the patient, Placement of the transducer, Setting control, M-Mode labeling, 2 D Echo, Normal variants, Terminology, Identification of segments, Doppler Echocardiography

UNIT-III

Echo in rheumatic heart disease-Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension, post MVR, Post AVR. Prosthetic valve Malfunction, LA clot.

UNIT-IV

Echo in congenital heart disease- Echo in ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, Coarctation of aorta, TOF, Dextrocardia.
Echo in ischemic heart disease- Echo in acute myocardial infarction, old myocardial infarction & other ischemic heart disease related conditions, LV aneurysm.

UNIT-V

Echo in other cardiovascular disease-
Echo in various types of Cardiomyopathy, infective endocarditis, diseases of aorta, Mitral valve prolapse, Myxoma & other cardiovascular diseases

PRACTICALS:

Practical based on the topics mentioned in the theory syllabus

Reference Books:

- 1: Textbook of Echocardiography – V Amuthan – Satish K Parashar – 2nd edition – 2022.
- 2: ECG Made Easy – Atul Luthra - 6th edition - 2020
- 3: Leoschamroth: An introduction to Electrocardiography – Calambur N., Johnson Francis – 8th edition- 2018
- 4: Navin C Nanda – Comprehensive Text book of Echocardiography – 2nd edition-2020



CARDIAC DISEASE – II

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

Course Outcomes

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

CO Statement	Taxonomy
Define cardiovascular Diseases, Pericardial Diseases, Pericardial effusion, Constrictive pericarditis & Cardiac tamponade	Remember
Explain the normal cardiac, cardiovascular, pericardial diseases anatomy & disease associated with it.	Understand
Determine the electrical disturbances of heart: Sinus node dysfunction Arrhythmias and conduction disturbances.	Apply
Classify the normal & abnormal range of blood pressure, pulmonary hypertension, Primary pulmonary hypertension.	Analyse
Justify normal peripheral vascular anatomy & Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection.	Evaluate
Formulate the congenital heart diseases & Congenital valvular disease, Acyanotic heart disease, Atrial & Ventricular septal defect.	Create

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

Learning Outcome

1. Knowledge of the structural development of the cardiovascular system
Knowledge of developmental anomalies in Cardiovascular System.
2. Knowledge of medical and surgical interventions of cardiac diseases.



UNIT-I

Anaemia
Hemophilia
Hemostasis
Wound healing

UNIT-II

Angina
Pericardial diseases-
Acute Pericarditis, Pericardial effusion, Pericardial tamponade. Chronic
constrictive pericarditis.

UNIT-III

Peripheral vascular diseases
Stroke
Heart Failure
Dyslipidemia

UNIT-IV

Myocardial Infarction
Heart Valve Complications
Infective Endocarditis

UNIT-V

Fluid therapy, Central venous lines.
Transfusion, Cryotherapy
Interpretation of Investigation reports.

PRACTICALS:

Based on the topics mentioned in the theory syllabus

Reference books:

1. Taylor's cardiovascular diseases: A handbook – Robert B. Taylor – 2005
2. Manual of Cardiovascular Medicine – Brian P. Griffin – 4th edition – 2013
3. Cardiac Functioning Disorders Challenges and Therapies – Mahira Parveen – 1st edition – 2013
4. The new heart disease handbook – Christopher P. Cannon & Elizabeth Vierck – 2009.



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 nonmaleficence 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



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:

1. Communication Skills for the Healthcare Professional, First edition
2. 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



Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	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 the Recent 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:

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



SEMESTER – V
CARDIAC CATHETERIZATION – I

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

Course Outcomes

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

CO Statement	Taxonomy
Define the hemodynamics, pascal's law & normal pressures of the chambers of the heart.	Remember
Explain the diagnostic catheterization & asepsis in the cardiovascular catheterization in laboratory.	Understand
Determine the application and mechanism of Defibrillator, Holter Monitoring in Cardiac Emergencies.	Apply
Classify the Basic Life Support technique in Airway Management, approach to Shock & Anaphylaxis.	Analyse
Justify the history taking - ECG: Arrhythmias, recent MI - Echo: RWMA, LV function, A pressure.	Evaluate
Formulate the assessment Urine Output -Blood pressure Late:-Patency of puncture -Renal Function -ECG & 2D Echo.	Create

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

- Learning Outcomes
1. Knowledge about coronary angiography.
 2. Knowledge about cardiac catheterization
 3. The occurrence and management of various complications

UNIT-I

Preparation for Cath procedure and post procedure care

Cardiac Catheterization laboratory- General details of Cardiac Catheterization equipment, how to handle the machine, common problems, one may come across and how to overcome it

UNIT-II

Radiation hazards

Materials used in the Cath Lab- All catheters , balloons, guidewires, pacemakers, contrast materials & other materials used in the Cardiac Catheterization Laboratory and Sterilization of all these materials.

UNIT-III

Right heart Catheterization- procedure, cath position, Oximetry at various levels, angios done & its interpretation

Left heart catheterization- procedure, cath position, Oximetry at various levels, angios done & its interpretation

UNIT-IV

Introduction to coronary angiogram

History of coronary angiography

Instrumentation in coronary angiography

Indications for coronary angiography

Contraindications for coronary angiography

UNIT-V

Procedure of Coronary Angiography

Approach

Seldingers technique

Catheters for coronary angiography

Views for coronary angiography

Evaluation of a coronary lesion

Reporting of coronary angiography

Decision making on management

Revascularization PTCA or CABG

Planning review of protocol

Complications and management

PRACTICALS:

Practical based on the topics mentioned in the theory syllabus

Reference Books:

- 1:A textbook of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim -9th edition-2021
- 2: Kern's Cardiac Catheterization Handbook – 7th edition - 2019
- 3:Introductory guide to cardiac catheterization-Arman T.Askari, Mehdi H.Shishehbor- 2nd edition-2012
- 4: Essential cardiac catheterization-Rob Butler -1st edition-2007



ECHOCARDIOGRAPHY –II

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

Course Outcomes

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

CO Statement	Taxonomy
Describes the basic principles of electrocardiography, ECG deflection & basic action of electrocardiograph.	Remember
Explain the normal ECG, rate & rhythm the electrical axis, pattern of ECG, general principles of right, left & hemiblock.	Understand
Determine the principles of echocardiography & instrumentation.	Apply
Analyse the echocardiographic examination.	Analyse
Assess the Doppler echocardiography, principles, clinical applications & Doppler effect.	Evaluate
Formulate the contrast ECHO, echo measurements – ASE recommendation.	Create

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

- Learning Outcome
1. To develop an understanding regarding Echocardiography.
 2. To train students to perform Echocardiography examinations by explaining the position of transducers.
 3. To make students aware of recent advances in Echocardiography.
 4. To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

UNIT-I

Trans esophageal echocardiogram- indications, procedures, usefulness & complications, one may encounter and its management.

Stress Echo- procedure & indications.

Fetal echocardiogram- procedure, basic interpretation

UNIT-II

Peripheral Doppler- procedure & usefulness of peripheral Doppler

Assessment of cardiac function- measurements of all cardiac chambers and assessment of cardiac function

UNIT-III

Contrast Echo cardiogram-Procedure & usefulness of Contrast Echo cardiogram. Myocardial

Contrast Echo- Basic knowledge

UNIT-IV

Echo in pericardial disease-pericardial effusion, cardiac tamponade, constrictive pericarditis.

1) 3D Echo

2) Other latest developments in the field of Echocardiogram

UNIT-V

Echocardiography

1) Congenital heart diseases

2) Transesophageal echocardiography

3) Stress echocardiography (pharmacological

4) 3D echocardiography

PRACTICALS:

Based on the topics mentioned in the theory syllabus

Reference books:

1.ECHO made easy – Atul Luthra-2nd edition-2007

2.The ECHO Manual-Jae K.OH ,James B.Seward&A.Jamil Tajik-3rd edition-2006

3.Making sense of Echocardiography A Hands-On Guide-Andrew R Houghton-1st edition-2009

4.Clinical Echocardiography – K.C.Verma& Saurabh Verma-2010



INVASIVE & NON INVASIVE CARDIOLOGY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
BSCCTCO503T23	Core	Invasive and Non Invasive Cardiology	4	3	1	-	20	80	100

Course Outcomes

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

CO Number	CO Statement	Taxonomy
CO1	Describes the basic principles of electrocardiography, ECG deflection & basic action of electrocardiograph.	Remember
CO2	Explain the ECG anatomy - Chambers enlargement, Technical artefacts ECG reporting	Understand
CO3	Determine the principles of Noninvasive Echocardiography	Apply
CO4	Analyse the Invasive technologies	Analyse
CO5	Assess the Gas Administration Devices	Evaluate
CO6	Formulate the contrast ECHO, echo measurements – ASE recommendation.	Create

- Course Outcome
1. To enable students, understand new techniques for procedures in and around the heart emerge that again need expert knowledge and manual dexterity.
 2. To understand such interventions which include diagnostic and therapeutic electrophysiology; implantation or exchange of complex pacemaker systems or percutaneous cardioverter-defibrillator-pacers; percutaneous valve repairs or replacements etc

Learning Outcome To enable students to not only be a helping hand to those just starting out in the specialty but also to serve as a reference for those who have been working in Invasive field for some time



UNIT I

Noninvasive ECG and TMT - ECG

- a) Technique of ECG recording
- b) ECG Leads system
- c) ECG waves - PQRSTU, Osborn wave, delta wave, epsilon wave.
- d) ECG rates, rhythm, axis calculation, lead positioning.
- e) Intervals and segments - PR interval, PR segment, ST segment, QT interval, J point and QRS complex.

UNIT-II

- a) ECG anatomy - Chambers enlargement.
- b) Technical artefacts
- c) ECG reporting Exercise Testing to Diagnose Obstructive Coronary Artery Disease - Rationale and Guidelines, Pretest Probability (true positive, false positive, true negative and false negative ST-Segment Interpretation, Confounders of Stress ECG Interpretation.
- d) Result Reporting

UNIT III

Noninvasive Echocardiography -

- a) Introduction and purposes, demonstration of machine parts,
- b) Basic windows
- c) Echocardiographic views
- d) Imaging modes - two-dimensional (2D) imaging, M-mode imaging, and Doppler imaging, color - flow mapping.

UNIT IV

Invasive technologies -

- a) Orientation to the Cath - Lab and biomedical equipments, Introduction and purposes of the Cath - Lab.
- b) Radiation safety and protocols.
- c) Vascular access - arterial in femoral, radial and ulnar, venous in femoral.
- d) Catheterization left heart and right heart, Angiography - Chambers.
- e) Transducers balancing, measurement of pressures, Calculations of gradients
- f) Blood flows, cardiac output and Calculations of cardio shunts, resistances.
- g) Management of patient in the Cath - Lab, coronary angiogram views.
- h) Prerequisites of cat lab procedures: CBC, RFT, Serology, ECG, Echo, and customised list for all types of procedures.
- i) Maintaining sterility, PPE - Personnel protective equipments.

UNIT V

Gas Administration Devices -

Gas administration devices (reducing valves, flow meters and regulators).

- a) Simple oxygen administration devices.
- b) Methods of controlling gas flow.
- c) Reducing valve, Flow meters, restrictors and regulators
- d) Selection of device

Reference books:

1. Handbook of interventional cardiac procedures-Dr. Yahya Kiwan-2016
2. Clinical methods in cardiology-B Soma Raju-2002
3. Review of cardiology-Nitin Parashar & Mumun Sinha-2019
4. Practical cardiology-Ragavendra R. Baliga & Kim A. Eagle-2nd edition-2008

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Immunology

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

Course Outcomes

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

CO Statement	Taxonomy
Recall the fundamental concepts and components of the immune system.	Remember
Explain the principles and mechanisms of immune responses against pathogens and diseases.	Understand
Apply immunological knowledge to diagnose and treat immune-related disorders.	Apply
Analyze experimental data to understand immunological processes and interpret research findings.	Analyze
Critically evaluate the efficacy and limitations of immunological techniques and therapies.	Evaluate
Develop innovative approaches and strategies for immunological research and therapeutic interventions.	create

Taxonomy: remember, understand, apply, analyze, evaluate, create

Learning Objectives	
	<ol style="list-style-type: none"> 1. Understand the basic principles of immunology, including the immune system's components and their functions. 2. Explain the mechanisms of immune responses and how they protect the body against pathogens. 3. Describe the types of immunity, including innate and adaptive immunity, and their roles in disease prevention. 4. Recognize the importance of immunization and its impact on public health.

Unit 1

- History and introduction to immunology
- Immunity
- Innate
- Acquired immunity
- Basic concepts about their mechanisms
- Definition, types of antigens and determinants of antigenicity
- Definition, types, structure and properties of immunoglobulin
- Antigen-Antibody reactions
- Definition
- Classification
- General features and mechanisms
- Applications of various antigen antibody reactions

Unit 2

- Principle, procedure and applications of under mentioned in Medical Microbiology:
 - Complement fixation test
 - Immuno- fluorescence
 - ELISA
 - SDS-PAGE
 - Western blotting
- Principle, procedure and interpretation of various serological tests:
 - Widal
 - VDRL
 - ASO
 - CRP
 - Brucella tube agglutination
 - Rose-Waaler

Unit 3

- Complement system:
 - Definition
 - Basic concepts about its components
 - Complement activation pathways



Unit 4

- Immune response:
 - Introduction
 - Basic concepts of Humoral and Cellular immune responses

Unit 5

- Hypersensitivity:
 - Definition
 - Types of hypersensitivity reactions
- Basic concepts of autoimmunity and brief knowledge about autoimmune diseases
- Automation in diagnostic serology
- Vaccines:
 - Definition
 - Types
 - Vaccination schedule
 - Brief knowledge about 'Extended programme of immunization' (EPI) in India

Suggested Readings:

1. Practical Medical Microbiology by Mackie & McCartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker & Satish Gupte
4. Medical laboratory Technology Vol. I, II, III by Mukherjee
5. Medical Laboratory manual for tropical countries Vol II Microbiology by Monica Cheesbrough
6. Immunology by Riott
7. Basic & Clinical Immunology by P. Daniel Fudenberg, H. Hugh and Stites



ABILITY ENHANCEMENT COURSE

MEDICAL PSYCHOLOGY

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

Course Outcomes

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

CO Statement	Taxonomy
This course covers various aspects of medical psychology.	Receive
Understand different aspects of medical psychology essential in medical professional.	Respond
Apply medical psychology in clinical scenario during clinical 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 behaviour



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

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INTRODUCTION TO QUALITY & PATIENT SAFETY

Course Code	Course Category	Paper Title	Credits	Contact per week			Evaluation		
				L	T	P	Internal	External	Total
	Discipline specific elective	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, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines

UNIT-II

Basics of emergency care and life support skills- Basic life support (BLS), Vitals signs and primary assessment, Basic emergency care – first aid and triage, Ventilations Including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR

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

DISCIPLINE SPECIFIC ELECTIVE

ENTERPRENEURSHIP 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 Development Author S S Khanka Edition reprint Publisher S. Chand Publishing, 2006
- 2: Entrepreneurship Development and Business Ethics Paperback – 1 January 2019 by Abhik Kumar Mukherjee and Shaunak Roy Author
- 3: Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Jones & Bartlett learning, 2014
- 4: Taxmann's Entrepreneurship development – CA(Dr.) Abha Mathur- 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

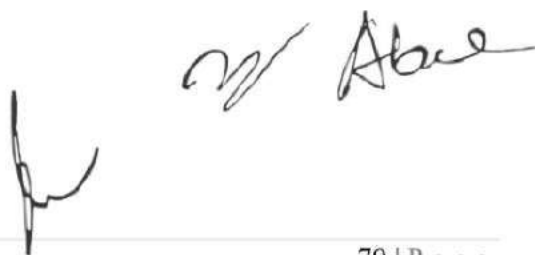
After completing this course, the student will be able to:

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 Methodology and applied statistics – DN Sansanwal - 2020



SEMESTER – VI
CARDIAC CATHETERIZATION –II

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

Course Outcomes

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

CO Number	CO Statement	Taxonomy
CO1	Describes the techniques of using catheters, its types, sterilization & packing.	Remember
CO2	Explain the table & image intensifier movements techniques.	Understand
CO3	Determine the extension of techniques & instruments to manage the cardiac output.	Apply
CO4	Analyse the procedures to manage the interventional cardiac activity.	Analyse
CO5	Assess the angiography & knowledge about coronary angiography catheters.	Evaluate
CO6	Formulate the critical cardiac activity with or without complication.	Create

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

Learning Outcomes

1. To provide the critical information to students when beginning with interventional cardiology.
2. To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques.
3. Understand coronary & peripheral angiogram
4. Understand valvuloplasty & angioplasty procedures.

UNIT-I

Coronary Angiogram-procedure, materials used, type & amount of dye used, indications & contra indications, various pictures recorded in various angles and gross interpretation.

UNIT-II

Peripheral Angiogram- procedure, indication & contra indication

Coronary Angioplasty- procedure, materials used, complications one may encounter and how to manage it.

Peripheral Angioplasty- materials used & procedure. Angioplasty of coarctation of aorta

UNIT-III

Valvuloplasties- procedure, indications, complications and preparation of balloons, mitral valvuloplasty, balloon aortic valvuloplasty, Balloon pulmonary valvuloplasty & Balloon tricuspid valvuloplasty

UNIT-IV

Coil closure & device closure of PDA- procedure, indications & materials used for coil & device closure of PDA

Device Closure of ASD- procedure, indications & materials used for device closure of ASD Device

Closure of VSD procedure, indications & materials used for & device closure of VSD

Electrophysiological studies-basic knowledge of electrophysiological studies

UNIT-V

Basic Cardiac Concepts

Measuring Intra cardiac pressures

Pressure recording systems

Fluid filled catheters versus catheter tipped manometers

Artifacts

Damping

Ventricularization

Pressure gradient recording pullback

Peak-to peak Cardiac output determination

Thermo dilution method, Oxygen dilution method,

Principles of oximetry

Shunt detection and calculations

PRACTICALS:

Based on the topics mentioned in the theory syllabus

Reference Books:

1:A textbook of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim -9th edition-2021

2: Kern's Cardiac Catheterization Handbook – 7th edition - 2019

3:Introductory guide to cardiac catheterization-Arman T.Askari, Mehdi H.Shishehbor- 2nd edition-2012

4: Essential cardiac catheterization-Rob Butler -1st edition-2007



CARDIAC SURGERY

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

Course Outcomes

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

CO Statement	Taxonomy
Remember the structure and function of the heart including the electrical activity involved in the normal and abnormal cardiac cycle.	Remember
Understand the structure & function of the peripheral and coronary circulatory systems at rest and during physical activity.	Understand
Discuss cardiovascular investigations & examinations.	Apply
Describe the invasive and non invasive cardiovascular investigations	Analyse
Assess the Stress test- treadmill test review, pharmacological stress testing.	Evaluate
Formulate the Preparation for 24 hours Holter monitoring	Create

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

Learning Outcomes

1. Knowledge of cardiac & Coronary Anatomy
2. Knowledge of difference between normal heart sounds and murmurs.
3. Knowledge of Invasive & non invasive cardiac technologies

UNIT I

Cardiovascular investigations: Noninvasive

- a) ECG - cardiac diagnosis by ECG: Chambers enlargement, arrhythmias, myocardial ischaemia and infarction.
- b) Echocardiography - cardiac diagnosis: valvular heart diseases, myocardial diseases, ischaemic heart diseases, Cardiomyopathies
- c) Pulmonary hypertension, infective endocarditis, intracardiac masses.

UNIT-II

Stress test- treadmill test review, pharmacological stress testing.

- 24 hours Holter monitoring
- Ambulatory BP monitoring
- Tilt table test
- Ankle-Brachial Index

UNIT III

Cardiovascular investigations: Invasive

- a) Diagnosis of coronary artery disease
- b) Diagnosis of valvular heart diseases in the cath-lab - stenosis, regurgitation and mixed
- c) Diagnosis of shunts
- d) Evaluation of pulmonary hypertension
- e) Diagnosis of pericardial constriction
- f) Diagnosis of peripheral and aortic diseases
- g) Complications of cardiac catheterization
- h) Complications and management of Contrast

UNIT-IV

Non invasive Technology;

- a) ECG recording basic
- b) ECHO evaluation basic
- c) Preparation for treadmill test
- d) Preparation for 24 hours Holter monitoring
- e) Preparation for ABPM

UNIT-V

Invasive Technology;

- a) Cardiac Cath right Heart
- b) Cardiac Cath Left Heart
- c) Cardiovascular Angiography
- d) Cardiac Pacing
- e) Relevant instrumentation in Cath Lab
- f) Cardiac Emergencies in Cath Lab

Reference books:

- 1.Acompact history of cardiac surgery- A Sampath Kumar – 2017
- 2.Manual of cardiac surgery – Prashant Shah- 1st edition – 2016
- 3.Techniques in valvular heart surgery – A.Sampath Kumar – 2nd edition – 2010
- 4.Recent advances in cardiothoracic surgery – Chander Mohan Mittal- 1st edition – 2013

CARDIAC CARE TECHNOLOGY – CLINICAL

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

Course Outcomes

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

CO Statement	Taxonomy
Describes the Documentation and Assessment for Cardiac care	Remember
Explain the Electrocardiography A review	Understand
Determine Ambulatory cardiac technologies	Apply
Analyse the Coronary angiogram for performing angioplasty	Analyse
Assess the vascular & coronary artery access & 24 hours ambulatory bimonitoring.	Evaluate
Formulate the techniques of coronary arteriography,angiography& video imaging system., medications & complications of PCI.	Create

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

Learning Outcome

1. Knowledge of interventional procedures
2. Knowledge of ambulatory cardiac technologies
3. Knowledge of coronary angiogram.



UNIT I

Documentation and Assessment for Cardiac care

1.Documentation in Non-Invasive technology

- a) ECG
- b) ECHO
- c) TMT

2.Documentation in Invasive technology

- a) Angiography
- b) Interventional procedures

UNIT II

Electrocardiography A review

- a) Chamber hypertrophy
- b) Acute coronary syndromes
- c) Bradyarrhythmias
- d) Tachyarrhythmias
- e) Pericardial diseases

UNIT III

Ambulatory cardiac technologies

- a) Holter monitoring
- b) Loop recorders
- c) Ambulatory blood pressure recording
- d) Newer technologies for monitoring the patients with heart diseases

UNIT IV

Invasive technologies

- a) Coronary angiogram for performing angioplasty
- b) PTCA
- c) Coronary Stents
- d) Optimizing the results of PTCA

UNIT V

Invasive technologies

- a) Intra-aortic balloon pump
- b) Fractional flow reserve
- c) Rotational atherectomy
- d) Intra vascular ultrasound
- e) Optical coherence tomography

PRACTICALS:

Based on the topics mentioned in the theory syllabus

Reference books:

- 1.Advanced cardiovascular life support Provider Manual- AHA- 16th edition 216
- 2.Bedside approach to clinical cardiology –Chandan Kumar Das- 2021
- 3.Textbook of interventional cardiology – Eric J.Topol&PaulS.Teirstein – 7th edition – 2015
- 4.Cardiology pearls- Adithya Udupa K – 1st edition - 201

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Professionalism and values

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

Course Outcomes

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

CO Statement	Taxonomy
Recall key principles of professionalism and ethical values in a professional context.	Remember
Comprehend the importance of maintaining professional behavior and upholding ethical standards.	Understand
Demonstrate the ability to apply professional standards and values in real-life situations.	Apply
Analyze ethical dilemmas and make informed decisions based on professional values.	Analyze
Assess personal and organizational practices against professional standards and values.	Evaluate
Develop strategies to foster a culture of professionalism and ethical values in the workplace.	Create

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

Learning Outcome	<p>On completion of this course, the students will be able to do the following:</p> <p>1. Understand the importance of professionalism and ethical behavior in the workplace.</p> <p>Demonstrate professionalism through effective communication, punctuality, and respect for colleagues and clients.</p> <p>Apply ethical principles and values to make informed decisions and solve problems.</p> <p>Foster a positive work environment by upholding professional standards and promoting integrity and trust.</p>
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UNIT I

Professional values – Integrity, Objectivity, Professional competence and due care, confidentiality

UNIT II

Personal values – ethical or moral values

UNIT III

Attitude and behavior – professional behavior, treating people equally

UNIT IV

Code of conduct, professional accountability and responsibility, misconduct

UNIT V

Differences between professions and importance of team efforts

Cultural issues in the healthcare environment

Suggested Readings

1. R. R. Gaur, R. Sangal, G.P. Bagaria, 2009, a Foundation Course in Value Education.
2. E.F. Schumacher, 1973, Small is Beautiful: A study of Economics as if people mattered, Blond & Briggs, Britain.
3. A. Nagraj, 1998, Jeevan VidyaekParichay, Divya Path Sansthan, Amarkantak.
4. P.L.Dhar, R.R.Gaur, 1990, Science and Humanism, Common wealth Publishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
7. B. P. Banerjee, 2005, Foundations of Ethics and Management, Excel Books.



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 defibrillator (AED)	Organize
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 consciousness

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 behaviour 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

Organizational Behavior-Definition-Importance -Historical Background-Fundamental concepts of OB- 21st Century corporate-Different models of OB i.e. autocratic, custodial, Supportive

UNIT-II

Organization Structure and Design - Authority and Responsibility Relationships - Delegation of Authority and Decentralization-Interdepartmental Coordination-Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design- Mechanistic vs Adoptive Structures - Formal and Informal Organization

UNIT-III

Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management. Learning-Processes of Learning-Principles of Learning- Organizational Reward Systems - 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 of Leadership 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: Human Behaviour at Work - Keith Davis 2004



DISCIPLINE SPECIFIC ELECTIVE

HOSPITAL MANAGEMENT

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

Course Outcomes

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

CO Statement	Taxonomy
Describes the Ability to use disciplines and concepts required in formulating, implementing, and evaluating strategic choices in health care	Receive
Discuss the Knowledge of key options in the policy, planning and financing of health care services	Respond
Demonstrate the Understanding of the diversity of international health policies	Value
Define International and comparative views on solutions and best practices	Organize
Revise the Practical experience in managerial issues	Characterize
Follow the skills required for Long-run orientation in problem analysis and solving	Receive

Taxonomy: Receive, Respond, Value, Organize, Characterize

Learning Objective

1. To provide an environment that enables students to benefit and learn nuances of Hospital Management from their collective learning experiences.
2. To offer opportunities to develop the ability to think analytically and build capacity for independent learning.

UNIT-I

Quality Concepts: Definition of Quality, Dimensions of Quality, Basic concepts of Total Quality Management, Quality Awards. Accreditations for hospitals: Understanding the process of getting

started on the road to accreditation, National and International Accreditation bodies, overview of standards- ISO (9000 & 14000 environmental standards), NABH, NABL, JCI, JACHO.

UNIT-II

Hospital Information System: Hospital Information System Management and software applications in registration, billing, investigations, reporting, ward management and bed distribution, medical records management, materials management and inventory control, pharmacy management, dietary services, management, information processing. Security and ethical challenges.

UNIT-III

Inventory Control: Concept, various costs of inventory, Inventory techniques- ABC, SDE/VED Analysis, EOQ models. Storage: Importance and functions of storage. Location and layout of stores. Management of receipts and issue of materials from stores, Warehousing costs, Stock verification.

UNIT-IV

Operations management: Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS, outsourcing of maintenance services, quality and reliability, concept of failure, equipment history and documents, replacement policy, calibration tests, spare parts stocking techniques and policies

UNIT-V

Biomedical Waste Management: Meaning, Categories of Biomedical Wastes, Colour code practices, Segregation, Treatment of biomedical waste-Incineration and its importance. Standards for waste autoclaving, microwaving. Packaging, Transportation & Disposal of biomedical wastes.

Reference books:

- 1.Hospital and patient care management – Dr Vidhya Srinivasan & Dr Akshay Ch. Deka – 2022
- 2.Hospital management & administration – BV Subrahmanyam – 2018
- 3.Hospital management- Manisha Saxena – volume 3 – 2018
- 4.Hospital management – Ashvini Arun Vora – 1st edition - 2018



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 theThe students will learn about Asepsis and the Cleanliness related to asepsis and on mobility of the patients.	Value
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 coursethestudentwilllearnhowtohandlethepatientsandtheirpositioning

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 enteral feeding 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



SEMESTER - VII

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 / Logbook 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.

