MALLA REDDY VISHWAVIDYAPEETH

SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

Suraram X Roads, Jeedimetla, Hyderabad-500055
Web: https://mrvv.edu.in/

Program

Bachelor of Science

Cardiovascular Technology (Cath Lab)

COURSE STRUCTURE

2026

Vision

To produce skilled cardiovascular technologists who contribute to quality cardiac care through clinical excellence, research, and ethical healthcare practice.

Mission

- Provide advanced knowledge and practical training in cardiovascular technology.
- Develop clinical, technical, and research skills for effective patient care.
- Promote ethical values, professionalism, and lifelong learning.
- Prepare students to support diagnosis and management of cardiovascular diseases using modern healthcare technologies.

Program Educational Objectives (PEOs)

Graduates will:

- Apply cardiovascular technology knowledge effectively in clinical practice.
- Assist in diagnostic and interventional cardiac procedures with competence.
- Demonstrate professional ethics, communication, and teamwork in healthcare settings.
- Participate in research and continuous professional development.
- Contribute to community health and cardiac care awareness.

Program Outcomes (POs)

Students will:

- Understand fundamental and advanced concepts of cardiovascular technology.
- Perform and assist in ECG, echocardiography, cath lab, and cardiac monitoring procedures.
- Analyze clinical data and support patient diagnosis and treatment.
- Apply knowledge of anatomy, physiology, pathology, and cardiac instrumentation.
- Follow infection control, patient safety, and ethical healthcare practices.
- Communicate effectively with patients, doctors, and healthcare teams.
- Utilize modern medical equipment and technologies efficiently.
- Demonstrate critical thinking and problem-solving abilities in clinical settings.
- Participate in research activities and evidence-based practice.
- Engage in lifelong learning and professional growth.

Program Specific Outcomes (PSOs)

Students can:

- Perform cardiovascular diagnostic procedures including ECG, Holter monitoring, echocardiography, and stress testing.
- Assist in cardiac catheterization, angiography, and interventional procedures.
- Operate and maintain cardiovascular equipment and monitoring systems.
- Recognize and manage cardiac emergencies with appropriate technical support.
- Apply clinical and technical skills in cardiac care units, cath labs, and related healthcare settings.

Course Outcomes (COs)

Students will:

- Understand basic and advanced cardiovascular science concepts.
- Assess cardiovascular parameters and interpret diagnostic findings.

- Apply knowledge in patient preparation, monitoring, and cardiac procedures.
- Interpret ECG, echocardiography, and related cardiovascular investigations.
- Follow safety standards, biomedical ethics, and infection control measures.
- Develop practical, technical, and professional skills required in cardiovascular technology.
- Support healthcare teams in delivering effective cardiac patient care.
- Demonstrate research aptitude and analytical skills in cardiovascular healthcare.

MALLA REDDY VISHWAVIDYAPEETH

SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

B.Sc. Cardiovascular Technology (Cath Lab)

COURSE STRUCTURE

I year I semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Human Anatomy - I	4	-	-	4	30	70	100
2		Human Physiology - I	4	-	-	4	30	70	100
3		Medical Bio-chemistry- I	3	-	-	3	30	70	100
4		Sociology	2	-	-	2	30	70	100
5		English and Communication Skills	2	-	-	2	30	70	100
6		Basic Computers	2	-	1	3	30	70	100
7		Human Anatomy - I Practical	-	-	2	2	30	70	100
8		Human Physiology - I Practical	-	-	3	3	30	70	100
9	VAC	Professionalisim and Values	1	-	-	1	100		
TOTAL			18	-	6	24	340	560	900

I year II semester

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C	MARKS		TOTAL MARKS
							INT	EXT	
1		Human Anatomy – II	4	-	-	4	30	70	100
2		Human Physiology - II	4	-	-	4	30	70	100
3		Microbiology	3		-	3	30	70	100
4		Pathology	2		-	2	30	70	100
5		Cardiac Instrumentation	4	-	-	4	30	70	100
6		Human Anatomy – II Practical	-	-	3	3	30	70	100
7		Human Physiology – II Practical	-	-	3	3	30	70	100
8	VAC	Health And Well-Being	1			1	100	-	100
		TOTAL	**18**		**6**	**24**	**310**	**490**	**800**

II year III semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Cardiac Anatomy and Physiology	4	-	1	5	30	70	100
2		ECG and Holter Monitoring	4	-	1	5	30	70	100
3		Introduction to Cardio vascular Technology	4	-	1	5	30	70	100
4		Cardiac Pathology	3	-	-	3	30	70	100
5		Clinical Postings - I	-	-	4	4	30	70	100
6	VAC	Stress Management	1	-	-	1	100	-	100
TOTAL			**16**		**7**	**23**	**250**	**350**	**600**

II year IV semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Ultrasound physics and Doppler Principles	4	-	1	5	30	70	100
2		Congenital Heart Disease I	4	-	1	5	30	70	100
3		Basics of Echocardiography and cardiac pacemakers	4	-	1	5	30	70	100
4		Medical ethics and legal aspects	3	-	-	3	30	70	100
5		Clinical Postings II	-	-	4	4	30	70	100
6	VAC	Environment awareness	1	-	-	1	100	-	100
TOTAL			**16**	**-**	**7**	**23**	**250**	**350**	**600**

III year – V semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Clinical applications of Echo	3	-	1	4	30	70	100
2		Myocardial, pericardial, Valvular and Ischemic Heart Diseases	3	-	1	4	30	70	100
3		Congenital heart disease - II	4	-	1	5	30	70	100
4		Clinical Postings III	-	-	4	4	30	70	100
5		Research Project and seminar			4	4		100	100
6	VAC	Interpersonal communication	1	-	-	1	100	-	100
TOTAL			**11**		**11**	**22**	**220**	**380**	**600**

III year – VI semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Community Medicine	3	-	1	4	30	70	100
2		Cardiac Cath and Intervention	3	-	1	4	30	70	100
3		Arrhythmia Management	3	-	1	4	30	70	100
4		Clinical Postings - IV	-	-	5	5	30	70	100
5		Research Methodology and Biostastics	2	-	-	2	30	70	100
6		Research Project and seminar	-	-	2	2		100	100
7	VAC	Soft skills development	1	-	-	1	100		100
TOTAL			**12**		**10**	**22**	**250**	**450**	**700**

IV Year Semester VII

Course Code	Course Title	L	P	C	L	T/P	Total	INT	EXT	Total
1	**Internship**	**2**	**20**	**22**	**30**	**900**	**930**	**-**	**100**	**100**
2	**Project Work**		**06**	**06**		**270**	**270**		**100**	**100**
3	**Total**	**2**	**26**	**28**	**30**	**1170**	**1200**	**-**	**200**	**200**

IV year/VIII semester

Course Code	Course Title	L	P	C	L	T/P	Total	INT	EXT	Total
1	**Internship**	**2**	**20**	**22**	**30**	**900**	**930**	**-**	**100**	**100**
2	**Project Work**		**06**	**06**		**270**	**270**		**100**	**100**
3	**Total**	**2**	**26**	**28**	**30**	**1170**	**1200**	**-**	**200**	**200**

1.1 Under Graduate Programme

Sl. No.	**Course**	**Duration**	**Eligibility for admission**
1	Bachelor of Cardiovascular Technology	4 years	Intermediate BiPC, vocational Physiotherapy (with bridge course), 10+2 with Physics, Chemistry and Biology or equivalent

1.2. Medium of Instruction:

English shall be the medium of instruction for all subjects of study and for examinations.

1.3. Duration of the Course

Duration details are mentioned under clause no. 1.1 of this booklet.

1.4 Examination Regulations

1.4.1 Attendance:

As per the MRV guidelines. 80% of attendance (physical presence) is mandatory for Theory and Practical of each subject

Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the closing of attendance before the final examination.

1.4.2 Internal Assessments:

(a) Internal Assessment (30 Marks): Two Internal Assessment Examinations shall be conducted during the semester, each carrying 30 marks.

(b)The marks obtained in each examination shall be proportionately converted to 10 marks, contributing a total of 20 marks. In addition,

(c) Continuous Assessment shall carry 10 marks, based on parameters such as assignments, quizzes, seminars, attendance, practical performance, and other academic activities.

(d)Thus, the total Internal Assessment shall comprise 30 marks (20 marks from the two Internal Assessment Examinations + 10 marks from Continuous Assessment).

The exam pattern of Internal Assessment is as follows

1. 10M X 1 =10M
2. 5M X 2 = 10M
3. 2M X 5 =10M

Total =30M

(e) Thus, a total of 30 marks for the internal examination. (10 + 10 + 10 = 30 marks). A candidate should secure a minimum of 40% marks in the internal assessment in each subject to be eligible to appear for the University examination

(f) For value added courses, only internal examination will be conducted. The minimum pass is 40% marks.

(g) The Internal Practical exam shall be conducted by internal faculty with following pattern

1. One Experiment (10M)
2. Spotters (10M)
3. Viva (10M)

Total 30M

(h) The Evaluation of clinical postings by internal faculty includes

1. Evaluation of log book

2. Viva

(i) For project/internship in 7th and 8th semesters, student is evaluated with the assessment of Dissertation/log book, Oral presentation and Viva.

1.4.3 University Examinations (External):

(a) University Examination shall be conducted at the end of every semester.

(b) A candidate who satisfies the requirement of 80 % attendance and 40% of internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.

(c) Examination will be of 3 hours duration (for theory).

(d) The exam pattern of External/University Examinations is as follows
1. 10M X 2 =20M (student has to attempt 2 questions out of 3)
2. 5M X 6 = 30M (student has to attempt 6 questions out of 8)
3. 2M X 10 =20M (student has to attempt all 10 questions)

Total 70M

(e) The External Practical exam shall be conducted by External faculty with following pattern

1. One Major experiment (20M)

2. One Minor Experiment (10M)

3. Spotters (20M)

4. Viva (20M)

Total 70M

(h) The Evaluation of clinical postings by External faculty includes

1. Evaluation of log book

2. Viva

1.4.4. Pass Criteria:

The minimum pass for internal assessment is 40% and for the University Examination is 50%. i.e., a student should score a total of 50% (adding the internal and external examination) to pass in each subject.

1.4.5. Promotion Criteria:

Students should clear all backlog subjects by the end of first year/second semester, to be eligible for promotion into second year/third semester
Newly Proposed Criteria: Student shall earn 80% credits by the end of 4th Semester to get promoted to 3rd Year

I year I semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Human Anatomy - I	4	-	-	4	30	70	100
2		Human Physiology - I	4	-	-	4	30	70	100
3		Medical Bio-chemistry- I	3	-	-	3	30	70	100
4		Sociology	2	-	-	2	30	70	100
5		English and Communication Skills	2	-	-	2	30	70	100
6		Basic Computers	2	-	1	3	30	70	100
7		Human Anatomy - I Practical	-	-	2	2	30	70	100
8		Human Physiology - I Practical	-	-	3	3	30	70	100
9	VAC	Professionalisim and Values	1	-	-	1	100		
TOTAL			18	-	6	24	340	560	900

Semester- I

HUMAN ANATOMY-I

(60 hours)

L/T/P/C

4/-/-/4

Learning Objectives

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

- Understand the basic concepts of general anatomy and histology.

- Describe the structure and functions of bones, muscles, joints, nerves, and blood vessels.
- Identify anatomical features of the upper extremity, thorax, and systemic organs.
- Explainthe anatomy of the cardiovascular and respiratory systems.
- Understand the arrangement and relations of major organs in the digestive, urinary, endocrine, and reproductive systems.
- Correlate anatomical knowledge with clinical and diagnostic applications.
- Develop skills in identifying anatomical structures using cadavers, models, charts, and

radiographs.
- Apply anatomical concepts in cardiovascular technology and allied health sciences.

Learning Outcomes

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

- Identify and describe major anatomical structures of the human body.
- Demonstrate understanding of musculoskeletal anatomy and movements.
- Explainthe anatomy of the heart, lungs, thoracic cavity, and major blood vessels.
- Recognize anatomical relationships relevant to clinical and cardiovascular procedures.
- Interpret basic anatomical features in radiological and clinical images.Apply anatomical knowledge in patient assessment and healthcare practice.
- Demonstrate competency in locating and identifying organs, muscles, nerves, and vessels during practical sessions.
- Integrate anatomical concepts with physiology and clinical cardiovascular technology applications.

COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy laysthe foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected material and radiographs are utilized to identify anatomical landmarks and configurations.

OBJECTIVES:

- The student should be able to identify & describe Anatomical aspects of muscles, bones,joints, their attachments & to understand and analyze movements.
- Application of knowledge of anatomy on the living (living anatomy).
- To identify and describe the course of peripheral nerves.
- To identify & describe various structures of the Cardio Vascular &Respiratory system andthe course of blood vessels
- Identify and describe various structures of Thoracic cage and mechanisms of Respiration
- Be able to apply knowledge of Living anatomy with respect to Cardio Vascular &Respiratory systemTo Obtain Knowledge of other systems & sensory organs

UNIT-I

GENERAL ANATOMYAND HISTOLOGY 12hrs

General Anatomy:

1. Fascia
2. Muscles
3. Bones
4. Joints
5. Vessels
6. Nerve

General Histology:

1. Epithelial
2. Connective tissue
3. Muscle
4. Bone and cartilage
5. Nerve and vessels
6. Embryology

UNIT-II 12hrs

UPPER EXTREMITY:

1. Osteology: Clavicle, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
2. Muscles: Origin, insertion, nerve supply and actions.

UNIT-III 12hrs

UPPER EXTREMITY:

1. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
2. Breast, pectoral region, axilla, cubital fossa, Arches of hand
3. Brachial plexus, nerves of upper extremity
4. Blood vessels and lymphatic drainage

UNIT-IV 14hrs

CARDIO VASCULAR & RESPIRATORY ANATOMY

1. Thoracic wall
2. MediastinumHeart: Anatomy of heart, blood Supply, nerve supply, conducting System and major blood vessels
3. Lungs: Anatomy of lungs, bronchial tree, pleura, Broncho pulmonary segments, blood Supply and nerve supply
4. Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.
5. Intercostal muscles: and Accessory muscles of Respiration: Origin, insertion, nerve supply and action
6. Ribs and sternum

UNIT-V 10hrs

SYSTEMIC ANATOMY

1. **Digestive system:**
    - List the parts of the digestive system
    - Anatomy of stomach, liver, gall bladder, spleen, pancreas, intestines.
2. **Urinary system:**
    - Anatomy of kidney, urinary bladder
3. **Endocrine system:**
    - Position and hormones secreted by each organ
4. **Genital system:**
    - Male organs and female organs

RECOMMEMDED TEXT BOOKS

1. Human Anatomy – Snell
2. Anatomy- Chaurasia, Volume- I,II & III
3. Neuro anatomy -- Inderbir Singh
4. Human Anatomy – Kadasne, Volume- I,II & III
5. Neuroanatomy -- Vishrsam Singh
6. Human Anatomy – Datta

HUMAN PHYSIOLOGY-I

(60 hours)

L/T/P/C
4/-/-/4

Learning Objectives

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

1. Understand the basic physiological mechanisms of the human body and maintenance of homeostasis.
2. Describe the structure and functions of blood, nerve, muscle, cardiovascular, and respiratory systems.
3. Explain the physiological principles involved in muscle contraction and neural transmission.
4. Understand the regulation of cardiac output, blood pressure, and respiration.
5. Analyze physiological responses to exercise, stress, and environmental changes.
6. Develop basic clinical skills related to physiological assessment and interpretation.

Learning Outcomes

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

1. Explain normal physiological functions of major body systems.

2. Demonstrate understanding of cardiovascular and respiratory physiology in clinical practice.
3. Interpret basic physiological parameters such as pulse, blood pressure, and respiratory rate.
4. Apply physiological concepts in understanding exercise and body responses.
5. Correlate physiological mechanisms with common clinical conditions.
6. Perform and interpret basic physiology practical procedures with accuracy.

COURSE DESCRIPTION:

The course is designed to study the function of the human body at the molecular, cellular, tissue and systems levels. The major underlying themes are; the mechanisms for promoting homeostasis, cellular processes of the metabolism, membrane function and cellular signaling; the mechanisms that match supply of nutrients to tissue demands at different activity levels; the mechanisms that match the rate of excretion of waste products to their rate ofproduction; the mechanisms that defend the body against injury and promote healing.

These topics address the consideration of nervous and endocrine regulation of the cardiovascular, hematopoietic, pulmonary, renal, gastro-intestinal and musculoskeletal systems including the control of cellular metabolism. The course stresses on the integrative nature of physiological responses in normal function and disease. This course will serve as a pre-requisite/foundation for the furthercourses i.e. Exercise physiology or Pathology

OBJECTIVES:

At the end of the course, the candidate will:

1. Acquire the knowledge of the relative contribution of each organ system in maintenance of the Milieu Interior (Homeostasis)
2. Be able to describe physiological functions of various systems, with special reference to Musculo-skeletal, Cardio-respiratory,
3. Analyze physiological response & adaptation to environmental stresses- with specialemphasis on physical activity, altitude, temperature
4. Acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, Cardiovascular & Respiratory system, & Exercise tolerance / Ergography

SYLLABUS

UNIT – I

14 hrs

GENERAL PHYSIOLOGY

Cell:

1. **Structure of cell membrane**
   a) Fluid mosaic model
   b) Lipid bi-layer
   c) Functions of cell membrane
2. **Transport across cell membrane**

A. Basic mechanism of transport

a) Channel proteins
b) Carrier proteins

B. Methods of transport

a) Passive transport
b) Active transport

3. **Body fluids**
   a) Intracellular fluid
   b) Extracellular fluid
   c) Body electrolytes
   d) Regulation of body fluid volume
4. **Homeostasis**
   a) Regulation of body function
   b) Homeostatic regulatory mechanism **BLOOD:**

1. **Composition of blood & it's volume**
2. **Plasma**
3. **Hemopoiesis**
   a) Composition
   b) Plasma protein
4. **Erythrocytes**
   a) Normal count
   b) Structure of RBC (shape & size)
   c) Functions of RBC
   d) Hemoglobin (Normal Value, Fate, Function)

e) Anemia & polycythemia

f) ESR & PCV

5. **Leukocytes**

a) Classification

b) Functions of leukocytes

6. **Platelets**

a) Normal count

b) Functions of thrombocytes

c) Blood Coagulation

d) Bleeding time & clotting time

7. **Blood group**

a) ABO system

b) Landsteiner's law

c) ABO incompatibility

d) Rh system

e) Rh incompatibility & erythroblastosis fetalis

f) **Blood transfusionCollection & storage of blood**

g) Precautions

h) Cross matching

i) Hazards of blood transfusion **Nerve:**

1. **Structure of a neuron**
2. **Classification of neurons**
3. **Electrical activity of neuron**
   a) Resting membrane potential
   b) Action potential
4. **Propagation of nerve impulse**
5. **Properties of nerve fibers**
6. **Neuroglia - Types & functions**
7. **Nerve injury**
   a) Types of nerve injury
   b) Effect of nerve injury
   c) Regeneration of damaged nerve fiber

UNIT – II

10 Hours

MUSCLE PHYSIOLOGY

1. **Classification**

2. **Properties of skeletal muscle**
3. **Structure of skeletal muscle**
    a) Sarcomere
    b) Sarcotubular system
    c) Neuromuscular junction & disease affecting it
4. **Excitation-Contraction coupling**
5. **Mechanism of muscle contraction**
6. **Functions of skeletal muscle**
7. **Types of muscle contractions**
8. **Red & white muscles**
9. **Rigor mortis, muscular dystrophy, altered muscle tone, muscle cramp, atrophy, EMG**

UNIT – III

12 Hours

CARDIOVASCULAR SYSTEM

1. **Structure of heart & blood vessels**
2. **Properties of cardiac muscle**
3. **Origin & spread of cardiac impulse**
4. **Cardiac cycle & heart sounds**
5. **Cardiac output**
    a) Related terms
    b) Regulation of cardiac output
    c) Circulatory shock
6. **Pulse & Heart rate and it's regulation**
7. **Blood pressure**
    a) Definitions
    b) Factors controlling & influencing BP
    c) Regulation of BP
8. **Regional circulation**
    a) Coronary circulation
    b) Cerebral circulation
9. **Normal ECG.**

UNIT – IV

12 Hours

RESPIRATORY SYSTEM

1. **Introduction, structure & function of RS**
    a) Upper respiratory tract
    b) Lower respiratory tract
    c) Respiratory membrane
2. **Mechanism of breathing**
    a) Mechanics of breathing
    b) Respirstory pressure change
    c) Compliance
    d) Surfactant
3. **Respiratory volumes & capacities**
4. **Pulmonary ventilation & Dead space**
5. **Transport of respiratory gasesNervous & chemical regulation of respiration**
6. **Pulmonary function test - direct & indirect method**
7. **Physiological changes with altitude & acclimatization**

UNIT – V

12 Hours

EXERCISE PHYSIOLOGY

1. Basal Metabolic Rate & Respiratory Quotient
2. Energy metabolism
3. Fatigue
4. Oxygen debt
5. Acute cardiovascular changes during exercise; difference between mild, moderate & severe exercise.
6. Concept of endurance
7. Acute respiratory changes during exercise
8. Concept of training/conditioning; effects of long-term exercise/training on the CVS & RS
9. Body temperature regulation during exercise
10. Hormonal & metabolic effects during exercise
11. Exercise for muscle strength, power, endurance and there effects on it. Physical fitness & its components

RECOMMENDED TEXT BOOKS

1. Textbook on Medical Physiology –Guyton
2. Textbook of Physiology –A K Jain (for MBBS students)

3. Human Physiology - C.C. Chatterjee

4. Essentials of Medical Physiology - Sembulingam, K.

5. Comprehensive Textbook of Medical Physiology : Vol - 1 & 2 - Pal, Gopal Krushna
6. Physiology: Prep Manual For Undergraduates - Joshi, Vijaya D.

7. Practical Physiology - Joshi, Vijaya D.

MEDICAL BIOCHEMISTRY

(60 hours)

L/T/P/C

4/-/-/4

Learning Objectives

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

1. Understand the structure, classification, and functions of carbohydrates, lipids, proteins, and nucleic acids.
2. Explainthe role of enzymes, vitamins, and minerals in normal body metabolism.
3. Describe the biochemical pathways involved in carbohydrate, lipid, and protein metabolism.
4. Understand the composition and functions of blood and urine constituents in clinical biochemistry.
5. Correlate biochemical processes with normal physiology and disease conditions.
6. Develop basic knowledge of laboratory biochemical investigations and their clinical significance.

Learning Outcomes

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

1. Classify and explain the biochemical importance of biomolecules in the human body.
2. Describe metabolic pathways and their role in energy production and utilization.
3. Interpretthe clinical significance of enzymes, vitamins, and mineral deficiencies.
4. Analyze normal and abnormal biochemical constituents in blood and urine.
5. Correlate biochemical alterations with common clinical disorders.
6. Apply biochemical knowledge in laboratory diagnosis and healthcare practice.

UNIT- I

12 Hours

CARBOHYDRATE CHEMISTRY

- Definition, general classification with examples
- Composition and functions of Monosaccharides, Disaccharides and Polysaccharides
- Anomers, Epimers, Enantiomers, Mutarotation
- Glycosaminoglycans (mucopolysaccharides)

LIPID CHEMISTRY

- Definition, classification with examples.
- Classification and Functions of Fatty acids, Phospholipids, Lipoproteins
- Structure and functions of Cholesterol
- Sources and functions of Ketone bodies

UNIT-II 12 Hours

AMINO ACID CHEMISTRY

- Definition, Classification of amino acids with examples.
- Definition, Classification of proteins with examples
- Structural organization of proteins
- Biologically important peptides

NUCLEIC ACIDS AND NUCLEOTIDE CHEMISTRY

- Composition and Functions of Nitrogen bases, Nucleosides, Nucleotides
- Structure and Functions of DNA
- Structure, Types and Functions of RNA
- Differences between DNA and RNA

UNIT-III 12 Hours

ENZYMES

- Definition, Classification of enzymes with examples
- Active site, Enzyme specificity.
- Factors affecting enzyme activity
- Enzyme inhibition
- Isoenzymes and their clinical significance - LDH, Creatine kinase, ALP

VITAMINS

- Definition, Classification
- Fat soluble Vitamins- Sources, RDA, Functions and Deficiency.
- Water soluble Vitamins - Sources, RDA, Functions and Deficiency.

UNIT-IV 12 Hours

INTERMEDIARY METABOILISM

- Glycolysis
- TCA cycle
- β-oxidation of fatty acids (Palmitic acid)
- Ketone body formation and utilization
- Urea cycle

UNIT-V 12 Hours

MINERAL METABOLISM

- Definition, Classification. Sources, RDA, Functions and Deficiency of Calcium, Phosphorous, Iron, Sodium,Potassium

CLINICAL BIOCHEMISTRY

Normal and abnormal constituents of Urine and Blood and their clinical significance:

Normal constituents:

Organic: Urea, Uric acid, Creatinine

Inorganic: Ca, phosphate, chloride, electrolytes

Abnormal constituents:

Glucose, Ketone bodies, Protein, Blood, Bile salts, Bile pigments

RECOMMENDED BOOKS

1. Essentials of Biochemistry by U.Satyanarayana.
2. Text book of Biochemistry for Medical students. DM Vasudevan
3. Integrated textbook of Biochemistry Volume –I and II. Indumathi.
4. Text book of Biochemistry for Medical students. M N Chatterjee and Rana Shinde.
5. Harper's Illustrated Biochemistry.
6. Essentials of Biochemistry. Pankaja Naik

SOCIOLOGY

(30 hours)

L/T/P/C
2/-/-/2

Learning Objectives

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

1. Understand the basic concepts, principles, and scope of sociology.
2. Explainthe role of social factors in health, illness, and healthcare delivery.
3. Describe the structure and functions of family, community, and social groups.
4. Understand the influence of culture, socialization, and social change on health behavior.
5. Identify major social problems affecting individuals and communities.
6. Develop communication and interpersonal understanding required for healthcare practice.

Learning Outcomes

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

1. Explain sociological concepts related to health and society.
2. Analyze the impact of social and cultural factors on health and disease.
3. Demonstrate understanding of family and community roles in healthcare.
4. Identify social problems and their influence on public health.
5. Apply sociological knowledge in patient care and healthcare communication.
6. Exhibit professional and socially responsible behavior in healthcare settings.

SUBJECT DISCRIPTION: Sociology will introduce student to the basic sociology concepts, principles and social process, social institutions in relation to the individual, family and

community and the various social factors affecting the family in rural and urban communities in India will be studied.

UNIT 1 6 Hours

1. Introduction:

a. Meaning- Definition, Nature and Scope of Sociology
b. Methods of Sociological Investigations, Case Study, Social Survey, Questionnaire and Interview methods.
c. Importance of its study with special reference to Health Care Professionals.

2. Social Factors in health and disease situations:

a. Role of Social factors in health
b. Role of social factor in illness
c. Decision making in taking treatment

UNIT-2 6 Hours

1. Socialization:

a. Definition and Meaning of Socialisation
b. Primary, Secondary and Anticipatory socialisation
c. Agencies of Socialisation

2. Social Groups:

a. Definition and Features of Social Group
b. Primary Social Group
c. Secondary Social Group
d. The role of Primary and Secondary Groups in Hospitals.

UNIT-3 6 Hours

1. Family:

a. The family, meaning and definition
b. Functions of family
c. Changing family patterns
d. Influence of Family on the individuals health, the effects of sickness in the family.

2. Community:

a. Rural community: meaning and features- Health problems of rural community.
b. Urban community: meaning and features – Health problems in urbanities.

UNIT-4 6 Hours

1. Culture and Health:

a. Concept of Health
b. Concept of Culture
c. Cultural factors affecting Health and diseases

2. Social Change:

a. Meaning of social change
b. Factors of social change
c. Human adaptation and social change
d. Social planning and Health

UNIT-5 6 Hours

1. Social Problems:

a. Population explosion
b. Juvenile delinquency
c. Alcoholism
d. Unemployment
e. Poverty
f. Problems of women

2. Social Security:

Social security and social legislation

Recommended Books:

1. Principles of sociology---------- C.N. Shankar Rao
2. Sociology for physiotherapy students ------- K.P Neeraja

ENGLISH AND COMMUNICATION SKILLS

(30 hours)

L/T/P/C
2/-/-/2

Learning Objectives

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

1. Develop effective reading, writing, listening, and speaking skills in English.
2. Improve grammatical accuracy and vocabulary related to healthcare communication.
3. Enhance professional communication skills required in clinical and academic settings.
4. Learn techniques for formal writing including letters, emails, reports, and essays.
5. Develop confidence in interpersonal communication and public speaking.
6. Understand the importance of empathy, listening, and professional behavior in healthcare communication.

Learning Outcomes

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

1. Communicate effectively in academic, professional, and healthcare environments.
2. Use appropriate grammar, vocabulary, and medical terminology in communication.
3. Draft formal letters, emails, reports, and professional documents accurately.
4. Demonstrate effective listening and speaking skills during patient and team interactions.

5. Participate confidently in discussions, presentations, and role plays.
6. Apply interpersonal and communication skills in patient care and healthcare teamwork.

Course Objectives:

- To enhance the lexical and grammatical skills of the learners.
- To develop reading competencies for academic and professional requirements.
- To write effectively to meet professional needs.
- To hone speaking and listening skills.
- To enhance empathy and other vital interpersonal skills of the learners

UNIT 1: Sympathy (Poem) by Charles Mackay	6 Hours
Reading - Reading and its importance, techniques of effective reading. Writing - Paragraph Writing (Topic sentence, Supporting sentences, and Conclusion) Grammar - Parts of Speech (Parsing), Articles Vocabulary - Pain and Symptoms, and Common Illness **ELCS LAB** CALL LAB: Phonetics - Vowel Sounds (Monophthongs and Diphthongs) Listening - Introduction to listening, Purpose of Listening, and Barriers to effective listening ICS LAB: Speaking - Self-introduction and Introducing others, JAM	

UNIT 2: A Birthday Letter by Jawaharlal Nehru	6 Hours
Reading - Skimming and Scanning Writing - Letter writing (Requests, Leave applications, Purchase letters, Letters in correspondence with medicalinsurance companies) Grammar - Phrase, Clause and Sentence; Prepositions Vocabulary - Body parts and diseases, Definitions / One-word substitutes **ELCS LAB** CALL LAB: Phonetics - Consonant Sounds Listening - Listening for gist and specific information ICS LAB: Speaking - Small talk, Narration of anecdotes	
UNIT 3: The secret of work by Swami Vivekananda	6 Hours

Reading - Making inferences and predictions
Writing - E-mail writing
Grammar - Tenses, Reported speech
Vocabulary - Food and lifestyle, Instruments and Equipment

ELCS LAB

CALL LAB: Intonation
Listening - Listening and identifying facts and opinions
ICSLAB: Speaking - Role Plays (OET) (Giving and taking instructions, Interacting with and explaining processes, conditions and instructions to the patients and their attenders,

UNIT 4: All the world's a stage (Poem) by William Shakespeare	6 Hours

Reading - Reading for explicit and implicit meaning
Writing - Short essays: 2-Paragraph Essay, Thesis Statement
Grammar - Subject-Verb agreement, Degrees of Comparison
Vocabulary - Caring and Emotions, Medical Abbreviations and Acronyms

ELCS LAB

CALL LAB: Consonant Clusters
Listening - Listen- Comprehend - Speak , Health Care
ICSLAB: Speaking - Formal Discussions, Physical Description/Personality

UNIT 5: Sister Nivedita: Calcutta's Angel of Mercy (Article/Essay) by Monidipa Dey	6 Hours

Reading - Intensive and Extensive Reading, Reading comprehension passages from OET and IELTS
Writing - Report writing (Analyzing tests and Reporting patient condition)
Grammar – Voice, If conditionals
Vocabulary - Health, Hygiene and Wellness, Medical Vocabulary/Terminology

ELCS LAB

CALL LAB: Past Tense Markers and Plural Markers
Listening - Listening tasks from OET and IELTS
ICS LAB: Speaking - Conversation practice, Short oral presentations specifying the condition of the patient

COURSE OUTCOMES:

- Construct grammatically correct sentences with appropriate vocabulary.
- Analyze, interpret and synthesize a diverse range of profession-specific concepts through better comprehension of the text.
- Draft various types of written communication pieces useful to their professional lives.

- Understand and apply norms of scientific communication, soft skills and positive interpersonal communication.
- Listen effectively and speak fluently in formal and informal situations, especially in their workplace.

TEXTBOOK:

1. English for nurses by Vijaya Laxmi Naidu. Nirali Prakashan. 2008.

REFERENCE BOOKS:

1. Practical English Usage by Michael Swan. OUP. 1995.
2. On Writing Well by William Zinsser, Harper Resource Book. 2001.
3. Cambridge English for nursing by Virginia Allum and Patricia Mc Garr. CUP. 2010.
4. English for nursing by Ross Wright and Bethany Cagnol. Pearson. 2001.
5. English for nursing-2 by Maris Spada Symonds and Ross Wright. Pearson. 2001.
6. Everyday English for International nurses by Joy Parkinson and Chris Brooker. Elsevier. 2004.
7. Oxford English for career Nurses by Tony Grice. Oxford University Press. 2007.

BASICS OF COMPUTERS

(30 hours)

L/T/P/C
2/-/1/3

Learning Objectives

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

1. Understand the basic concepts, components, and functions of computers.
2. Learn the use of MS Word, MS Excel, and MS PowerPoint for academic and professional purposes.
3. Understand computer networks, internet applications, and email communication.
4. Develop skills in data entry, document preparation, and presentation creation.
5. Gain basic knowledge of artificial intelligence and machine learning applications in healthcare.
6. Apply computer knowledge for efficient management of healthcare and clinical information.

Learning Outcomes

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

1. Identify and explain the basic hardware and software components of computers.
2. Create and manage professional documents, spreadsheets, and presentations using MS Office tools.
3. Utilize internet resources, email services, and search engineseffectively.
4. Apply computer applications in data organization and healthcare documentation.
5. Demonstrate understanding of computer networking and digital communication systems.
6. Explainthe role of artificial intelligence and machine learning in modern healthcare systems.

COURSE OBJECTIVES:

1. To understand all components of computer, different working environments and operations ofcomputer.
2. To learn creating different types of word documents, MS Excel manipulations, Power pointdocuments.
3. To understand basic requirements of computer network hardware, software and itsnetwork architecture.

UNIT – I

6 Hours

Introduction to computers--Definition of Computer-Characteristics of computer-Components of Computer Hardware – Input & Output devices- Memories– RAM and ROM– MB, GB their conversions – Software : Application Software and Systems software- Data and Information –Different computer languages- Number systems- Binary and decimal conversions.

UNIT – II

6 Hours

MS WORD: Typing text in MS Word– Manipulating text¬– formatting text–using different font sizes, bold, italic– bullets and numbering –Pictures, Aligning the text and justify– choosing paper size– adjusting margins– header and footer, inserting page no's in a doc– printing a file with options– using spell check and grammar– find and replace– mail merge – insert tables in a document.

UNIT – III

6 Hours

MS EXCEL: Creating MS Excel-Cell editing, using formulas and functions, manipulating data with excel– using sort function to sort numbers and alphabets– drawing graphs and charts using data in excel.

MS POWERPOINT: Slide transition andanimation-slides with sounds– inserting clip arts– Pictures, tablesand graphs.

UNIT – IV

6 Hours

Introduction to Computer Networks: Introduction, Computer Network Devices(Hubs, Switches, Routers, Gateway, Bridge, Modems, Wireless Access Points, Firewalls & NIC), Types of computer Networks (LAN, MAN & WAN), Network Topologies (Star, Ring, Mesh, Tree, Hybrid Topologies), Internet Based Applications, Advantages & Disadvantages of Computer Networks, E-Mail, Components of E-Mail, Attaching Files in E-mail, Different Search Engines.

UNIT – V

6 Hours

Introduction to Artificial Intelligence & ML: History of AI, Sub Areas of AI, Applications of AI in Healthcare, Benefits of AI in Health Care, Challenges of AI in Healthcare, Introduction to MachineLearning, Applications of Machine Learning, Machine Learning Algorithms, Real world Machine Learning Use Cases.

COURSE OUTCOMES:

At the end of the course the student will be able

1. To understand peripherals of the computer how it works and understand various languages ofthe computer.
2. To create any kind of presentations for presenting their knowledge anywhere in the form ofdocument or ppt.
3. To create excel sheetsto save data and process the data efficiently.
4. To understand basic requirements of computer network hardware, software and itsnetwork architecture.

REFERENCES:

1. Computer Fundamentals by Goel, Anita Pearson
2. Computer Fundamentals : Concepts, Systems & Applications- 8th Edition by Priti Sinha, PradeepK., Sinha
3. MS-Office 2010 Training Guide by Prof. Satish Jain, M. Geetha
4. Computer Networks, Andrews S Tanenbaum, 5th Edition, Pearson Education
5. Artificial Intelligence : Amodern Approach, Stuart J. Russell and Peter Norvig, Third Edition, PearsonEducation
6. Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurelien Geron-Oreilly, 2ndEdition.

HUMAN ANATOMY - I Practical

L/T/P/C
-/-/2/2

Human anatomy practicals for physiotherapy students are essential for understanding the structure of the human body, its systems, and their functional relationships. These practicals focus on giving students hands-on experience in identifying anatomical structures, learning dissection techniques, and understanding the musculoskeletal, nervous, and cardiovascular systems, all of which are vital for effective physiotherapy practice.

GROSS SPECIMENS/SPOTTERS

Upper Extremity

1. Identify the **spotter**- (Cross section of shoulder Joint, Elbow Joint, Wrist complex,Hand)
2. Identify the bone- UPPER EXTREMITY BONES (Scapula, Clavicle, Humerus, Radius and Ulna, Carpals, Metacarpals and Phalanges) Including side determination
3. **Surface Anatomy of the Upper Extremity** – UPPER EXTREMITY BONES AND MUSCLES

4. Myology- **(cadaveric spotter)** Spotters of the upper extremity muscles including the origin, insertion, blood and nerve supply
5. Spotters of Blood vessels (Profunda Brachii, Brachial, Radial, Ulnar)
6. Spotter of Nerves (Axillary, Musculocutaneous, Radial, Median, Ulnar)

Structure and Parts of the Breast- Spotter

Cardio-vascular and Respiratory Anatomy

1. Gross Specimen of Heart, Lung
2. Spotters of Bronchial tree, Bronchopulmonary segments
3. Myology- (Diaphragm, Intercoastal muscles and Accessory Muscles)

Systemic Anatomy

1. Gross Specimen/Spotter (Stomach, Liver, Gall Bladder, Spleen, Pancreas, Intestines,Kidney, Uterus)
2. Cross section of Kidney
3. Spotters of Glands- (Pituitary Gland, Thyroid gland, Adrenal gland, Parathyroid, Pineal Gland)

HUMAN PHYSIOLOGY - I Practical

L/T/P/C
-/-/3/3

These practicals typically align with the theoretical aspects of physiology and help students apply concepts to real-world clinical scenarios. Key Areas Covered in Human Physiology for this semester includes the following.

1. Determination of blood group
2. Estimation of haemoglobin concentration
3. Peripheral pulse determination
4. Auscultation of Heart sounds
5. Determination of blood pressure
6. Auscultation of breathe sounds
7. Assessment of respiratory rate
8. Anthropometric assessment (BMI & WHR)

PROFESSIONALISM AND VALUES

L/T/P/C

1/-/-/1

Course Description:

This course is designed to provide students with the foundational knowledge and skills required to demonstrate professionalism in a variety of workplace settings. Topics will include communication, ethics, accountability, time management, problem-solving, conflict resolution, and maintaining a positive and effective work ethic. Students will engage in practical activities that promote personal and professional growth.

Course Objectives:

By the end of thiscourse, students will:

- Understand the key elements of professional behavior in the workplace.
- Demonstrate effective communication, both verbal and non-verbal, in a professional environment.
- Learn to manage time effectively and handle workplace challenges with a positive attitude.
- Cultivate emotional intelligence and adaptability in professional settings.
- Understand workplace ethics, integrity, and how to make ethical decisions.
- Develop skills for conflict resolution and teamwork in diverse work environments.

Unit 1

Introduction to Professionalism

What is professionalism?

Characteristics of a professional: Appearance, behaviour, and attitude The importance of professional ethics and integrity

Unit 2

Effective Communication in the Workplace

Verbal and non-verbal communication Active listening and responding Communicating across cultures

Unit 3

Workplace Etiquette and Networking Social etiquette in the workplace Networking best practices

Building relationships with colleagues, managers, and clients

Unit 4

Time Management and Organization

Prioritizing tasks and setting goals

Managing deadlines and avoiding procrastination Tools and techniques for effective time management

Unit 5

Accountability and Reliability

Taking responsibility for your actions

Being reliable and dependable in the workplace How accountability affects professional reputation

Unit 6

Problem Solving and Decision Making

Approaches to critical thinking and decision-making Strategies for solving workplace problems effectively The role of creativity and innovation in problem-solving

Unit 7

Teamwork and Collaboration

Working with diverse teams

Building trust and collaboration in teams Managing team conflictsand maintaining harmony

Unit 8

Conflict Resolution and Handling Difficult Conversations

Understanding conflict dynamics

Techniques for resolving conflicts professionally Role-playing difficult conversations in the workplace

Unit 9

Ethical Dilemmas in the Workplace

Recognizing ethical challenges

Making decisions based on ethical principles The role of transparency and honesty

Unit 10

Building Emotional Intelligence and Adaptability What isemotional intelligence and why does it matter? Developing self-awareness and self-regulation Adapting to changing work environments

Assessment and Evaluation:

Class Participation :20

Assignments/ case study presentations: 30 Final: 50

Reference Textbook

a. Professionalism: Skills for Workplace Success" by Deborah C. Dillon
b. The Professional Workplace: The Skills You Need to Succeed" by Ronald W. Holmes

I year II semester

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C	MARKS		TOTAL MARKS
							INT	EXT	
1		Human Anatomy – II	4	-	-	4	30	70	100
2		Human Physiology - II	4	-	-	4	30	70	100
3		Microbiology	3		-	3	30	70	100
4		Pathology	2		-	2	30	70	100
5		Cardiac Instrumentation	4	-	-	4	30	70	100
6		Human Anatomy – II Practical	-	-	3	3	30	70	100
7		Human Physiology – II Practical	-	-	3	3	30	70	100
8	VAC	Health And Well-Being	1			1	100	-	100
		TOTAL	**18**		**6**	**24**	**340**	**560**	**900**

Semester- II

HUMAN ANATOMY – II

(60 hours)

L/T/P/C
4/-/-/4

Learning Objectives

1. Understand the anatomy ofthe lower extremity, vertebral column, pelvis, head, neck, and nervous system.
2. Describe the structure and functions of bones, muscles, joints, nerves, and blood vessels of the lower limb.
3. Explainthe anatomy of the vertebral column and pelvic girdle with clinical relevance.
4. Understand the gross anatomy of the brain, spinal cord, cranial nerves, and sensory organs.
5. Correlate neuroanatomy with functional and clinical applications.
6. Develop practical skills in identifying anatomical structures using cadavers, models, and radiographs.

Learning Outcomes

1. Identify and describe anatomical structures of the lower extremity and vertebral column.
2. Explainthe organization and functions of the nervous system and cranial nerves.
3. Correlate anatomical knowledge with movement, posture, and clinical conditions.
4. Interpretanatomical structures in radiological and clinical images.
5. Demonstrate competency in identifying neuroanatomical and musculoskeletal structures during practical sessions.
6. Apply anatomical knowledge in clinical and cardiovascular technology practice.

COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy laysthe foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected material and radiographs are utilized to identify anatomical landmarks and configurations.

Objectives:

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

- Identify & describe Anatomical aspects of muscles, bones,joints, their attachments & to understand and analyze movements.
- Apply the knowledge of anatomy on the living (living anatomy).
- Identify and describe the course of peripheral nerves and blood vessels
- Obtain Knowledge of other systems & sensory organs

SYLLABUS

UNIT-I

12 Hours

LOWER EXTREMITY:

1. Osteology including features, side determination, muscular attachment, clinical and applied anatomy of the following lower extremity bones

   Innominate bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.

2. Myology: Origin, insertion, nerve supply, action, function, clinical and applied anatomy
   - Anterior compartment of thigh, Medial compartment and Posterior compartment
   - Gluteal Region
   - Anterior aspect of leg, medial and lateral aspect, Posterior aspect of leg
   - Dorsum of foot

UNIT-II

2 Hours

LOWER EXTREMITY:

1. Arthrology: Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography
2. Hip Joint, Knee joint, Ankle joint, joints of the foot.
3. Femoral triangle, femoral canal and inguinal canal, Adductor canal, popliteal fossa, arches of foot
4. Lumbar plexus, Sacral plexus, Nerves of the Lower Extremity including cutaneous Nerves
5. Blood vessels and lymphatic drainage

UNIT-III

12 Hours

VERTEBRAL COLUMN AND PELVIC GIRDLE:

1. Atypical and typical vertebra
2. Structure and features of Cervical, thoracic, lumbar, sacral and coccygeal vertebrae
3. Origin, insertion, nerve supply and actions of pre and para vertebral muscles
4. Muscles of Trunk and Abdomen
5. Core muscle Anatomy
6. Joints of vertebral column, structure and composition of intervertebral disc including the Radiography Evaluation
7. Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography of Sacro- Iliac joint
8. Structure of Innominate bone Pelvic girdle and muscles of the pelvic floor including Applied Anatomy

UNIT-IV

10 Hours

HEADAND NECK:

1. Bones of the skull and face
2. Muscles of the face and neck
3. Triangles of the neck
4. Gross anatomy of eyeball, nose, ears and tongue

UNIT-V

1 4 Hours

NEURO ANATOMY:

1. General organization of Nervous System
2. Central Nervous System-Gross structure of Brain and Spinal Cord
3. Diencephalon- Gross structure of Thalamus, Hypothalamus and Basal Ganglia
4. Meninges and Coverings of spinal cord

5. Cerebro-Spinal Fluid and ventricles of brain
6. Spinal Cord- Segmental features, Laminae, Nuclei, Tracks of spinal cord
7. Spinal nerves, nerve root ganglia
8. Blood supply to brain and spinal cord with clinical and applied anatomy
9. Peripheral Nervous system
10. Cranial nerves- Course and applied AnatomNeuromuscular junction

RECOMMEMDED TEXT BOOKS

1. Human Anatomy – Snell
2. Anatomy- Chaurasia, Volume- I,II & III
3. Neuro anatomy -- Inderbir Singh
4. Human Anatomy – Kadasne, Volume- I,II & III
5. Neuroanatomy -- Vishrsam Singh
6. Human Anatomy – Datta

HUMAN PHYSIOLOGY-II

(60 hours)

L/T/P/C
4/-/-/4

Learning Objectives

1. Understand the physiology of the nervous, endocrine, reproductive, gastrointestinal, and excretory systems.
2. Explainthe mechanisms of sensory and motor functions in the nervous system.
3. Describe the physiology of special senses including vision, hearing, taste, and smell.
4. Understand hormonal regulation and functions of endocrine glands.
5. Explain reproductive physiology, pregnancy, and lactation.
6. Develop understanding of renal physiology, digestion, and fluid-electrolyte balance.

Learning Outcomes

1. Explain physiological functions of the nervous and endocrine systems.
2. Interpret mechanisms involved in sensory perception and motor control.
3. Describe hormonal regulation and reproductive physiology.
4. Apply physiological concepts to understand gastrointestinal and renal functions.
5. Correlate physiological mechanisms with common clinical disorders.
6. Perform and interpret basic physiology practical examinations accurately.

COURSE DESCRIPTION

The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions in the human body. The major topics covered include the following: Nervous system, special senses, reproductive system, endocrine system, gastrointestinal and excretory.

Objectives:

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

- Describe physiological functions of various systems, with special reference to nervous system

- Acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, special senses.

SYLLABUS

UNIT-I

12 Hours

NERVOUS SYSTEM-I

1. Introduction to nervous system - CNS, PNS and ANS
2. Neurotransmitters - Definition, fate of neurotransmitter, types
3. Synapse - Definition, type, structure, transmission of impulse across a synapse, properties.
4. Receptors and Sensation - Types of sensations, Classification of receptors, properties
5. Sensory System - Organization of the sensory system, sensory Homunculus
6. Ascending Tracts - Definitions, Neuronal composition of ascending tracts, dorsal column, anterolateral tract
7. Pathophysiology of pain - Definitions, hyperalgesia and allodynia, deep pain, referred pain and it's theories, management of chronic pain, endogenous opioid analgesic system
8. Motor Cortex - Cerebrum, cortical areas of brain, motor homunculus, cerebral dominance, connections, mapping the functional areas of brain
9. Descending Tracts - Pyramidal system, extrapyramidal system

UNIT-II

12 Hours

NERVOUS SYSTEM-II

1. Spinal cord - Introduction, effects of complete transection of the spinal cord, effects of hemisection of the spinal cord(Brown-Sequard Syndrome)
2. Reflexes - Reflex action, reflex arc, classification, properties, types - conditioned reflex, stretch reflex, inverse stretch reflex, withdrawal reflex, crossed extensor reflex, superficial reflexes(Plantar & Abdominal)
3. Connections, Functions and applied aspect of thalamus, hypothalamus, cerebellum, basal ganglia
4. Regulation of tone, Posture and it's reflexes, Equilibrium and vestibular apparatus
5. Limbic system, Reticular Activating System, Sleep and it's types, sleep disorders, Electroencephalogram (EEG)
6. Higher Functions - Learning, Memory, Speech
7. Autonomic Nervous System - Sympathetic division, Parasympathetic division, control of autonomic functions
8. Cerebrospinal fluid - Formation and circulation, composition and properties, functions, applied aspect - Hydrocephalus, lumbar puncture

UNIT-III

12 Hours

SPECIAL SENSES:

1. Vision - Anatomy of eye, visual pathway, pupillary reflexes, dark adaptation, light adaptation, photosensitivity
2. Hearing - Anatomy of ear, auditory pathway, tests for hearing - Watch test, Rinne's test, Weber's test, deafness, Audiometry
3. Taste and Smell: Taste sensations, taste pathway, olfactory pathway

ENDOCRINOLOGY:

1. Hormones - Definition, types, hormonal chemistry, regulation, hormone receptor, mechanism of action
2. Secretion, regulation, function and applied aspect of Hypothalamus, Pituitary Gland, Thyroid Gland, Parathyroid Gland, Pancreas, Adrenal Gland.

UNIT-IV

12 Hours

REPRODUCTIVE SYSTEM:

1. Sex determination and differentiation & it's abnormalities, puberty, importance of sex hormones
2. Female reproductive system - Internal & external genital organs, Oogenesis, Structure of egg, Follicle development, ovulation, menstrual cycle, menopause
3. Male reproductive system - Testes, accessory sex organs, Spermatogenesis, structure of sperm
4. Physiology of pregnancy - Fertilization, Implantation, Placenta(formation, function, hormones), maternal changes during pregnancy, pregnancy tests, infertility 5. Childbirth Physiology - Parturition, Lactation

UNIT-V

12 hours

GASTROINTESTINAL SYSTEM:

1. Physiological stages of digestion
2. Liver function

EXCRETORY SYSTEM:

1. Kidneys-structure & function
2. Urine formation (to exclude concentration and dilution)
3. Juxtaglomerular apparatus
4. Fluid and electrolyte balance – Na, K, H_2O
5. Neural control of Micturition and diuresis

6. Applied physiology: Types of bladder

RECOMMENDED TEXT BOOKS

1. Text book on Medical Physiology – Guyton
2. Textbook of Physiology – A K Jain

MICROBIOLOGY

(45 HOURS)

L/T/PC

3/-/-/3

Learning Objectives:

- Understand microorganisms and their role in disease
- Learn classification, structure, and growth of microbes
- Study infection mechanisms and immune response
- Understand sterilization and infection control

Learning Outcomes:
Students will be able to:

- Identify major pathogenic microorganisms
- Explain mechanisms of infection and transmission
- Apply infection control and prevention techniques
- Interpret microbiological test results

UNIT I: General Microbiology ***(9 hrs)***

- Classification, size, shape, and structure of microorganisms
- Microscopy and its applications
- Growth, nutrition, and multiplication of bacteria
- Culture media and antimicrobial sensitivity testing

UNIT II: Sterilization and Immunology ***(9 hrs)***

- Sterilization and disinfection methods
- Hot air oven, autoclave, pasteurization, and antiseptics
- Immunity and vaccines
- Serological tests (Widal, VDRL, ASLO, CRP, RF, ELISA)
- Rapid tests for HIV and HBsAg

UNIT III: Systematic Bacteriology ***(9 hrs)***

- Morphology, cultivation, diseases, and laboratory diagnosis of:
    - Gram-positive bacteria
    - Gram-negative bacteria
    - Mycobacteria
    - Clostridia and Spirochetes
- Specimen collection and processing

UNIT IV: Parasitology and Mycology ***(9 hrs)***

- Morphology, life cycle, and laboratory diagnosis of common parasites
- Intestinal protozoa and helminths
- Common pathogenic fungi
- Opportunistic fungal infections

UNIT V: Virology ***(9 hrs)***

- General properties of viruses
- Herpes viruses
- Hepatitis viruses
- HIV
- Rabies virus
- Poliomyelitis virus
- Laboratory diagnosis and prevention of viral infections

RECOMMENDED TEXT BOOKS

a. Microbiology, Anantha Narayan and Paniker's,
b. CP.Baveja. Textbook of Microbiology for Nurses.
c. A textbook of Microbiology-Chakraborty.

PATHOLOGY

(30 HOURS)

L/T/P/C

2/-/-/2

Learning Objectives:

- Understand basic disease processes and mechanisms
- Learn cellular injury, inflammation, and healing
- Study common disease conditions affecting organ systems
- Correlate pathology with clinical findings

Learning Outcomes:
Students will be able to:

- Explain pathological changes in diseases
- Identify causes and progression of disease processes
- Correlate clinical symptoms with pathology
- Interpret basic pathological reports

UNIT I: General Pathology ***(6 hrs)***

- Cell injury and adaptation
- Inflammation and healing
- Hemodynamic disorders
- Neoplasia

UNIT II: Hematology ***(6 hrs)***

- Blood composition and function
- Anemia
- Leukocyte disorders
- Bleeding and coagulation disorders

UNIT III: Cardiovascular Pathology ***(6 hrs)***

- Atherosclerosis
- Ischemic heart disease
- Hypertension
- Cardiomyopathies
- Valvular heart disease

UNIT IV: Clinical Pathology ***(6 hrs)***

- Specimen collection and handling
- Urine examination
- Body fluid analysis
- Laboratory investigations

UNIT V: Systemic Pathology ***(6 hrs)***

- Diseases of the respiratory system
- Diseases of the liver and kidneys
- Diabetes mellitus
- Infectious diseases and clinicopathological correlation

RECOMMENDED TEXT BOOKS

Pathology, Harsh Mohane. Basic Pathology by Robbins

CARDIAC INSTRUMENTATION

(60 hours)

L/T/P/C 4/-/-/4

Understand the principles and working of biomedical instruments used incardiology.

1. Explainthe types and applications of transducers, electrodes, and amplifiers.
2. Learn the measurement and recording of physiological signals such as ECG and blood pressure.
3. Understand the principles and applications of pacemakers and defibrillators.
4. Explainthe basics of ultrasound, echocardiography, and heart-lung machines.
5. Develop basic technical knowledge of modern cardiovascular diagnostic equipment.

Learning Outcomes

1. Identify andexplain the components and functions of cardiac instrumentation systems.
2. Demonstrate understanding of physiological signal acquisition and measurement techniques.
3. Explainthe operation and applications of ECG, pacemakers, and defibrillators.
4. Apply knowledge of ultrasound and echocardiography in cardiovascular diagnostics.
5. Interpret the basic functioning of heart-lung machines and imaging modalities.
6. Utilize cardiac instrumentation knowledge in clinical and healthcare technology practice.

UNIT I: **(12 Hours)**

TRANSDUCERS: Classification & Selection of transducers, Types: Pressure transducers: Resistive strain gauge, capacitance, Inductance and piezoelectric transducers; Photoelectric transducers: Photoconductive transducers

UNIT II: **(12 Hours)**

ELECTRODES & AMPLIFIERS: Principles of working and their characteristics, Half-cell potential, Types of electrodes: Surface electrodes, needle electrodes & microelectrodes; Amplifiers for biomedical instrumentation.

UNIT III: **(12 Hours)**

PHYSIOLOGICAL SIGNALS & MEASUREMENTS: Basics of ECG, PCG and Instrumentation for measuring these signals, Measurement of blood pressure,Measurement of blood flow by Electromagnetic & Doppler methods.

UNIT IV: **(12 Hours)**

CARDIAC PACEMAKERS: External and Implantable pacemakers, Types oftriggering: Asynchronous and Synchronous, Pacemaker Electrodes.

Defibrillators: AC and DC defibrillators, Types of electrodes and their features, cardioverters.

UNIT V: **(12 Hours)**

ULTRASOUND: Basic principles of Ultrasound, Principles of echocardiography.

Heart-Lung Machine: Principle of working, Functional details of bubble, thin film& Membrane oxygenators. Principles of X-rays, CT & MRI.

Reference books:

Biomedical instrumentation, technology and application. R.S Chandpur

HUMAN ANATOMY PRACTICAL – II

L/T/P/C
-/-/3/3

GROSS SPECIMENS/SPOTTERS
SPINE, PELVIS AND LOWER EXTREMITY

7. Identify the **spotter**- Osteology- Identify the bone, LOWER EXTREMITY BONES (Innominate bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.) Including side determination, Spinal Segments, Vertebrae (Cervical, Thoracic, Lumbar,
   Sacral and Coccyx), Pelvis and Innominate Bones
8. **Surface Anatomy of the Spine and Lower Extremity** –Atlas, Axis, C-7 vertebrae, Spinous and Transverse process of vertebra, Locate the Innominate bone, ASIS and PSIS, Coccyx, Sacrum, Greater Trochanter, Condyles of femur, Patella, Tibial Tubercles and condyles, Shin Bone, Tarsal bones, Malleoli
9. Myology- **(cadaveric spotter)** Spotters of the lower extremity muscles including the origin, insertion, blood and nerve supply
10. Arthrology- (Cross section of Hip Joint, Knee Joint, Ankle Joint, Joints of Foot, Pelvic Joints, Joints of Spine, Intervertebral Joints, Facet Joints, Sacro-Iliac Joints)
11. Abdominal muscles, Pre and para vertebral muscles, pelvic floor muscles
12. Popliteal Fossa, Inguinal Canal, Arches of foot
13. Spotters of Blood vessels

NEURO-ANATOMY
IDENTIFY THE SPOTTER

1. Cross Section of the Skull, Sinuses of skull,
2. Muscles of the skull and face
3. Triangles of the neck

SYSTEMIC ANATOMY

1. Gross Specimen/Spotter (Brain and Spinal Cord)
2. Cross section of brain and spinal cord
3. Identify the spinal nerves
4. Cranial Nerve

HUMAN PHYSIOLOGY PRACTICAL – II

L/T/P/C
-/-/3/3

1. Examination of superficial sensations
2. Examination of deep sensations
3. Examination of cortical sensations
4. Examination of reflexes
5. Cranial nerve examination
6. Examination of Balance and coordination

HEALTH AND WELL BEING

L/T/P/C

1/-/-/1

Health and Well-being

Course Description:

This course explores the holistic approach to health and well-being, focusing on physical, mental, and social aspects. Students will learn about health promotion strategies, the importance of physical activity, nutrition, mental health awareness, and stress management. The course also addresses the impact of lifestyle choices and societal factors on overall health.

Course Objectives:

- Understand the physical, mental, and social determinants of health.
- Apply strategies for improving and maintaining physical health.
- Recognize the importance of mental well-being and stress management techniques.
- Understand the relationship between nutrition and overall health.
- Develop practical skills for managing time, stress, and emotions.
- Cultivate a balanced approach to achieving long-term health and well-being.

Unit 1

Introduction to Health and Well-being

support Community involvement and social well-being

Overview of health and well-being concepts

Dimensions of health: Physical, mental, social, and emotional he impact of lifestyle choices on health

Unit 2

Physical Health and Fitness

Importance of physical activity for overall health

Types of exercise: Aerobic, strength, flexibility, and balance Creating a personal fitness plan

Unit 3

Nutrition and Healthy Eating

Basics of nutrition: Macronutrients and micronutrients Healthy eating habits and food groups

Impact of nutrition on physical and mental health

Unit 4

Mental Health and Emotional Well-being

Understanding mental health: Definitions, stigma, and myths Key aspects of emotional well-being

Building emotional resilience

Unit 5

Stress Management Techniques Understanding stress and its effects on health

Mindfulness and relaxation techniques

Time management for stress reduction

Unit 6

Sleep and Recovery

Importance of sleep for physical and mental health

Sleep hygiene and healthy sleep habits

Impact of sleep deprivation on overall well-being

Unit 7

Social Health and Relationships

The role of social connections in well-being

Healthy relationships: Communication, boundaries, and

Unit 8

Substance Use and Addiction

The impact of alcohol, tobacco, and drugs on health Understanding addiction and treatment options Preventive measures and harm reduction strategies

Unit 9

Chronic Diseases and Prevention

Common chronic diseases (e.g., diabetes, heart disease) Risk factors and lifestyle modifications for prevention Screening, early detection, and health monitoring

Unit 10

Building Healthy Habits

The psychology of habit formation

Strategies for adopting and maintaining healthy habits Overcoming barriers to healthy behaviour changes

Assessment and Evaluation:

Class Participation :20

Assignments/ case study presentations: 30 Final: 50

Reference Textbook

Health and Wellness" by S. L. Kaskutas & K. A. A. Nielson

II year III semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Cardiac Anatomy and Physiology	4	-	1	5	30	70	100
2		ECG and Holter Monitoring	4	-	1	5	30	70	100
3		Introduction to Cardio vascular Technology	4	-	1	5	30	70	100
4		Cardiac Pathology	3	-	-	3	30	70	100
5		Clinical Postings - I	-	-	4	4	30	70	100
6	VAC	Stress Management	1	-	-	1	100	-	100
TOTAL			**16**		**7**	**23**	**250**	**350**	**600**

Semester – III

CARDIAC ANATOMY AND PHYSIOLOGY

(75 Hours)

L/T/P/C
4/-/1/5

Learning Objectives

1. Understand the anatomy and physiology of the heart and circulatory system.
2. Describe the structure, blood supply, and innervation of the heart.
3. Explaincardiac cycle, cardiac output, and blood pressure regulation.
4. Understand fetal circulation and physiological changes in cardiac disorders.
5. Correlate anatomical and physiological concepts with cardiovascular diseases.
6. Develop basic clinical skills in cardiovascular assessment andinterpretation.

Learning Outcomes

1. Identify and describe the anatomical structures of the heart and great vessels.
2. Explain physiological mechanisms involved in cardiac function and circulation.
3. Interpret cardiac cycle events, heart sounds, and blood pressure changes.
4. Correlate physiological abnormalities with common cardiovascular diseases.
5. Demonstrate competency in cardiovascular assessment procedures.
6. Apply cardiac anatomy and physiology knowledge inclinical cardiovascular technology practice.

COURSE OBJECTIVES:

1. To familiarize and introduce students tointense anatomical features of the heart and physiological changes during various pathological conditions.

2. To provide an understanding of certain conditions involving the dynamics of cardiac physiology.

UNIT – I Anatomy of Heart

(15 Hours)

Structure of Pericardium – Layers of pericardium, blood supply, nerve supply.

External and Internal features of heart – surfaces and borders of heart, atria and ventricles, inter atrial septum and inter ventricular septum.

UNIT – II Structures of Heart

(15 Hours)

Great vessels of heart Aorta and its branches, pulmonary trunk, Superior and Inferior Vena Cava

Atrioventricular valves and semilunar valves.

Musculature of heart – properties of cardiac muscle.

Systemic and pulmonary Circulation.

UNIT – III

(15 Hours)

Blood supply of heart – coronary circulation

Venous drainage of heart

Fetal Circulation of Heart.

Innervation of heart – Parasympathetic and sympathetic nerve supply.

UNIT – IV

(15 Hours)

Cardiac cycle – Heart sounds, Murmurs of Heart.

Conduction system of heart – Factors affecting Heart Rate

Cardiac output, factors influencing cardiac output, methods to calculate cardiac output

UNIT – V

(15 Hours)

Circulatory shock.

Blood pressure – methods, factors affecting blood pressure.

Applied Anatomy and physiology – Myocardial infarction, hypertension, Bradycardia, tachycardia, Regurgitation of valves.

PRACTICALS:

Blood pressure measurement with sphygmomanometer

Auscultation of heart sounds and interpretation

Demonstration of Coronary arteries using cadaver heart

Analysis and interpretation of physiological condition fluctuation during cardiac pathologies

REFERENCES:

1. BD Chaurasia's Handbook of General Anatomy, B.D.Chaurasia, 2009, fourth edition.
2. Ross and Wilson Anatomy and Physiology in Health and Illness, Anne Waugh, Allison Wynn Grant, 2015, 12th edition
3. Basics of Medical Physiology D Venkatesh, H.H. Sudhakar, Third Edition

ECG AND HOLTER MONITORING

(75 hours)

L/T/P/C
4/-/1/5

Learning Objectives

1. Understand the basic principles and components of electrocardiography.
2. Learn ECG lead systems, waveforms, intervals, and electrical axis.
3. Understand ECG changes associated with cardiac diseases and arrhythmias.
4. Explain ECG interpretation in coronary artery disease and conduction abnormalities.
5. Understand the principles and indications of Holter monitoring.
6. Develop practical skills in ECG recording and interpretation.

Learning Outcomes

1. Identify normal ECG waveforms, intervals, and cardiac rhythms.
2. Interpret ECG findings in arrhythmias, myocardial infarction, and conduction defects.
3. Demonstrate proper ECG lead placement and patient preparation techniques.
4. Analyze ECG changes in various cardiovascular conditions.
5. Explain the role and interpretation of Holter monitoring.
6. Apply ECG knowledge in cardiovascular diagnostic procedures and patient care.

COURSE OBJECTIVES:

- To familiarize and introduce students to intense anatomical features of the heart and physiological changes during various pathological conditions.
- To provide an understanding of certain conditions involving the dynamics of cardiac physiology.

UNIT I: **(15 Hours)**

ECG- Basic principles –The electrocardiographic paper; amplitude, frequency, rate & rhythm , the electrical field of heart, the leads; standard limb leads ; precordial leads , the basic ECG deflections; the normal P wave , QRS complex, the genesis of QRS complex, transition zone, T wave , U wave, Segments and intervals of waves, rotation of heart , electrical Axis

ECG in CAD – Myocardial infarction, types of MI, STEMI, NSTEMI, ischemic Acuteness score, Localisation of MI, wellen's syndrome

UNIT II: **(15 Hours)**

ECG in Angina -angina syndromes- stable angina, unstable angina, prinzmetal angina.
ECG in Bundle branch blocks- Right bundle branch blocks, left bundle branch blocks, fascicular blocks.

UNIT III: **(15 Hours)**

Chamber enlargement – left atrial Enlargement, Right atrial enlargement **Hypertrophy-** Right ventricular hypertrophy, Left ventricular hypertrophy

UNIT IV: **(15 Hours)**

Arrhythmias: Atrial arrhythmia- Atrial fibrillation, Atrial flutter, Atrial Premature complex, atrial Tachycardia and Supraventricular tachycardia.
Ventricular Arrhythmias- Atrial fibrillation, Atrial flutter, Atrial Premature complex, atrial Tachycardia, Brugada criteria.
AV nodal arrhythmias, Pacemaker rhythm

UNIT V: **(15 Hours)**

ECG in miscellaneous conditions: cardiomyopathies, Pericarditis, Myocarditis, pulmonary thromboembolism, ECG in electrolyte imbalance
Brugada syndrome, Basics of Holter test- indications and interpretation.

PRACTICALS:

Machine setting and patient positioning
ECG lead placement
ECG interpretation (identifying deflection, heart rate, rhythm, electrical axis deviation)
ECG in coronary artery disease
ECG in chamber abnormalities (bundle branch blocks, ventricular hypertrophy, atrial enlargement)
ECG in conduction abnormalities

References:

1. 2. An introduction to electrocardiography – Leoschamroth, 8th edition The ECG made easy John R Hampton 8th edition

INTRODUCTION TO CARDIOVASCULAR TECHNOLOGY

(75 Hours)

L / T/ P/ C

4/-/1/5

Learning Objectives:

1. Understand the fundamentals of Cardiovascular Technology and Cath Lab practice.
2. Identify various cath lab equipment, instruments, and monitoring systems.
3. Explain the roles and responsibilities of cath lab personnel.
4. Demonstrate basic patient preparation and monitoring techniques in cath lab procedures.
5. Understand the principles of diagnostic and interventional cardiac procedures.
6. Apply radiation safety and infection control measures in the cath lab environment.
7. Develop basic technical and professional skills required in cardiovascular technology practice.

Learning Outcomes:

1. Describe the structure and functioning of a cardiac catheterization laboratory.
2. Operate and identify basic cath lab equipment and accessories.
3. Assist healthcare professionals during diagnostic and interventional procedures.
4. Perform basic patient care and monitoring before, during, and after procedures.
5. Follow aseptic techniques, radiation protection, and biomedical waste management protocols.
6. Demonstrate professional ethics, communication skills, and teamwork in cath lab settings.
7. Apply foundational knowledge of cardiovascular technology in clinical practice.

SYLLABUS

UNIT – I: Basics of Cardiovascular Technology (15 Hours)

- Introduction to Cardiovascular Technology (CVT)
- Scope and role of CVT technologist
- Introduction to Cath Lab and its components
- Types of Cath Labs:
    - Adult Cath Lab

    - Pediatric Cath Lab
    - Electrophysiology (EP) Lab
- Roles and responsibilities of cath lab personnel

UNIT – II: Fundamentals of Cardiac Care **(15 Hours)**

- Basic concepts of cardiovascular diseases
- Introduction to cardiac emergencies
- Patient assessment and monitoring
- Vital signs monitoring
- Basics of ECG monitoring
- Hemodynamic monitoring overview

UNIT – III: Cath Lab Equipment and Instrumentation **(15 Hours)**

- X-ray imaging system
- Recording and monitoring system
- Pressure transducers and hemodynamic monitoring
- Catheters and guidewires
- Contrast media
- Defibrillator and emergency equipment
- Sterile techniques and aseptic precautions

UNIT – IV: Diagnostic and Interventional Procedures **(15 Hours)**

- Coronary angiography
- Right and left heart catheterization
- Temporary pacing
- Basics of angioplasty and stenting
- Patient preparation and positioning
- Post-procedure care and complications

UNIT V: Radiation and Safety **(15 Hours)**

- Radiation physics basics
- Radiation hazards

- Radiation protection methods
- Cath lab infection control
- Biomedical waste management
- Ethical practices in cath lab

Practicals

1. Identification of cath lab equipment
2. ECG lead placement
3. Sterile gowning and gloving
4. Preparation of cath lab tray
5. Patient preparation for angiography
6. Identification of catheters and guidewires
7. Basic hemodynamic monitoring
8. Radiation safety practices

Recommended Books

1. *The Cardiac Catheterization Handbook* – Morton J. Kern
2. *Grossman's Cardiac Catheterization, Angiography and Intervention*
3. *Manual of Cardiovascular Medicine*

CARDIAC PATHOLOGY

(45 Hours)

L /T/P/C 3-/-/-/3

Learning Objectives

1. Understand the basic concepts and principles of pathology related to cardiovascular diseases.
2. Identify the pathological changes occurring in congenital and acquired heart diseases.
3. Explain the etiology, pathogenesis, and clinical manifestations of common cardiac disorders.
4. Correlate pathological findings with diagnostic investigations and clinical presentations.
5. Understand the role of laboratory investigations and cardiac biomarkers in disease diagnosis.
6. Develop knowledge regarding prevention, complications, and progression of cardiovascular diseases.
7. Apply pathology knowledge in cardiovascular technology and patient care practice**.**

Learning Outcomes:

1. Describe the pathological basis of common cardiovascular diseases.
2. Differentiate congenital and acquired cardiac disorders based on pathological features.
3. Identify pathological changes associated with coronary artery and valvular diseases.
4. Interpret basic diagnostic findings related to cardiac pathology.
5. Correlate ECG, laboratory, and imaging findings with cardiac diseases.
6. Demonstrate understanding of cardiac biomarkers and histopathological investigations.
7. Apply knowledge of cardiac pathology in clinical and cath lab practice.

SYLLABUS

UNIT – I: Introduction to Cardiac Pathology **(9 HOURS)**

- Definition and scope of pathology
- Cellular adaptation, injury, and cell death
- Inflammation and healing
- Hemodynamic disorders

- Basic pathological terminology
- Introduction to cardiovascular pathology

UNIT – II: Congenital Heart Diseases **(9 HOURS)**

- Classification of congenital heart diseases
- Acyanotic heart diseases:
    - Atrial Septal Defect (ASD)
    - Ventricular Septal Defect (VSD)
    - Patent Ductus Arteriosus (PDA)
    - Coarctation of Aorta
- Cyanotic heart diseases:
    - Tetralogy of Fallot
- Transposition of Great ArteriesPathophysiology and complications

UNIT – III: Acquired Heart Diseases **(9 HOURS)**

- Rheumatic heart disease
- Infective endocarditis
- Pericarditis
- Myocarditis

- Cardiomyopathies:
    - Dilated cardiomyopathy
    - Hypertrophic cardiomyopathy
    - Restrictive cardiomyopathy
- Valvular heart diseases

UNIT – IV: Coronary Artery and Vascular Diseases **(9 HOURS)**

- Atherosclerosis
- Coronary artery disease
- Angina pectoris
- Myocardial infarction
- Hypertension and hypertensive heart disease
- Peripheral vascular diseases
- Aneurysms and thrombosis

UNIT – V: Diagnostic Pathology and Clinical Correlation (9 HOURS)

- Cardiac biomarkers
- Histopathological examination
- ECG changes in cardiac diseases
- Echocardiography findings
- Cardiac catheterization findings
- Laboratory investigations in cardiovascular diseases

Practical / Demonstration

1. Identification of gross pathological specimens
2. Histopathology slide demonstration
3. Interpretation of cardiac biomarkers
4. Case discussion on common cardiac diseases
5. Correlation of ECG with pathology

Recommended Books

1. *Robbins and Cotran Pathologic Basis of Disease*
2. *Robbins Basic Pathology*
3. *Braunwald's Heart Disease*
4. *Pathology Illustrated* by Ivan Damjanov

CLINICAL POSTINGS - I

L/T/P/C
/-/4/4

Theory and Practicals

Demonstration of anatomical features through cadaver heeart

Demonstration of coronary arteries and their location

Demonstration of Auscultation in heart sounds

Physiology of Cardiovascular system. Introduction and interpretation of ECG ECG in Coronary artery disease

ECG in electrolyte imbalance ECG in arrhythmia

Case seminars

Hands On practice on ECG

STRESS MANAGEMENT

L/T/P/C
1/-/-/1

Course Objectives:

By the end of the course, students will:

1. Understand what stress is and how it affects the body and mind.
2. Learn how to recognize personal stressors and individual responses to stress.
3. Explore various coping strategies to manage stress effectively.
4. Understand how lifestyle changes can reduce overall stress.
5. Learn how to manage stress in academic and professional settings.
6. Equip students with tools to build long-term resilience against stress.

Unit 1

Introduction to Stress and Its Effects Definition of stress: Eustress vs. Distress Types of stress: Acute vs. Chronic
The biology of stress (fight-or-flight response, hormones) Short-term and long-term effects on physical and mental health The role of perception and coping mechanisms

Unit 2

Identifying Stressors and Personal Stress Response Internal vs. external stressors (work, relationships, environment) Identifying stress patterns (thoughts, behaviours, physical reactions) Emotional regulation and its role in stress management
The Stress Process: How stress develops and escalates

Unit 3

Coping Strategies and Stress Relief Techniques
Problem-focused vs. emotion-focused coping
Cognitive Behavioral Therapy (CBT) techniques for stress Relaxation techniques (deep breathing, progressive muscle relaxation) Time management and organization as stress-relief tools
Developing a personal coping plan

Unit 4

Lifestyle Changes for Managing Stress The role of physical activity and exercise Sleep hygiene and its connection to stress Nutrition and its impact on mental health Social support and healthy relationships Mindfulness and meditation practices

Unit 5

Stress Management at Work and School
Managing work and school stress: Time management, prioritization Dealing with high-pressure environments and deadlines
Building resilience and avoiding burnout

The importance of taking breaks and practicing self-care

Unit 6

Building Long-Term Stress Resilience

Resilience theory and how to bounce back from adversity Developing a growth mindset to handle challenges

Building emotional intelligence to cope with stress Integrating stress management into daily life

Assessment & Evaluation

Participation: 20 (Engagement in group discussions and exercises)

Assignments: 30

Final Exam (Internal) : 50 marks

Reference Textbook

Stress Management: From Basic Science to Best Practice" by C. L. Cooper and Philip L. Merritt

II year IV semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Ultrasound physics and Doppler Principles	4	-	1	5	30	70	100
2		Congenital Heart Disease I	4	-	1	5	30	70	100
3		Basics of Echocardiography and cardiac pacemakers	4	-	1	5	30	70	100
4		Medical ethics and legal aspects	3	-	-	3	30	70	100
5		Clinical Postings II	-	-	4	4	30	70	100
6	VAC	Environment awareness	1	-	-	1	100	-	100
TOTAL			**16**	**-**	**7**	**23**	**250**	**350**	**600**

Semester – IV

1. Ultrasound physics and Doppler Principles
2. Congenital Heart Disease I
3. Basics of Echocardiography and cardiac pacemakers
4. Medical ethics and legal aspects
5. Clinical Assessment-II
6. VAC (Health and Well Being)

ULTRASOUND PHYSICS AND DOPPLER PRINCIPLES

(75 hours)

L/T/P/C
4/-/1/5

Learning Objectives

1. Understand the basic principles and physics of ultrasound andechocardiography.
2. Learn different echocardiographic modalities including M-mode, 2D, Doppler, and color Doppler.
3. Understand normal cardiac anatomy and function through echocardiographic imaging.
4. Explainechocardiographic findings in valvular, congenital, and ischemic heart diseases.
5. Develop knowledge of transesophageal and stress echocardiography techniques.
6. Develop practical skills in patient preparation and echocardiographic image acquisition.

Learning Outcomes

1. Explainthe principles and applications of echocardiography in cardiac diagnosis.

2. Identify normal and abnormal cardiac structures using echocardiographic techniques.
3. Interpret basic echocardiographic findings in common cardiovascular diseases.
4. Demonstrate competency in echocardiography patient preparation and assistance.
5. Apply Doppler and color flow imaging concepts in cardiovascular assessment.
6. Utilize echocardiography knowledge in clinical cardiovascular technology practice.

COURSE OBJECTIVES:

1. To understand the Physics and working principle under Ultrasound Instrument for better operation.
2. To make students analyze the working of the Ultrasound and troubleshoot on demand.

UNIT I: **(15 hours)**

Basics of Ultrasound & sound waves, propagation of ultrasound wave, properties of ultrasound, and interaction of Ultrasound with tissue: reflection, refraction, attenuation, scattering, acoustic impedances of media, specular and scattered echoes, image properties in ultrasound: Hyperechoic, hypoechoic, Anechoic, Clinical applications and Limitations of ultrasound imaging.

UNIT II: **(15 HOURS)**

Transducers and the Production of Ultrasound Beams: Transducer design, types of transducers, high and low frequency transducers, piezoelectric effect, acoustic absorber, matching layer, pulse characteristics: resonant and non-resonant transducers, focal zone grating lobes and side lobes. Frensel and Fraunhofer zone, Q-factor, Pulse Repetition Frequency (PRF). Phased array transducer and linear array transducer

UNIT III: **(15 HOURS)**

Display modes: A-mode, B- mode, TM- mode and grey scale imaging. Principles of M-mode and Two-dimensional Echocardiography Components of echo machine, their controls and the protocols for maintaining the equipment.
Image quality in Ultrasound. Artefacts and its types in ultrasound.

UNIT IV: **(15 HOURS)**

Doppler instrumentation- doppler effect, doppler shift frequency, doppler equation, doppler angle. Continuous and pulsed wave doppler: Applications and limitations Colour Flow Imaging: Applications and limitations, aliasing, Nyquist limit

Assessing severity of regurgitations, limitations of color flow, 'billiard ball effect', Proximal Isovelocity Surface Area (PISA), Tissue Doppler imaging and 3D echocardiography

UNIT V: **(15 HOURS)**

The role of ultrasound in Transesophageal Echocardiography, Cardiac dysynchrony and Dobutamine Stress Echocardiography, Contrast Enhanced Ultrasound imaging, Ultrasound-guided interventions & procedures.

PRACTICALS:

Ultrasound machine and its components

Types of Transducers and its key features

Protocol for maintenance and upkeep of the equipment

Machine settings, controls and parameters

Role of echocardiography in Transesophageal Echocardiography and Dobutamine stress Echo

REFERENCES:

1. The physics of Radiology and imaging- K Thayalan, first edition:2014, Jaypee Brothers medical publishers (P) LTD.The Washington manual of echocardiography- Wolters Kluwer, Lippincott Williams & Wilkins

CONGENITAL HEART DISEASE I

(75 hours)

L/T/P/C
4/-/1/5

Learning Objectives

1. Understand embryology and development of the cardiovascular system.
2. Learn the classification and pathophysiology of congenital heart diseases.
3. Explainacyanotic congenital heart defects and their hemodynamic effects.
4. Understand cyanotic congenital heart diseases and clinical manifestations.
5. Correlate diagnostic investigations with congenital cardiac abnormalities.
6. Develop knowledge of clinical management and interventional approaches in congenital heart disease.

Learning Outcomes

1. Explainembryological development and congenital abnormalities of the heart.
2. Identify common acyanotic andcyanotic congenital heart diseases.
3. Interpret hemodynamic and clinical features of congenital cardiac defects.
4. Correlate echocardiographic and diagnostic findings with congenital heart diseases.
5. Apply knowledge of congenital heart diseasesin cardiovascular assessment and patient care.
6. Demonstrate understanding of management strategies for congenital cardiac disorders.

COURSE OBJECTIVES:

1. To acquire basic knowledge about embryology and formation of Heart tube.
2. To understand and interpret the occurrence of each congenital heart disease and their pathogenesis.

UNIT 1: **(15 HOURS)**

Embryology of heart

Vasculogenesis, angiogenesis, Formation of heart tube, cardiac looping, fate of venous sinosus, formation of cardiac septum, formation of pulmonary veins, formation of great vessels, embryology of conducting system.

UNIT 2: **(15 HOURS)**

Monozygotic and dizygotic twins, teratogens and birth defects

Fetal circulation, postnatal changes in circulation and congenital heart diseases.

Respiration, Classification of congenital heart diseases.

UNIT 3: **(15 HOURS)**

Atrial septal defect- types, causes, management- pharmacological and surgical Other acyanotic diseases

Acyanotic congenital heart disease – Ventricular septal defect, types, management, pharmacological and surgical.

UNIT 4: **(15 HOURS)**

Acyanotic heart diseases

PDA – Embryology, pathophysiology, hemodynamic classification, krichenko Classification

UNIT 5: **(15 HOURS)**

Co- A – types based on location, associated 60nomalies, management and surgical procedures. AVSD – types of AVSD, Associated 60nomalies, down syndrome, Management and surgical procedures

Reference books:

1. AComprehensive Approach to Congenital Heart Diseases, 2nd edition, IB vijyalakshmi
2. Clinical management of congenital heart diseases, Douglas S Moodie
3. Inderbir singh's , Human embryology, 11th edition

BASICS OF ECHOCARDIOGRAPHY AND CARDIAC PACEMAKERS

(75 hours)

L/T/P/C
4/-/1/5

Learning Objectives

1. Understand the principles and instrumentation of echocardiography.
2. Learn basic echocardiographic views and cardiac measurements.
3. Explain Doppler echocardiography and assessment of cardiac function.
4. Understand the principles, indications, and types of cardiac pacemakers.
5. Learn pacemaker components, programming, and troubleshooting basics.
6. Develop practical knowledge in echocardiography assistance and pacemaker monitoring.

Learning Outcomes

1. Explainthe basic principles and applications of echocardiography.
2. Identify standard echocardiographic views and cardiac structures.
3. Interpret basic Doppler and echocardiographic findings.
4. Describe types, functions, and indications of cardiac pacemakers.
5. Demonstrate understanding of pacemaker monitoring and troubleshooting principles.
6. Apply echocardiography and pacemaker knowledge in cardiovascular technology practice.

COURSE OBJECTIVES:

1. To acquire basic knowledge about the components and working of Cardiac pacemakers.
2. To introduce the concepts of basic echocardiographic views.

UNIT 1: **(15 HOURS)**

Basic concepts of pacemaker

Introduction over-view

Pacemaker circuits, mode

Pacing leads, electrical aspects of pacing, Power source, connections, Ohms law applications PG circuits

UNIT 2: **(15 HOURS)**

Temporary pacemakers: Indication**,** components**,** modes, Procedures**,** pacing methods**,** lead testing, trouble-shootings**,** Complication

Permanent Pacemakers: Introduction, Cardiac hemodynamics, Basic components, Classifications (NBG code), Indications, Physiology of cardiac pacing, Lead thresholds, Factors affecting threshold

UNIT 3: **(15hours)**

- Implantable cardioverter Defibrillators Introduction: Sudden cardiac death, Indications
- Contraindications
- System components and functions Implantation and testing procedures
- Device programming for arrhythmia recognition Management and follow-up

UNIT 4: **(15hours)**

Echo cardiographic views and modalities

Acquisition techniques of Trans -Thoracic views, Acquisition techniques of Aortic arch view, Acquisition techniques of subcoastal view

Modalities of Echo

Conventional echo, Doppler echo, Basics of stress echo, epicardial imaging, intracardiac echocardiography- indications and contraindications.

UNIT 5: **(15hours)**

• Quantification of Right atrium, left atrium, Right ventricle, Left ventricle, Right ventricle.

• Assessment of temporary, permanent pacemaker in echo.

PRACTICALS:

Patient positioning and image viewing

Identifying segmental analysis

Advanced Cardiac Life support algorithm

Types of pacemaker, lead placements and modes.

Positioning and steps involved in Defibrillator operation

Reference books:

Cardiac catheterization: William Grossman, Eric Topols, Morten B Kern

The echo manual- jae K.Oh, James B. Seward, A.Jamil Tajik

MEDICAL ETHICS AND LEGAL ASPECTS

(45 hours)

L/T/P/C
3/-/-/3

Course Objectives:

Medical ethics has developed into a well-based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Physicians are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to be focused on are as follows:

UNIT- I: **9 hours**

Medical ethics – Definition, Goal & Scope, Importance of medical ethics, Goals of medical interventions.

Introduction to Codes of conduct: Athreya Anushasana, Charaka Samhita, Sushruta Samhita, Hippocratic Oath, Helsinki declaration, International code of medical ethics, Nuremberg code, Declaration of Geneva.

Basic Principles of Medical ethics – Autonomy, Beneficence, Confidentiality, Nonmaleficence, Equity.

UNIT – II **9 hours**

Rights and responsibilities of patients

Informed consent – Definition, Types, need for informed consent, conditions need to obtain informed consent.

Rational & irrational drug therapy – Definitions of Rational & irrational drugs, Factors responsible for rational & irrational drug usage, Standard treatment guidelines.

Medical records – Definition, components of medical record & advantages of medical records

UNIT – III **9 hours**

Care of the terminally ill

Euthanasia - Definition, Types of euthanasia

Organ transplantation – Definition, Types of organ transplants, Ethical issues in organ transplantation.

Professional indemnity insurance policy

UNIT -IV **9 hours**

Medical law – Definition, Types of medical law – civil & criminal law Medico legal cases – Definition of medico legal case, examination of medico legal case, documents related to MLC, ownership and retention of medico legal cases, confidentiality privilege communication

Malpractice & medical negligence – Definition, causes of medical negligence, classification of medical negligence based on court of law & liability, measures to avoid medical negligence.

UNIT – V **9 hours**

Development of standardized protocol to avoid near miss or sentinel events

Prenatal diagnosis – Definition, Indications, Brief on PCPND Tact

Human experimentation – Definition, Important requisites, Institutional ethical committee-Responsibilities

Recommended Books

1. Medical Ethics & Law, The CorCurriculum – Tony HopeAtla

CLINICAL POSTINGS - II

L/T/P/C

-/-/5/5

Theory and Practicals

Instrumentation handling and sterilization techniques.

Cardiac pacemaker- types

Machine settings & patient positioning

Clinical practice and observation of critically ill cardiac patients

Echo handling of post PTCA patients in ICCU

Observation and recording of Log and patient details

Hands on practice of echo views.

Case presentations

ENVIRONMENTAL AWARENESS

L/T/P/C
1/-/-/1

Environmental Awareness

Course Description:
This course introduces students to the fundamental concepts of environmental awareness, examining the relationship between humans and the environment. It emphasizes the impact of human activities on the planet and promotes sustainable practices. Students will explore key environmental issues, such as climate change, biodiversity, pollution, and resource conservation, and develop practical knowledge for contributing to environmental protection.

Course Objectives:

- Understand the basic concepts of environmental science and sustainability.
- Identify the major environmental challenges facing the world today.
- Analyze the impact of human activities on ecosystems, biodiversity, and natural resources.
- Explore global environmental policies and local solutions to environmental problems.
- Implement sustainable practices in everyday life.

Unit 1
Introduction to Environmental Awareness
What is environmental awareness?
The importance of environmental education.
Key environmental concepts: ecosystems, biodiversity, sustainability. Historical perspective on environmental awareness.

Unit 2
Earth's Ecosystems and Biodiversity
What are ecosystems?
Types of ecosystems: forests, oceans, wetlands, etc. Importance of biodiversity.
Threatsto biodiversity: habitat loss, invasive species, climate change.
Unit 3
Pollution and Its Impact
Types of pollution: air, water, soil, noise, and light pollution. Causes and effects of pollution on health and ecosystems. Case studies of major pollution events.
Unit 4
Climate Change and Global Warming
The science of climate change.
Greenhouse effect and human contributions.
Impacts of climate change: rising temperatures, sea levels, extreme weather. Mitigation and adaptation strategies.
Unit 5
Resource Conservation
Renewable vs. non-renewable resources.
The importance of conserving water, energy, and other resources.
Techniques for conservation: recycling, energy efficiency, and water-saving practices.

Unit 6
Sustainable Agriculture and Food Systems
Environmental impact of conventional farming practices.
Sustainable agriculture: organic farming, permaculture, and agroecology. The role of diet in environmental sustainability.

Unit 7
Waste Management
Types of waste: municipal, industrial, hazardous, electronic. The 3 Rs: Reduce, Reuse, Recycle. Landfills, incineration, and composting. Zero waste lifestyle.

Unit 8
Water Conservation and Management
The global watercrisis: causes and consequences. Water management practices and policies.
The importance of clean water for all living organisms.

Unit 9
Environmental Policy and Legislation
Global environmental treaties: Paris Agreement, Kyoto Protocol. National environmental policies and regulations.
Role of NGOs, governments, and individuals in policy development.

Unit 10
Green Technologies and Innovations
Introduction to renewable energy sources (solar, wind, hydro, etc.). Electric vehicles and sustainable transportation.
Innovations in waste-to-energy and sustainable agriculture.

The Role of Individuals in Environmental Protection
How individual actions impact the environmentEco-friendly lifestyles: reducing waste, sustainable consumption, green travel. Community action and grassroots movements.

Assessment and Evaluation:
Class Participation :20
Assignments/ case study presentations: 30 Final: 50
Reference Textbook
Environmental Science: A Global Concern" by William P. Cunningham & Mary Ann Cunningham

III year – V semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Clinical applications of Echo	3	-	1	4	30	70	100
2		Myocardial, pericardial, Valvular and Ischemic Heart Diseases	3	-	1	4	30	70	100
3		Congenital heart disease - II	4	-	1	5	30	70	100
4		Clinical Postings III	-	-	4	4	30	70	100
5		Research Project and seminar			4	4		100	100
6	VAC	Interpersonal communication	1	-	-	1	100	-	100
TOTAL			11		11	22	220	380	600

THIRD YEAR

Semester – V

1. Clinical applications of Echo
2. Myocardial, pericardial, Valvular and Ischemic Heart Diseases
3. Congenital heart disease – II
4. Clinical Assessment I
5. VAC(Environmental Awareness)

CLINICAL APPLICATIONS OF ECHO

(60 hours)

L/T/P/C
3/-/1/4

Learning Objectives

1. Understand the clinical applications of echocardiography in cardiovascular diseases.
2. Learn echocardiographic evaluation of cardiac chambers, valves, and ventricular function.
3. Explainthe role of echocardiography in ischemic, valvular, congenital, and pericardial diseases.
4. Understand stress echocardiography and transesophageal echocardiography applications.
5. Develop knowledge of Doppler and hemodynamic assessment in clinical practice.
6. Develop practical skills in echocardiographic image interpretation and reporting.

Learning Outcomes

1. Explainthe clinical applications of echocardiography in cardiovascular diagnosis.
2. Interpretechocardiographic findings in common cardiac diseases.
3. Assess ventricular function, valvular lesions, and hemodynamic abnormalities.
4. Demonstrate understanding of stress and transesophageal echocardiography.
5. Apply echocardiographic knowledge in cardiovascular patient assessment.
6. Utilize echocardiographic findings in clinical decision-making and patient care

COURSE OBJECTIVE:

1. Understanding Basic Principles and the different modes of echocardiography.
2. Develop skills in interpreting echocardiographic images and data.

UNIT 1 **12 hours**

Chamber quantification – RA, RV LA, LV

Assessment of ECHO in ischemic cardiomyopathy and non ischemic cardiomyopathy

Assessment of pericardial disease in echocardiography.

UNIT II **12 hours**

Assessment of ECHO in CAD – systolic and diastolic function

Echo in rheumatic heart disease –Echo in mitral stenosis, mitral regurgitation, aortic stenosis, aortic regurgitation, pulmonary hypertension.

Prosthetic valves and its functional assessment in echo.

UNIT III **12 hours**

Introduction of 3D Echocardiogram and its application, Transesophageal echocardiography-indication, procedure, usefulness and complications and its management. Tissue doppler, strain, strain rate and velocity vector imaging, studying

UNIT IV **12 hours**

Stress echocardiography – indications, contraindications, mechanism of diagnosis, applications and complications,

Chemicallyinduced Dobutamine stress test – indications, contraindications, mechanism of diagnosis, applications and complications. Vasodilator (dipyridamole or Adenosine) Stress test – indications, contraindications, mechanism of diagnosis, applications and complication.

UNIT V **12 hours**

Dobutamine stress echocardiogram in aortic stenosis - indications, contraindications, mechanism of diagnosis, applications and complication.

Myocardial contrast study, bubble saline contrast – indications, contraindications, mechanism of diagnosis, applications and complications.

PRACTICAL

1. Analysis of Echocardiographic views
2. Basic views virtual representation
3. Techniques for Echo view placement and handling of probe
4. Case scenarios for Pathological assessment

REFERENCE BOOKS

1.7th South Asian edition of feigenbaum's echocardiography
2. 2nd edition Washington manual of echo cardiography

MYOCARDIAL, PERICARDIAL, VALVULAR AND ISCHEMIC HEART DISEASES

(60 hours)

L/T/P/C

3/-/1/4

Learning Objectives

1. Understand the etiology and pathophysiology of myocardial and pericardial diseases.
2. Explain valvular heart diseases and ischemic heart disease mechanisms.
3. Learn clinical features, diagnostic investigations, and complications of cardiac diseases.
4. Understand hemodynamic changes associated with various cardiac disorders.
5. Correlate echocardiographic and ECG findings with cardiovascular diseases.
6. Develop knowledge of medical and interventional management strategies.

Learning Outcomes

1. Explain pathological and clinical features of myocardial and pericardial diseases.
2. Identify valvular and ischemic heart diseases using diagnostic findings.
3. Interpretclinical and imaging features of cardiovascular disorders.
4. Correlate disease mechanisms with cardiac function abnormalities.
5. Apply cardiovascular disease knowledge in clinical assessment and patient care.
6. Demonstrate understanding of management approaches for cardiac diseases.

COURSE OBJECTIVES:

1. Develop a detailed understanding of the pathophysiology, clinical presentation, and diagnostic techniques

2. Learn the principles of medical, interventional, and surgical management for the cardiac Conditions

UNIT I **12 hours**

Coronary Artery Diseases-Causes, Pathophysiology and clinical prevention, Angina, unstable angina and Prinzmetal angina, Myocardial Infarction - Types and locations of Infarction, Treatment of Acute Infarction -Thrombolytic therapy, Complications of Myocardial Infarction and their Management.

Rheumatic Heart Diseases- Etiology, Pathophysiology, diagnosis & management, Structure of Valves and its function.

UNIT II **12 hours**

Myocardial Diseases-Myocarditis- Acute and Chronic, Dilated Cardiomyopathy, Restrictive Cardiomyopathy, Hypertrophic Cardiomyopathy, Masses and tumors of the heart; Constrictive Pericarditis, Pericardial effusion, Cardiac tamponade

UNIT III **12 hours**

Infective Endocarditis, Pulmonary Artery Hypertension, Aortic Diseases - Aneurysm, dissection, debakey and standford classification; Types of Heart failure & general Management, Acute circulatory failure (shock) and its types.

UNIT IV **12 hours**

Mitral Stenosis – anatomy, pathophysiology, Treatment, other diagnosis
Mitral Regurgitation – pathophysiology, Treatment & diagnosis
Tricuspid Stenosis- anatomy, pathophysiology, Treatment, other diagnosis
Tricuspid Regurgitation– pathophysiology, Treatment & diagnosis.

UNIT V **12 hours**

Aortic Stenosis– Anatomy, BAV, Classification, Pathophysiology, Treatment, Other Diagnosis Aortic Regurgitation – Pathophysiology, Treatment, Other Diagnosis
Pulmonary Stenosis–Anatomy, Classification, Pathophysiology, Treatment, Other Diagnosis, Pulmonary Regurgitation– Pathophysiology, Treatment & Diagnosis

PRACTICAL:

SPOTTERS & CASE SCENARIOS:

1. Ischemic Heart Diseases
2. Myo-Pericardial Diseases
3. Diseases of Aorta 4. Valvular Heart Diseases.
5. Basic Echo assessment.

REFERENCE BOOKS:

1. Textbook of Pathology, Harsh Mohan, Sixth edition, Jaypee Brothers medical Publishers (P) Ltd, Puducherry, 2010
2. Textbook of Pathology, B N Dutta, Second edition, Jaypee Brothers medical Publishers (P) Ltd, Puducherry, 2004
3. Comprehensive Cardiology, S Uma Devi, First Edition, Jaypee Brothers medical publishers.

CONGENITAL HEART DISEASE – II

(60 hours)

L/T/P/C
3/-/1/4

Learning Objectives

1. Understand complex congenital heart diseases and their pathophysiology.
2. Learn diagnostic evaluation and imaging techniques for congenital cardiac disorders.
3. Explain postoperative assessment and complications in congenital heart diseases.
4. Understand interventional and surgical management of congenital heart defects.
5. Correlate hemodynamic findings with congenital cardiovascular abnormalities.
6. Develop practical knowledge in congenital heart disease assessment and care.

Learning Outcomes

1. Explaincomplex congenital heart diseases and their clinical manifestations.
2. Interpretechocardiographic and diagnostic findings in congenital cardiac disorders.
3. Assess postoperative and interventional outcomes in congenital heart disease patients.
4. Correlate congenital abnormalities with hemodynamic and physiological changes.
5. Apply congenital heart disease knowledge in cardiovascular patient care.
6. Demonstrate understanding of management strategies for congenital cardiac conditions.

COURSE OBJECTIVES:

1. Advanced knowledge of the pathophysiology, anatomy, and physiology of complex congenital heart diseases

2. Diagnostic techniques for evaluating congenital heart diseases, including echocardiography, cardiac MRI, CT angiography

UNIT – I **12 hours**

Acyanotic heart diseases - PDA – Pathophysiology, hemodynamic classification, krichenko classification, Treatment and surgical procedures.

Co- A - Types based on location, associated anomalies, Treatment and surgical procedures.

AVSD – Types of AVSD, Associated anomalies, down syndrome, Treatment and surgical procedures

UNIT – II **12 hours**

Tetralogy of fallot, Transposition of great arteries-TOF- Characteristics, etiology, developmental defect, absence of pulmonary valve, AP colletrals, associated anomalies, Treatment and surgical procedures

Transposition of the Great Arteries – Pathophysiology, DTGA, LTGA/ CC-TGA, associated malformation, Treatment and surgical procedures.

UNIT – III **12 hours**

Double outlet right ventricle, Total Anomalous Pulmonary Venous Connection (TAPVC), DORV- Classification, associated anomalies, Treatment and surgical procedures, TAPVC- Classification of TAPVC, pathophysiology, sites of obstruction, associated anomalies and views, Treatment & surgical procedures, complication of surgery.

UNIT – IV **12 hours**

Congenital Valvular heart diseases, miscellaneous diseases-Hypoplastic left heart syndrome, Truncus arteriosus, AP window.

UNIT – V **12 hours**

Palliative procedures, Basic surgical treatments of cardiac diseases

Aorta-pulmonary shunts, PA banding, ASD & VSD closure, TOF repair and arterial switch (jantene), rastelli operation, norwood operation, glen-shunt and hemi fontan & fontan procedures, pulmonary valvotomy, Co- A repair, LVOT obstruction repair.

PRACTICALS:

SPOTTERS & CASE SCENARIOS:

1. Transposition of great arteries.
2. Tetralogy of fallot.
3. Patent ductusarteriosus.
4. Coarctation of aorta.

REFERENCE BOOKS :

1. Perloff's clinical recognition of congenital heart diseases, Joseph k perloff, Ariane J. Marlli, 2012, 6 th edition.
2. Braunwald's heart diseases, A text book of cardiovascular medicine, Bonow, Mann, Zipes, Lippy, 2015, 10 th edition.
3. Comprehensive textbook of echocardiography , Navin C Nandha ,2015, 1 st edition 4. Moss and Adam's heart diseases in infants , children and Adolescents including the fetus and young adult, Hugh D. alien, David J Driscoll, Robert E. Shaddy , Timothy FFeltes , copyright 2015, 8 th edition.

CLINICAL POSTINGS - III

L/T/P/C
/-/4/4

Echo: Chamber Assessment, Regional Wall Motion Abnormality (Rwma)

Left Ventricular Systolic Function, Left Ventricular Diastolic Function, Valve Pathology (Mitral, Tricuspid, Aortic, Pulmonary)

Congenital Heart Disease (Cyanotic, Acyanotic) Myopathies, Pericardial Effusion.

ECG-Myocardial Infraction, Disorders Of Cardiac Rhythm, Conduction Blocks, Drug and

Electrolyte Effects, Congenital Heart Disease, Cardiac – Implantable Electronic Devices.

ICU-Coronary Artery Disease, Valvular Heart Disease, Congenital Heart Disease

Ischemic Cardiomyopathies, Pericardial, Myocardial Disease

TMT- Hemodynamics, Protocol, Arrhythmias

Conduction Abnormalities, Myocardial Infraction

Cath- Coronary Angiogram, Coronary Angioplasty

Cardiac Pacemaker Implantation, Balloon Valvoplasty, TAVR, Pericardiocentasis

RESEARCH PROJECT AND SEMINAR

L/T/P/C

-/-/4/4

Learning Objectives

1. To develop research aptitude and scientific thinking skills.
2. To understand research methodology, data collection, and analysis techniques.
3. To enhance academic writing, presentation, and communication skills.
4. To encourage evidence-based learning and critical appraisal of scientific literature.
5. To develop confidence in presenting and defending research work.

Learning Outcomes

1. Identify and formulate relevant research problems in the field of specialization.
2. Conduct literature review and apply appropriate research methodology.
3. Collect, analyze, and interpret research data systematically.
4. Prepare and present seminars and research reports effectively.
5. Demonstrate scientific, ethical, and professional approach in research activities.

120 Hrs

- Introduction to Research Methodology
- Literature Review and Research Gap Identification
- Formulation of Research Question and Objectives
- Research Design and Study Planning
- Sampling Methods and Data Collection Techniques
- Statistical Analysis and Interpretation of Data
- Preparation of Research Proposal and Synopsis
- Ethical Considerations in Research
- Dissertation / Research Report Writing
- Seminar Preparation and Presentation Techniques
- Audio-Visual Aids and Scientific Presentation Skills
- Viva Voce and Research Defense Techniques

INTERPERSONAL COMMUNICATION

L/T/P/C
1/-/-/1

Course Description:
This course explores the fundamental principles, theories, and techniques of interpersonal communication. Students will examine both verbal and non-verbal communication strategies and apply these skills to improve personal and professional interactions. Through class discussions, role-playing, and group activities, students will develop a better understanding of effective communication in various social contexts.

Course Objectives:
By the end of the course, students will:

- Understand the theories and principles of interpersonal communication.
- Develop effective verbal and non-verbal communication skills.
- Analyse and enhance communication in various interpersonal relationships (e.g., friendships, family, workplace).
- Improve listening, empathy, and conflict-resolution skills.
- Understand cultural and gender influences on communication.
- Apply communication skills in real-world scenarios.

Unit 1

Introduction to Interpersonal Communication
Overview of interpersonal communication theory.
Key principles: sender, message, receiver, feedback, noise. Importance of communication in daily life.

Unit 2

Verbal Communication
The role of language in communication.
Choosing words carefully: Clarity, precision, and ambiguity. Influence of culture and context on verbal communication.

Unit 3
Non-Verbal Communication
Body language, facial expressions, and gestures. Space, posture, and touch in communication.
The role of non-verbal cues in conveying emotions

Unit 4 Listening Skills
Types of listening: Active, passive, reflective. Barriers to effective listening.
Developing empathy through listening.

Unit 5
Self-Disclosure and Relationship Development The importance of self-disclosure in relationships. The Johari Window model.
How self-disclosure affects trust and intimacy.

Unit 6
Conflict in Interpersonal Communication Types of conflict: Productive vs. destructive. Conflict management styles.
Strategies for resolving conflict in healthy ways.

Unit 7
Cultural and Gender Differences in Communication
Cultural influences on communication styles. Gender communication differences.
Strategies for effective cross-cultural communication.

Unit 8
Communication in Close Relationships
Communication patterns in romantic relationships, family, and friendships.
Managing expectations and maintaining healthy communication in intimate relationships.

Unit 9Communication in the Workplace
Interpersonal communication in professional settings.
Navigating professional relationships and maintaining boundaries. Communication and leadership.

Unit 10
Digital Communication
The role of technology in interpersonal communication. The impact of social media on relationships.
Pros and cons of digital communication tools.

The Ethics of Communication
Ethical dilemmas in communication.

Honesty, transparency, and privacy in conversations. Balancing openness with respect for others' boundaries.

Evaluation and Grading:
Assignments:50
Final exam (internal 50 marks)

Reference Textbook:

"Interpersonal Communication: Everyday Encounters" (Author: Julia T. Wood, 9th Edition)

III year – VI semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Community Medicine	3	-	1	4	30	70	100
2		Cardiac Cath and Intervention	3	-	1	4	30	70	100
3		Arrhythmia Management	3	-	1	4	30	70	100
4		Clinical Postings - IV	-	-	5	5	30	70	100
5		Research Methodolog and Biostastics	2	-	-	2	30	70	100
6		Research Project and seminar	-	-	2	2		100	100
7	VAC	Soft skills development	1	-	-	1	100		100
TOTAL			12		10	22	250	450	700

Semester – VI

Learning Objectives:

COMMUNITY MEDICINE

(60 hours)
L/T/P/C
3/-/1/4

1. Understand the principles and concepts of community medicine and public health.
2. Learn epidemiology, disease prevention, and health promotion strategies.
3. Understand communicable and non-communicable diseases affecting the community.
4. Explain national health programs and primary healthcare services.
5. Understand environmental sanitation, nutrition, and occupational health.
6. Develop awareness regarding community participation and healthcare delivery systems.

Learning Outcomes:

1. Explain the principles of community medicine and public health.
2. Identify methods of disease prevention and health promotion.
3. Apply epidemiological concepts in community health assessment.

4. Demonstrate understanding of national health programs and healthcare services.
5. Correlate environmental and social factors with community health.
6. Apply community medicine principles in healthcare and patient education.

COURSE OBJECTIVES:

1. To define Health and understand various concepts of Health
2. To know the Healthcare delivery system in India
3. To know various National Health Programmes of India
4. To have an overview of First Aid Principles and guidelines

Unit I **12 hours**

Concepts & Dimensions of Health-Definition of health; Changing concepts of health-biomedical concept, ecological concept, psycho-social concept and holistic concept;

Dimensions of Health – Physical dimension, mental dimension, social dimension etc; Spectrum of Health.Determinants of health & Concepts of Disease Causation-Determinants of Health – Biological determinants, Behavioural and socio-cultural conditions, Environmental & socio-economic conditions; Germ theory of disease; Epidemiological triad; Iceberg phenomenon of disease.

Unit II **12 hours**

Concepts of Prevention of disease -Levels of prevention – Primary prevention, secondary prevention, Tertiary prevention; Modes of intervention – Health promotion, Specific protection, Early diagnosis & treatment, Disability limitation, Rehabilitation. Basic terminologies in healthcare-Definitions of Mortality, Morbidity, Disability, Incidence, Prevalence, Incubation period, Period of communicability, Communicable diseases, non-communicable diseases, Outbreak, Epidemic, Endemic, Sporadic, Pandemic, Zoonoses, Nosocomial infection, Opportunistic infection, Iatrogenic infection, Immunization.

Healthcare status in India-Common health problems in India – Communicable diseases, non-communicable diseases, MCH problems, Nutritional problems.

Unit III: **12 hours**

Evolution of healthcare delivery systems in India, Health for all; National health policy Health care of the Community-Levels of health care – Primary health care, secondary health care, tertiary health care, Referral system; Primary health care- principles of primary health care, elements of primary health care. Health Care Systems-Structure of health care delivery system in India; Primary health care in India at village level – Village health guides scheme, Local dais, ICDS Scheme, ASHA scheme; MPHS male & female.

Unit IV **12 hours**

National Health Programmes -Introduction; National Vector Borne Disease Control Programme; Revised National Tuberculosis Control Programme; National AIDS Control Programme; Universal Immunization Programme; National Rural Health Mission; Reproductive and Child Health Programme; National Nutritional Anemia Prophylaxis Programme; National Cancer Control Programme;

Unit V **12 hours**

Indigenous system of Medicine in India-AYUSH & role of AYUSH in delivering health care in India;First aid-Basic principles & general guidelines; first aid in specific situations- Wound, bleeding, fracture, choking, burns, epistaxis, strains and sprain, animal bites (classification, causes and first aid), Cardio- pulmonary resuscitation.

Reference Books:

1. Park K. Park's Text book of Preventive and Social Medicine. 27th edition; Banarsidas Bhanot Publishers
2. AH Suryakantha. Textbook of Community Medicine with recent advances. 6th edition; Jaypee publishers
3. Community Medicine simplified – Sreejith P.S Paras publishers 2nd edition.
4. Community Medicine Preparation Manual for Undergraduates – Bhalwar Rajvir, 2nd Edition, Elsevier publishers

CARDIAC CATH AND INTERVENTION

(60 hours)

L/T/P/C
3/-/1/4

Learning Objectives

1. Understand the principles and setup of cardiac catheterization laboratories.
2. Learn cardiac catheterization procedures and hemodynamic monitoring techniques.
3. Explain coronary angiography and interventional cardiology procedures.
4. Understand angioplasty, stenting, and structural heart interventions.
5. Learn radiation safety, sterile techniques, and emergency management in cath lab practice.
6. Develop technical skills in assisting diagnostic and interventional cardiac procedures.

Learning Outcomes

1. Explain cardiac catheterization and coronary angiography procedures.
2. Demonstrate understanding of hemodynamic monitoring and pressure measurements.
3. Identify equipment and instruments used in cardiac interventions.
4. Assist in angioplasty, stenting, and other interventional procedures.
5. Apply radiation safety and infection control measures in cath lab practice.
6. Utilize cardiac cath and intervention knowledge in cardiovascular technology practice.

COURSE OBJECTIVES:

1. Understanding Cardiac Catheterization and Diagnostic Techniques.
2. Learn the principles and different techniques of Interventional procedures.

UNIT 1: 12 hours

Cath lab oriented machines-Generation of X- rays and basic physics – Cath lab equipment's Fluoroscopy, Movements of gantry and cath table Angiographic views and basic maintenance of equipment's Cardiac radiology and radiation safety measures Power injector – Principles- Defibrillators – Intra Aortic balloon pump – Console room techniques.

UNIT 2: 12 hours

Monitoring system in cathlab -Monitors-Transducers- ECG-Pulse – Oximetry – NIBP- Noninvasive Blood pressure – Temporary pacemaker- IAP waveforms and recording systems – fluid filled catheter systems, pressure transducers and basic invasive pressure monitoring.

UNIT 3: 12 hours

Cardiac catheterization Hardwares- Catheters- Used in diagnostic and intervention procedures- Guide wires- Used in various diagnostic and intervention procedures – Sheath indicator – hardware's cleaning and Packing-Techniques of sterilization – Advantages and Disadvantages of each setting up in the cardiac catheterization laboratory for a diagnostic study – Balloon and stents

UNIT 4: **12 hours**

Right heart catheterization, left heart catheterization, Arterial and Venous Access – Radial Artery Catheterization – Femoral artery Catheterization – Venous access- Sheath removal RHC- procedure, cath position, oximetry at various levels, angio done & interpretation

LHC – procedure, cath position, oximetry at various levels, angio done & interpretation.

UNIT 5: **12 hours**

Coronary Angiogram and Peripheral angiogram-CAG – Procedure, materials used, type and amount of dye used, indications, contraindication and complications, various pictures recorded in various angles and gross interpretation, Peripheral angiogram-procedure, indication and contraindication.

PRACTICALS:

1. Understanding patient selection criteria, including indications and contraindications for cardiac catheterization.
2. Understanding angiography techniques for visualizing coronary anatomy
3. Interpretation of imaging results to guide interventions.
4. Detailed overview of common interventions such as angioplasty, stent placement

REFERENCES BOOKS:

1. Grossman's cardiac Catheterization, Angiographic and interventions, Donald S Baim, 2006, Seventh edition
2. Invasive Cardiology, A Manual for Cath lab, personnel, Sandy Watson and kennath A Gorski, 2011, Third edition
3. Chistens physics of diagnostic radiology, Thomas S Curry III, Robert C Murry Jr, James E Dowdey, 1990, Fourth edition

Learning Objectives:

ARRHYTHMIA MANAGEMENT

(60 hours)

L/T/P/C

3/-/1/4

1. Understand the mechanisms and classification of cardiac arrhythmias.
2. Learn ECG interpretation related to arrhythmias and conduction abnormalities.
3. Explain pharmacological and non-pharmacological management of arrhythmias.
4. Understand pacemakers, defibrillators, and electrophysiological procedures.
5. Learn emergency management of life-threatening arrhythmias.
6. Develop practical skills in arrhythmia recognition and patient monitoring.

Learning Outcomes:

1. Identify and classify common cardiac arrhythmias using ECG findings.
2. Interpret conduction abnormalities and rhythm disturbances accurately.
3. Explain treatment modalities for arrhythmia management.
4. Demonstrate understanding of pacemaker and defibrillator functions.
5. Apply emergency management principles for critical arrhythmias.
6. Utilize arrhythmia management knowledge in cardiovascular patient care.

COURSE OBJECTIVES :

1. Understand the clinical significance of different types of arrhythmias
2. Develop Acute and chronic Arrhythmia Management Skill.

UNIT-I: **12 hours**

Basic life support – Adult, pediatric, pregnancy CPR, Foreign body airway obstruction – Chocking – Adult, Pediatric, pregnancy, Automated electrical defibrillator.

UNIT- II: **12 hours**

ACLS – Cardiac arrest algorithm, post cardiac algorithm, Airway management – OPA, NPA, LMA, Endotracheal Tube, combi tube, Difficult airway intubation.

UNIT –III: **12 hours**

Patient history taking-Insertion techniques, contraindications & indications of Central venous access, intravenous, intramuscular, intraosseous, subcutaneous, defibrillator. Brady arrhythmia, heart block, tachyarrhythmia, stroke, MI.

UNIT –IV: **12 hours**

Arterial blood gas; respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis, Compensated and uncompensated MUD PILES, Anion gap. Basic first aid – environmental, medical and traumatic emergencies

UNIT –V: **12 hours**

Blood pressure, Pulse oximetry, Temperature, Capnography.

PRACTICALS:

1. Drug administration-[Intravenous, Intramuscular, Subcutaneous].

2.Intubation, CPR techniques in Adult, pediatric and pregnant women.

1. How to use AED, ECG interpretation, ABG interpretation.

2. Defibrillation vs cardioversion.

REFERENCES BOOKS :

1. Tintinalli's Emergency Medicine-AComprehensive Study Guide, 9th Edition; Judith E. Tintinalli Publisher.

2. Nancy Caroline's Emergency Care in the Streets-Volume 1 ;Nancy L. Caroline publisher.

3. The Textbook of Emergency Cardiovascular Care and CPR ; John M. Field publisher.

CLINICAL POSTINGS – IV

L/T/P/C
-/-5/5

Practicals

Defibrillators – Intra Aortic balloon pump –Console room techniques

Guide wires- Used in various diagnostic and intervention

Coronary Angiogram – Procedure, materials used
type and amount of dye used in Coronary Angiogram

Types of – Balloon and stents

Case presentation & seminar

Basic life support – Adult, pediatric, pregnancy CPR, Foreign body airway obstruction – Chocking – Adult, Pediatric, pregnancy, Automated electrical defibrillator, ACLS – Cardiac arrest algorithm, post cardiac algorithm

Airway management – OPA, NPA, LMA, Endotracheal Tube, combi tube, Difficult airway intubation, Patient history taking, Insertion techniques, contraindications & indications of Central venous access, intravenous, intramuscular, intraosseous, subcutaneous, defibrillator. Brady arrhythmia, heart block, tachyarrhythmia, stroke, MI Arterial blood gas; respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis, Compensated and uncompensated MUD PILES, Anion gap. Basic first aid – environmental, medical and traumatic emergencies, Blood pressure, Pulse oximetry, Temperature, Capnography.

COURSE OBJECTIVES:

1. Understand the clinical significance of different types of arrhythmias
2. Develop Acute and chronic Arrhythmia Management Skill.

RESEARCH METHODOLOGY AND BIOSTATISTICS

(30 HOURS)

L/T/P/C
2/-/-/2

Learning Objective:

1. To understand fundamental concepts of research methodology, including research design, problem formulation, and hypothesis testing.
2. To develop knowledge of ethical principles and guidelines in conducting biomedical and clinical research.
3. To acquire basic skills in biostatistics, including data collection, analysis, and interpretation.
4. To learn the process of developing a structured research proposal

using appropriate sampling and data collection methods.

Learning Outcome:

1. Formulate research problems, objectives, and hypotheses using appropriate research designs and methodologies.
2. Apply ethical principles, including informed consent and data confidentiality, in research practices.
3. Analyze and interpret data using basic biostatistical tools such as measures of central tendency, probability, and graphical representation.
4. Develop and present a complete research proposal incorporating sampling techniques, data collection methods, and analysis plans.

UNIT I: Introduction to Research Methodology ***(6 hrs)***

- Research concepts and types
- Research process
- Research problem and objectives
- Research ethics

UNIT II: Research Design and Sampling ***(6 hrs)***

- Research designs
- Variables and hypothesis
- Sampling techniques
- Data collection methods

UNIT III: Descriptive Biostatistics ***(6 hrs)***

- Types of data
- Data presentation
- Measures of central tendency
- Measures of dispersion

UNIT IV: Inferential Biostatistics ***(6 hrs)***

- Probability and normal distribution
- Hypothesis testing
- Correlation and regression
- Statistical significance

UNIT V: Data Analysis and Research Reporting ***(6 hrs)***

- Statistical software (SPSS/Excel)
- Data interpretation
- Research report writing
- Referencing and plagiarism prevention

RECOMMENDED BOOKS:

1. Methods in biostatistics by Mahajan
2. Research methodology by C R Kothari
3. Textbook of biostatistics by Sundar Rao
4. Textbook of biostatistics and research methodology by U. Satyanarayana

5. Creswell, J.W., & Creswell, J.D. (2023). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches
6. Shamoo, A.E., & Resnik, D.B. (2015). Responsible Conduct of Research.
7. Creswell, J.W. (2023). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches

RESEARCH PROJECT AND SEMINAR

(30 HOURS)

L/T/P/C
-/-/2/2

Learning Objectives

- Develop the ability to identify a research problem.
- Understand research methodology and ethical principles.
- Learn data collection, analysis, and interpretation.
- Improve scientific writing and presentation skills.
- Present and defend research findings effectively.

Learning Outcomes

- Conduct an independent research project.
- Apply appropriate research methods.
- Analyze and interpret research data.
- Write a scientific research report.
- Deliver an effective seminar presentation.

SYLLABUS

UNIT I: Research Planning and Proposal Development *(6 Hours)*

- Introduction to research and evidence-based practice
- Identification and selection of a research problem
- Formulation of research objectives and hypothesis
- Review of literature and literature search strategies
- Preparation of research proposal and synopsis
- Ethical principles in biomedical research and Institutional Ethics Committee (IEC) approval

UNIT II: Research Methodology and Data Collection *(6 Hours)*

- Research design (observational and experimental studies)
- Sampling techniques and sample size
- Development of data collection tools (questionnaires, case record forms)
- Informed consent process
- Data collection methods and documentation
- Good Clinical Practice (GCP) and research ethics

UNIT III: Data Analysis and Interpretation *(6 Hours)*

- Data coding, entry, and validation
- Descriptive and inferential statistics
- Use of statistical software (SPSS/MS Excel)
- Data presentation using tables, charts, and graphs
- Interpretation of results

- Discussion and comparison with published literature

UNIT IV: Research Report Writing and Seminar Presentation ***(6 Hours)***

- Structure of a research report/dissertation
- Referencing styles (Vancouver/APA)
- Scientific writing and plagiarism prevention
- Preparation of PowerPoint presentations
- Seminar presentation techniques
- Handling questions and academic discussions

UNIT V: Project Submission, Evaluation and Publication ***(6 Hours)***

- Final project compilation and formatting
- Preparation of abstract and manuscript
- Poster and oral presentation guidelines
- Viva voce preparation
- Publication ethics and authorship
- Research dissemination and future scope of the study

SOFT SKILLS DEVELOPMENT

L/T/P/C
1/-/-/1

Course Objectives:

By the end of the course, students will:

- Improve their communication and interpersonal skills.
- Develop emotional intelligence (EQ) and conflict resolution strategies.
- Enhance their ability to work in teams and exhibit leadership qualities.
- Gain confidence in public speaking and professional writing.
- Master time management and personal organization strategies.

Week 1
Introduction to Soft Skills
Definition of soft skills vs. hard skills
The importance of soft skills in the workplace
Key soft skills: communication, teamwork, adaptability, problem-solving, leadership, etc.

- **Activities:** Icebreakers, group discussions on soft skills in the workplace
- **Assignment:** Self-assessment on current soft skills

Week 2
Communication Skills
The communication process: sender, message, receiver,
feedback Active listening techniques
Body language and non-verbal

cues Effective speaking: tone,
clarity, and pacing Email and
phone communication etiquette

- **Activities:** Role-playing scenarios (e.g., client interaction, conflict resolution)
  - **Assignment:** Practice active listening and send an email incorporating effective communication principles.

Week 3

Emotional Intelligence (EQ)

What isemotional intelligence? (Self-awareness, self-regulation, motivation, empathy, and social skills) Recognizing and managing your emotions
Understanding others' emotions and building empathy
Developing emotional resilience

- **Activities:** Emotional intelligence quizzes, group discussion on handling emotions in stressful situations
- **Assignment:** Journaling emotional responses and reflection on EQ practices.

Week 4

Teamwork and
Collaboration Roles and
dynamics within teams
Effective communication
in teams Conflict
resolution in teams
Building trust and fostering a collaborative environment

- **Activities:** Team exercises, problem-solving tasks, and brainstorming sessions • **Assignment:** Work on a team project or task, and present it in class.

Week 5

Conflict Resolution

Sources of conflict (miscommunication, differing priorities,
etc.) Conflict resolution strategies (e.g., negotiation, mediation,
compromise) The role of active listening in resolving
conflicts
Managing personal emotions during conflict

- **Activities:** Case studies, role-playing conflict resolution scenarios
- **Assignment:** Reflect on a personal or professional conflict and propose a resolution strategy.

Week 6

Time Management and Personal Organization

The importance of time management in personal and professional
success Prioritization techniques (e.g., Eisenhower Matrix, ABCDE
method)
Tools for time management (digital calendars, to-do lists, Pomodoro technique)
Setting SMART goals
Managing procrastination and avoiding distractions

- **Activities:** Time-blocking exercises, goal-setting workshop
- **Assignment:** Create a personal time management plan and track daily productivity for a week.

Week 7

Leadership and Influence

Types of leadership (e.g., transformational, transactional, servant leadership) Leading by example: qualities of effective leaders

Building and maintaining team morale

The art of persuasion and influence

- **Activities:** Leadership style assessment, group discussions on leadership challenges
- **Assignment:** Write a reflection on a leader you admire and why.

Week 8

Public Speaking and Presentation Skills

Overcoming fear of public speaking

Structuring a presentation (opening, body, conclusion) Effective use of visual aids (PowerPoint, etc.)

Engaging the audience through storytelling, eye contact, and body language

- **Activities:** Group presentations, peer feedback sessions, impromptu speaking exercises
- **Assignment:** Prepare and deliver a short presentation (5-7 minutes) on a topic of choice.

Assessment and Evaluation:

Class Participation :20

Assignments: 30

Final: 50

Reference Textbook

The 7 Habits of Highly Effective People" by Stephen R. Covey

FOURTH YEAR

Semester – VII

INTERNSHIP-I

PROJECT

L/T/P/C
2/-/26/2

Semester – VIII

L/T/P/C
2/-/26/2

INTERNSHIP-II

PROJECT