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LIAQUAT UNIVERSITY
OF MEDICAL & HEALTH SCIENCES,
JAMSHORO, SINDH

STUDY GUIDE

FIRST PROFESSIONAL MBBS

BATCH 2024-25

ACADEMIC SESSION 2024-25

ACADEMIC CALENDAR
Academic Session 2024-2025

Activity	Class Year	Dates
Classes starts	First Prof MBBS	February 18, 2025
Eid-ul-Fitr	Holiday	March 31 to April 06, 2025
Classes Resumes	All Batches of MBBS	April 07, 2025
Summer Vacation	1st to 4th Year MBBS	June 07 to July 06, 2025
Classes Resumes	All Batches of MBBS	July 07, 2025
Classes Ends	First Year MBBS	November 14, 2025
Exam Preparation	First Year MBBS	November 15 to December 07, 2026
Annual Examination	First Year MBBS	December 08 to January 04, 2026

PREFACE

The MBBS curriculum is designed to prepare the medical student to assume the role of the principal carer for patients. The majority of instruction in the various basic and clinical science disciplines is focused on attaining this objective. The amount of material and specificity that the student must acquire in order to complete the MBBS programme as a whole is substantial. Subject-based instruction affords students the chance to develop comprehensive and profound understanding of each respective subject. However, this instructional framework might result in the student failing to recognize the interconnectedness of knowledge across different disciplines, their interrelation, and most significantly, their significance in the context of patient care.

Over the years, numerous inventive approaches have been devised to tackle these obstacles. One such approach is the integration of instruction at multiple levels, which eliminates and reduces boundaries within subjects, both vertically and horizontally, across phases. LUMHS, while acknowledging the merits of these methodologies, has endeavoured to seize the opportunity to comprehend the interdependencies and minimise duplication in the subjects being instructed through the implementation of an integrated modular approach.

The cardiovascular system, musculoskeletal system, and respiratory system are few examples of system-based modules in an integrated modular curriculum that connects basic scientific knowledge to clinical problems. By means of integrated instruction, subjects are presented as a unified whole. Students can enhance their comprehension of basic scientific principles through consistent application of clinical examples in their learning. A skills lab provides early exposure to the acquisition of skills, case-based discussions, and self-directed learning are all elements of an integrated teaching programme.

LEARNING STRATEGIES

The following instructional and learning strategies are implemented to foster greater comprehension:

- Interactive Lectures
- Small group sessions
- Case-Based Learning (CBL),
- Self-Study,
- Practical,
- Skills lab sessions,
- Demonstrations
- Field visits

INTERACTIVE LECTURES

In large group, the lecturer actively involves the students by introducing the topic or common clinical conditions and explains the underlying phenomena by questions, pictures, videos of patients' interviews, exercises, etc. in order to enhance their learning process.

SMALL GROUP TEACHING (SGT):

This strategy is helpful for the students to make their concepts clear, and s acquiring skills or attitudes. These sessions are organized with the help of specific tasks such as patient case, interviews or discussion topics. Students are than encouraged to exchange their ideas and apply knowledge gained from lectures, tutorials and self-study. The facilitator employs probing questioning, summarization, or rephrasing techniques to enhance the understanding of concepts.

CASE- BASED LEARNING:
A format of small group discussion that centers on a sequence of questions derived from a clinical scenario, with the aim of facilitating learning. Students engage in discussions and provide answers by applying pertinent knowledge acquired in clinical and basic health sciences throughout the curriculum.

PRACTICAL:
Basic science practical related to anatomy, biochemistry, pathology, pharmacology and physiology are scheduled to promote student learning by application.

SKILLS LAB SESSION:
Skills relevant to respective module are observed and practiced where applicable in skills laboratory.

SELF DIRECTED LEARNING:
Students take on the responsibility of their own learning by engaging in independent study, collaborating and talking with classmates, accessing knowledge from the Learning Resources available, teachers, and other experts. Students can make use of the designated self-study hours provided by the college.

DEMONSTRATIONS:
During Anatomy teaching hour students in small groups are encouraged to utilize their knowledge in demonstrating different morphological features of various organs of the body with the help of their facilitator and discuss with their peers. This would help in enhancing their learning as well as motivate them in team based learning environment.

FIELD VISITS:
Students visit community health areas to understand the common diseases and their preventive measures.

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STUDY GUIDE

A study guide is a strategic and effective approach to

- ❖ Provide students a detailed framework of the modules organization
- ❖ Support students in organizing and managing their studies throughout academic year.
- ❖ Provide students information on assessment methods and the rules and regulations that apply.

- It outlines the outcomes which are expected to be achieved at the end of each module.
- Ascertains the education strategies such as lectures, small group teachings, demonstration, tutorial and case based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources for students in order to increase their learning.
- Emphasizes information on the contribution of attendance, end module tests, block examinations and annual examinations on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's achievement of objectives.

ABBREVIATIONS

FOUNDATION	Fnd
HAEMATOLOGY	Hem
RESPIRATORY	RESP
CARDIOVASCULAR	CVS
MUSCULOSKELETAL	MSK
PATHOLOGY	Path
PHARMACOLOGY	Pharm
MEDICINE	Med
SURGERY	Surg
PAEDIATRICS	Paeds
COMMUNITY MEDICINE	CM
GYNAECOLOGY & OBSTETRICS	Gynae & Obs
CARDIOLOGY	Cardio
SPIRAL	S

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FOUNDATION MODULE-1

Introduction Welcome to the foundation module. This exciting module will serve as building block and is very essential to your future work as doctors. This module is designed to make your learning both interesting and productive by including several interactive activities.

During this module, students will be encouraged to learn basic organization of human body in terms of structure, function and Biochemical properties in an integrated manner i.e. Basic subjects including Anatomy, Physiology, Biochemistry, Pharmacology and Pathology will be learned and assessed together. You will also learn to integrate basic knowledge with clinical relevance. By adopting this approach, you will be prepared for your future work as doctor, where patients will come to you with problems that are not categorized by discipline name.

In order to help you learn in an integrated manner, we have updated the learning of basic sciences around a few key health-related situations (real life situations), which you are likely to encounter as house officers. You will be expected to think about the scenarios and participate in case-based learning sessions for clearing your concepts and better learning. It will also help you focus your attention on what you need to achieve from the Interactive Lectures, practical and tutorials that have been scheduled during this module.

Rational Orientation of medical sciences in respect to health and disease is the fundamental requirement of every medical student. Therefore, this module is designed to provide the integration of core concepts that underlie the foundation of basic sciences and their correlation and application in clinical sciences. Students also learn clinical skills such as how to communicate effectively with patients and their relatives with compassion and understanding their issues/problems and how to resolve in coming years. Working in groups will enhance students' team working skills and capacity and management skills. Along with LGT/Interactive Lectures, practical and demonstrations; through supplemented case-based learning they develop problem solving skills to apply their basic medical knowledge and skills to practical situations under supervision and subsequently in real life practice.

Duration 8 weeks

Learning Outcomes

by the end of this foundation module, the students should be able to:

Knowledge

- Describe the cell division, its types and genetic material along with its clinical correlation.
- Describe the basic organization of the human body.
- Describe the basic tissues of the human body
- Explain the maintenance of homeostatic mechanism.
- Describe the various malformations.
- Describe the Biochemistry of carbohydrates, nucleic acids and enzymes
- Describe various cellular adaptations during cell growth, differentiation and cell injury
- Describe the basic concepts of medical ethics, professionalism, clinical research, behavioral sciences, communication skills, information technology skills

Skills

- Describe the basic laboratory techniques and demonstrate the use of microscope
- Identify basic tissues under the microscope
- Learn and follow the basic laboratory protocols
- Perform Biochemical analysis of carbohydrates
- Prepare different solutions used in laboratory for tests

Attitude

- Follow the basic laboratory protocols
- Participate in class and practical work professionally
- Communicate effectively in a team with pears, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, pears, staff and teachers.
- Communicate effectively in a team with pears and teachers.
- Demonstrate the ability to reflect on the performance.

Themes

Theme 1: Cell structure, Chemistry and Function
Theme 2: Cellular interactions, Cell injuries, Cellular responses and Adaptations
Theme 3: Body fluids: Composition, Function & Homeostasis
Theme 4: Macromolecules: Fundamental tissues/systems of the human body
Theme 5: Fundamental tissues/systems of the human body
Theme 6: Development, Differentiation and Growth
Theme 7: Genetics and Developmental anomalies

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

INTRODUCTORY WEEK

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
		Anatomy		
1	State the history of the subject Anatomy including its various branches and practical applications of Anatomy as a foundation in different fields of medicine	**Fnd-S1-Ana-G1** Introduction to the subject of Anatomy and its subdivisions	Interactive Lecture	SBQs & OSVE
2	Comprehend the exact location of dissected/ prosecuted part /organ of human body with respect to various terms of positions, direction, and body planes	**Fnd-S1-Ana-G2** Anatomical position, Anatomical planes & terms of position		
3	Interpret the movements of different parts of human body the knowledge of various terms of movement.	**Fnd-S1-Ana-G3** Terms of movements		
4	Explain the appendicular and axial skeleton	**Fnd-S1-Ana-G4** Introduction to the parts of axial and appendicular skeleton		
		Physiology		
5	Define Physiology and Enumerate the branches of Physiology	**Fnd-S1-Phy-1** Introduction to Physiology	Interactive Lecture	SBQs & OSVE
		Biochemistry		
6	Define Biochemistry & Discuss the role of Biochemistry in medicine	**Fnd-S1-Bio-1** Introduction to Biochemistry and its implication in medicine	Interactive Lecture	SBQs &OSVE

7	Describe the significance of Protection protocols to keep yourself safe during Biochemistry laboratory work.	**Fnd-S1-Bio-2** Laboratory Hazards & Protection Protocols	Practical	OSPE & OSVE
8	Demonstrate importance of chemicals and reagents in the different reactions of Biomolecules	**Fnd-S1-Bio-3** Chemicals and reagents		
9	Illustrate techniques of using glassware and handling of Biochemical instruments during laboratory work.	**Fnd-S1-Bio-4** Use of glassware & Instruments for laboratory work		
Pathology				
10	Define the pathology Enumerate the different branches of pathology Describe the terminologies used in Pathology	**Fnd-S1-Path-1** Introduction to Pathology	Interactive Lecture	SBQs & OSVE
Pharmacology				
11	Define the Pharmacology and role of Pharmacology in medicine Discuss Pharmaco-dynamics and Pharmacokinetics	**Fnd-S1-Pharm-1** Introduction to Pharmacology	Interactive Lecture	SBQs & OSVE
Community Medicine				
12	Define different definition of public health/Community Medicine Discuss basic functions of Public health/community Medicine Define the difference between clinical and community medicine Discuss Non-Governmental organizations, International agencies and National Programs of Pakistan	**Fnd-S1-CM-1** Introduction to Community Medicine & Public Health	Interactive Lecture	SBQs & OSVE
Forensic Medicine				
13	Define Forensic Medicine, Forensic Pathology and state Medicine Know the branches and the history of Forensic Medicine briefly Discuss the scope of Forensic Medicine in practice Identify the essential facilities for medico legal investigation. Define medical jurisprudence and differentiate it from Forensic medicine	**Fnd-S1-FM-1** Introduction to forensic Medicine and Toxicology	Interactive Lecture	SBQs & OSVE

Medical Education				
14	Describe the curriculum and modules under implementation Describe the use of study guides (not to be assessed) Differentiate between various teaching & learning strategies Enlist various assessment tools, and assessment policy	**Fnd-S1-ME-1** Curriculum structure teaching learning strategies	Interactive Lecture	SBQs & OSVE
15	Describe various study skills strategies	**Fnd-S1-ME-2** Study skills strategies		
Information Technology				
16	Define IT and its importance in Medicine	**Fnd-S1-IT-1** Importance of IT skills	Interactive Lecture	SBQs & OSVE
Library Sciences				
17	Learn literature search skills	**Fnd-S1-LIB-1** Literature search and library resources	Interactive Lecture	SBQs & OSVE
Behavioral Sciences				
18	Learn the significance of communication skills in Medical Sciences	**Fnd-S1-BS-1** Introduction to behavioral Sciences	Interactive Lecture	SBQs & OSVE
Communication Skills				
19	Learn the significance of communication skills in Medical Sciences	**Fnd-S1-CS-1** Introduction to communication skills	Interactive Lecture	SBQs & OSVE
Biomedical Ethics				
20	Learn the significance of ethics in Medical Sciences	**Fnd-S1-BE-1** Introduction to Bio Medical Ethics	Interactive Lecture	SBQs & OSVE
Research Methodology				
21	Learn the significance of ethics in Medical Sciences	**Fnd-S1-RM-1** Introduction to research methodology	Interactive Lecture	SBQs & OSVE

Theme 1: Cell Structure, Chemistry & Functions

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
22	Describe the basic structure and functions of cell membrane. Describe the basic structure and functions of the Nucleus.	**Fnd-S1-Ana-H1** Cell structure and function (Membrane structure and the Nucleus)	Interactive Lecture	SBQs & OSVE
23	Describe the structural Organization of different organelles of a cell. (Endoplasmic Reticulum, Golgi Apparatus, Ribosomes, Centrioles, Mitochondria, Lysosomes, Peroxisomes)	**Fnd-S1-Ana-H2** Cell Organelles		

24	Operate the different parts of the light microscope. Explain how to use the light microscope to visualize a slide.	**Fnd-S1-Ana-H3** Parts of Light microscope	Practical	OSPE & OSVE
Physiology				
25	Describe the Functional arrangement of different level of organization and General structure, Physiology and composition of cell, tissues, organs, organ systems, cell nutrition, capillary and venules.	**Fnd-S1-Phy-2** Functional arrangement of different levels of organization and General structure and composition of Cell.	Interactive Lecture	SBQs& OSVE
26	Define the Functional organization of different components of a cell and its organelles, Describe the functions of lysosomes & peroxisomes, Endoplasmic Reticulum.	**Fnd-S1-Phy-3** Cell organelles-I (Lysosomes, Peroxisomes, Endoplasmic Reticulum, Golgi complex)		
27	Describe the functions of mitochondria, its special features & its role in generation of ATP Describe the functions of ER, Golgi apparatus, Ribosomes, and cytoskeleton.	**Fnd-S1-Phy-4** Cell organelles-II Mitochondria, Microtubules & Microfilaments, Ribosomes Vaults Centromere.		
28	Recognize the structure & functions of Nucleus	**Fnd-S1-Phy-5** Nucleus & its functions		
29	Show the Parts And Functions of the Microscope	**Fnd-S1-Phy-6** Introduction to Microscope	Practical	OSPE & OSVE
Biochemistry				
30	Describe the chemical structure and significance of mitochondria, functions and location of enzymes for metabolic pathways & chemical reactions that occur in mitochondria.	**Fnd-S1-Bio-5** Mitochondria: Structure, functions & location of enzymes for metabolic pathways	Interactive Lecture	SBQs & OSVE
31	Prepare all types of solutions and their quantities in different chemicals reaction.	**Fnd-S1-Bio-6** Solutions, concentration expression (Percent solutions, Molarity, Molality, Normality)	Practical	OSPE & OSVE
Pathology				
32	Define Hypertrophy, Hyperplasia, Atrophy and Metaplasia. Enlist Physiological and pathological mechanisms of cellular adaptation	**Fnd-S1-Path-2** Cellular adaptations	Interactive Lecture	SBQs & OSVE

Theme 2: Cellular Interactions, Cell Injuries, Cellular Responses and Adaptations

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
33	Describe components of cell surface modifications and junction complex	**Fnd-S1-Ana-H-4** Cell surface modifications and cell Junctions	Interactive Lecture	SBQs & OSVE
34	Differentiate between normal and abnormal cell division and their consequences	**Fnd-S1-Ana-E-1** Cell cycle: Mitosis and Meiosis cell divisions		
35	Enlist steps of tissue processing. Define the artifacts. Know the basic histological stains. Define H&E Staining.	**Fnd-S1-Ana-H-5** Slide preparation and the H&E Staining	Practical	OSPE & OSVE
Physiology				
36	Explain composition and basic structure of cell membrane, its functional importance and adaptation	**Fnd-S1-Phy-7** Plasma membrane & its structure and function	Interactive Lecture	SBQs & OSVE
37	Describe types and process of transport across the membrane and their effects.	**Fnd-S1-Phy-8** Types of transport, Simple Diffusion		
38	Describe the Transport across cell membrane via protein mediated method. Describe the process of osmosis	**Fnd-S1-Phy-9** Protein mediated transport Facilitated diffusion, Osmosis		
39	Explain the Physiological mechanism and types of transport. (Passive & Active)	**Fnd-S1-Phy-10** Active transport, Primary active transport, Secondary active transport Bulk transport		
40	Describe the membrane potential its development & maintenance of resting membrane potential. Explain Permeability of cell membrane Explain the Propagation of action potential and its ionic basis	**Fnd-S1-Phy-11** Resting membrane Potential Graded potential, Factors affecting membrane potential		
41	Discuss action potential Give mechanism of propagation of action potential & its ionic changes	**Fnd-S1-Phy-12** Action potential		
42	Employ types and methods of sterilization	**Fnd-S1-Phy-13** Sterilization	Practical	OSPE & OSVE
Pathology				
43	Demonstrate gross and microscopic features of cellular adaptations and Necrosis	**Fnd-S1-Path-3** Cell Pathology	Interactive Lecture	SBQs & OSVE
Pharmacology				

44		**Fnd-S1-Pharm-2** Introduction to Pharmacokinetics	Interactive Lecture	SBQs & OSVE
45		**Fnd-S1-Pharm-3** Introduction to Pharmacodynamics		

Theme 3: Body Fluids: Composition, Function & Homeostasis

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Physiology				
46	Describe the divisions of body fluids into intracellular, extracellular and intravascular compartments.	**Fnd-S1-Phy-14** Body fluids	Interactive Lecture	SBQs& OSVE
47	Recognize the Physiological aspects for the maintenance of homeostasis, ECF, Internal environment and role of various body systems in homeostasis.	**Fnd-S1-Phy-15** Homeostasis		
48	Explain the concepts of homeostasis and its regulation through feedback mechanism. Negative feedback, Positive Feedback, Feed-forward Stress & disease	**Fnd-S1-Phy-16** Mechanisms of Homeosta		
Pharmacology				
44	Enlist different routes of drug administration Describe the merits & demerits of the different routes of drug administration	**Fnd-S1-Pharm-4** Routes of drug administration	Interactive Lecture	SBQs & OSVE
Pathology				
51	Define cell aging Discuss events in Cellular Aging	**Fnd-S1-Path-4** Cell Aging	Interactive Lecture	SBQs & OSVE

Theme 4: Macromolecules/ Fundamental tissues/systems of the Human Body

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
52	Define the divisions & functions of skeletal system. Classify bones on the basis of shape, development, region, structure and microscopic features, gross structure of adult long bone and parts of young long bone.	**Fnd-S1-Ana-G5** The skeletal system (classification of bones.)	Demonstration	SBQs, OSPE & OSVE
53	Describe general concepts of development, ossification and blood supply of bones	**Fnd-S1-Ana-G6** Bone development (ossification), Blood		

		supply of long bones		
54	Define the joints. Classify joints on the basis of structure, regions and functions Discuss the characteristics of synovial joints and classify on basis of structure & movement	**Fnd-S1-Ana-G7** The joints and its types. The synovial joints.	Interactive Lecture	SBQs & OSVE
55	Define dislocation, sprain and inflammation of joints	**Fnd-S1-Orth-1** Fractures	Clinical Interactive Lecture	SBQs & OSVE
56	Describe the microscopic features of epithelial tissues Explain their functional importance and their surface modifications	**Fnd-S1-Ana-H-06** The Epithelium	Interactive Lecture	SBQs & OSVE
57	Discuss gross and microscopic features of exocrine glands	**Fnd-S1-Ana-H-07** Exocrine glands		
58	Define the composition of the connective tissue. Describe and differentiate the microscopic features of the different types of the connective tissues	**Fnd-S1-Ana-H-08** Histology of Connective tissue		
59	Demonstrate histological features of cartilage. Describe the types of the cartilage.	**Fnd-S1-Ana-H-09** The cartilage and its types		
60	Identify different types of the epithelia on the light microscope	**Fnd-S1-Ana-H-10** Epithelium	Practical	OSPE & OSVE
Physiology				
61	Explain Physiology experiments and introduction to power-lab.	**Fnd-S1-Phy-17** Power lab	Practical	OSPE & OSVE
62	Identify the indications of hand washing Demonstrate the protocols and steps of hand washing in sequential manner	**Fnd-S1-Phy-18** Hand washing		
Biochemistry				
63	Apply the basic knowledge of carbohydrates in chemistry for health	**Fnd-S1-Bio-07** carbohydrates: introduction, classification and its Biochemical significance	Interactive Lecture	SBQs& OSVE
44	Describe the Biochemical structure of polysaccharides with its clinical importance	**Fnd-S1-Bio-08** Monosaccharides: Classification, Structure, Functions		
65	Discuss functions of carbohydrates in cell membrane,	**Fnd-S1-Bio-09** Chemical Properties &		

	energy provision and nutrition supply to different parts of body	Derivatives of Monosaccharides & their Biochemical significance in Biological systems.		
66	Describe different isomers of monosaccharides e.g. Glactose, Mannose, Fructose, Dextrose.	**Fnd-S1-Bio-10** Isomerism: Structural & Optical Isomerism in carbohydrates & their Biochemical significance.		
67	Explain Structure of disaccharides and oligosaccharides	**Fnd-S1-Bio-11** Glycosidic Linkage, Biologically important disaccharides and oligosaccharides		
68	Describe classification of polysaccharides and their functions.	**Fnd-S1-Bio-12** Polysaccharides: Classification, Structure & Functions of Homopolysaccharides		
69	Perform Molisch's Test, Iodine Test, Benedict's Test to identify an unknown carbohydrate in a given fluid	**Fnd-S1-Bio-13** Molisch's Test, Iodine Test, Benedict's Test	Practical	OSPE & OSVE
70	Detect carbohydrates by different tests	**Fnd-S1-Bio-14** Selivanoff's Test, Barfoed's Test, Osazone Test		
71	Classify amino acids on the basis of their polarity, charge & nutritional significance.	**Fnd-S1-Bio-15** Classification of Amino Acids on the basis of structure, Properties, Nutrition & their role in human metabolism	Interactive Lecture	SBQs & OSVE
72	Describe Physio-chemical classification of proteins. Enumerate functional classification of proteins. Classify proteins on the basis of their axial ratio.	**Fnd-S1-Bio-16** Classification of Proteins on the basis of their structures, functions & chemical reactions.		
73	Describe the structural levels of proteins and their important Biochemical features.	**Fnd-S1-Bio-17** Structural Organization of Proteins		
74	Able to detect unknown amino acid/protein in a given fluid	**Fnd-S1-Bio-18** General Tests for Proteins & Amino acids	Practical	OSPE & OSVE
75	Discuss the significance of Lipids for a balanced diet and Health	**Fnd-S1-Bio-22** Lipids: Classification & Biochemical significance.	Interactive Lecture	SBQs & OSVE
76	Able to detect proteins by colour reaction tests	**Fnd-S1-Bio-19** Colour Reaction Tests of	Practical	OSPE & OSVE

		Proteins		
77	Able to detect proteins by Separation tests	**Fnd-S1-Bio-20** Separation Tests		
78	Able to detect proteins by precipitation tests	**Fnd-S1-Bio-21** Precipitation Tests		
79	Able to detect solubility, oily nature, emulsification, saponification tests	**Fnd-S1-Bio-23** Tests for Lipids		

Theme 5: Fundamental Tissues/Systems of the Human Body

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
		Anatomy		
82	Define the parts of the skin Define the appendages of the skin. Recognize the role of Component tissues of Skin and fascia in Support and Protection	**Fnd-S1-Ana-G-08** Introduction to Integumentary system (Skin and fascia)	Interactive Lecture	SBQs & OSVE
83	Explain the types and functions of blood vessels. (Arteries, veins, capillaries and Anastomosis)	**Fnd-S1-Ana-G-09** Blood vascular system		
84	Integrate the function of Defense with the structure of lymph nodes and lymphatic's	**Fnd-S1-Ana-G-10** Introduction to lymphatic system		
85	Define the types of muscles Describe the internal structure of muscle action, nerve supply and naming of skeletal muscles Define smooth and cardiac muscles.	**Fnd-S1-Ana-G-11** Definition and classification of muscles		
86	Describe the Nervous system and classification of NS Define the central and peripheral nervous system	**Fnd-S1-Ana-G-12** Introduction to Nervous System		
87	Describe the structure and the structure of the typical spinal nerve.	**Fnd-S1-Ana-G-13** Formation and structure of Typical Spinal Nerve		
88	Define the autonomic nervous system. Describe the types and functions of Autonomic Nervous System.	**Fnd-S1-Ana-G-14** General Concepts of Autonomic nervous system		
89	Describe the process of Gametogenesis	**Fnd-S1-Ana-E-2** Gametogenesis		
90	Discuss ovulation and phases and outcomes of fertilization	**Fnd-S1-Ana-E-3** Ovulation Fertilization		
91	Enumerate the events of first week of development (cleavage and blastocyst formation and implantation)	**Fnd-S1-Ana-E-4** The First week of development		
92	Enumerate the events of Second week of development (Formation of	**Fnd-S1-Ana-E-5** The second week of		

	amniotic cavity, amnion, bilaminar embryonic disc, yolk sac, chorionic sac and primary chorionic villi)	development		
93	Recognize male & female genitalia. Describe the process of fertilization (conception).	**Fnd-S1-Cli-G&O-1** Fertilization (The conception)		
Physiology				
94	Describe the Physiological Concepts and organization of nervous system. State general physiological concepts and organization of Autonomic Nervous System	**Fnd-S1-Phy-19** Introduction Organization of the Nervous system	Interactive Lecture	SBQs & OSVE
95	Describe the basic Structure and function of neuron & neuroglia Describe the Excitable cells and their types(Synapse)	**Fnd-S1-Phy-20** Neuron and neuroglia synaptic transmission		
96	Definition, structure, functions and types of synapse, Properties of synapse	**Fnd-S1-Phy-21** Synapses and neural integration		

Theme 6: Development, Differentiation and Growth

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
98	Explain the main events of third week of development State formation of the primitive streak, Gastrulation and notochord	**Fnd-S1-Ana-E-6** Third week of development (Trilaminar germ disc)	Interactive Lecture	SBQs & OSVE
99	Explain formation of neural tube and somites Recognize external appearance of embryo during second month	**Fnd-S1-Ana-E-7** Third week to eighth week of development (Embryonic period)		
100	Enlist the derivatives of Ectoderm and neural crest cells	**Fnd-S1-Ana-E-08** Derivatives of ectodermal germ layer and neural crest cells		
101	Enlist the derivatives of mesodermal and endodermal germ layers	**Fnd-S1-Ana-E-09** Derivatives of mesodermal and endodermal germ layers		
102	Describe the development of fetus & parturition	**Fnd-S1-Ana-E-10** 3rd month to birth (Fetal Period)		
103	Explain the interchange of substances between maternal and fetal blood by applying the knowledge of structure and functions of placenta and fetal Membranes & clinicals	**Fnd-S1-Ana-E-11** Placenta and fetal membranes		
104	Describe the Ectopic pregnancy & its consequences.	**Fnd-S1-CL-O&G-2** Ectopic pregnancy		

Theme 7: Genetics and Developmental Anomalies

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
105	Define teratogenesis and the basic principles of teratogenesis. Categorize the common teratogens	**Fnd-S1-Ana-E-12** Teratogenesis	Interactive Lecture	SBQs & OSVE
106	Explain the types of twin/ multiple pregnancies and clinical significance	**Fnd-S1-Ana-E-13** Twin pregnancy		
107	Calculate the expected date of delivery (EDD) Describe various methods used to assess fetal wellbeing	**Fnd-S1-Gyn & Obs-3** The Fetal wellbeing & EDD		
Biochemistry				
108	Enlist different types of nucleotides and their basis in genetics.	**Fnd-S1-Bio-24** Structure and types of nucleotides.	Interactive Lecture	SBQs & OSVE
109	Enlist different types of nucleotides and their basis in genetics	**Fnd-S1-Bio-25** Structure of DNA & RNA	Interactive Lecture	SBQs & OSVE
Physiology				
110	Describe Physiological basis of gene and functions of DNA and RNA	**Fnd-S1-Phy-22** DNA, Gene, Genetic code RNA,Types, codan , anti codan	Interactive Lecture	SBQs & OSVE
		Fnd-S1-Phy-23 Control of gene functions		
Pathology				
114	Define Mutation and its types. Classification of genetic disorders Define Mendelian Disorders	**Fnd-S1-Path-5** Introduction to genetic disorder	Interactive Lecture	SBQs & OSVE
115	Describe the normal Karyotype Discuss various numerical and structural abnormalities of chromosomes	**Fnd-S1-Path-6** Chromosomal aberration.		
116	Describe causes and pathogenesis of congenital fetal abnormalities	**Fnd-S1-Path-7** Congenital fetal abnormalities		

HAEMATOLOGY MODULE-1

Introduction welcome to the hematology module. this module aims to provide the basic understanding of hematopoiesis and hemostasis at the molecular level. this module is designed to learn and integrate basic knowledge of blood cells, with clinical relevance. this module is designed to make your learning both interesting and productive by including more practical activities. it will deal with the basic patho-physiological and pharmacological aspects of infections and chemo therapeutic agents and integrate it with clinical sciences.

The module will give the 1st year medical students, an opportunity to know the presentations and principles of management of common hematological, immunological, inflammatory and neoplastic disorders. You will be expected to think about the scenarios and participate in case-based learning sessions for clearing your concepts and better learning. It will also help you focus your attention on what you need to achieve from the Interactive Lectures, practical and tutorials that have been scheduled in this module.

DURATION: 8 weeks

Learning outcomes

- Knowledgeable
- Skillful
- Community Heath Promoter
- Problem-solver
- Professional
- Researcher
- Leader and Role Model

COGNITIVE DOMAIN: By the end of this module, first year MBBS students shall be able to:

- Identify & describe the various cellular and non-cellular components of blood in relation to its Anatomy, Physiology &Biochemistry
- Describe structure, synthesis and degradation of Hemoglobin
- Describe the regulatory mechanisms of normal hemostasis and coagulation
- Describe the conditions associated with dysfunction of cellular and non-cellular components of blood
- Describe the basic characteristics of immune system.
- Discuss the structure, functions and Biochemical aspects of the Lympho-reticular system.
- Explain the principles and clinical significance of ABO/RH blood grouping system
- Explain the Patho-Physiology of various bleeding disorders
- Identify the role of Pharmacology in inflammation, anemia and bleeding disorders.

PSYCHOMOTOR DOMAIN

Description of the psychomotor skills to be developed and the level of performance required: By the end of this Module, the student should be able to:

- Carry out practical work as instructed in an organized and safe manner
- Make and record observations accurately.
- Determine percentage of formed blood elements (Hematocrit).
- Identify RBC and should be able to do its counting-on-counting chamber and to know normal values. And also classify Anemia morphologically.
- Determine the Hemoglobin with the apparatus and have knowledge of normal and abnormal value.

- Identify WBC morphology and its different types, should be able to count them on counting chamber and to know the normal values. Diagnostic importance of each WBC.
- Identify Platelets and should be able to know normal values. Its diagnostic importance in relation to bleeding disorders
- Perform bleeding time and clotting time and to know normal values and its diagnostic importance in relation to bleeding disorders.
- Perform Blood groups typing and Rh factor.
- Perform ESR and to know its normal value and prognostic importance.

ATTITUDE AND BEHAVIOUR:

By the end of Module, the student shall gain the ability and carry responsibility to:

- Demonstrate ability to give and receive feedback, respect for self and peers.
- Demonstrate sympathy and care to patients.
- Having respect for patients, colleagues and other health professionals
- Organize & distribute tasks
- Exchange opinion & knowledge
- Develop communication skills with sense of responsibility.
- Regularly attend the classes
- Demonstrate good laboratory practices

Laboratory Skills (Physiology & Pathology):

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

- Describe types & methods of sterilization
- Collect blood sample by various methods i.e. pricking method &venipuncture on dummies
- Prepare blood film & Identify and quantify different types of white blood cells on blood film
- Identify different blood groups
- Antigen-Antibody reactions in the Laboratory
- Determine hemoglobin concentration (Sahli's method)
- Laboratory diagnosis of Anemias
- Estimate bleeding time, clotting time (BT & CT)
- Laboratory diagnosis of Bleeding Disorders
- Estimate erythrocyte sedimentation rate (ESR by wester green method)
- Non. Neoplastic WBC Disorders
- Acute Inflammation/ Chronic inflammation
- Repair: Wound Healing
- Isolation of micro-organism/Lab diagnosis of infectious disease
- Culture Media-I & Culture Media-II

Clinical Skills: By the end of Module, the students should be able to:

1. Practice history taking: patients with anemia and bleeding disorders
2. Define and classify polycythemia
3. Define and describe the different types of anemia
4. Describe various types of blood indices

Themes

Theme 1: Red cell disorders (Anemia, Polycythemia)
Theme 2: Infections & Inflammation
Theme 3: Bleeding & thromboembolic disorders
Theme 4: ABO & Rh-Incompatibility
Theme 5: Immunological disorders

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Red cell disorders (Anemia, Polycythemia)

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
1	• Illustrate the organization of hematopoietic tissue • Enlist the sites and source of hematopoiesis before and after the birth.	**Hem-S1-E1-Ana-** Development of blood	Interactive Lecture	SBQs & OSVE
2	• Examine structure of RBC, WBC & platelets. • Illustrate methods use to study blood and bone marrow cells.	**Hem-S1-H1-Ana-** Morphology of blood cells	Interactive Lecture/ Practical	SBQs &OSPE & OSVE
Physiology				
3	• Discuss the cellular components of blood • Define hematocrit, normal values & factors affecting hematocrit	**Hem-S1-Phy-1** Composition of blood & its cellular components	Interactive Lecture	SBQs & OSVE
4	• Discuss the various stages of RBC'S formation. • Discuss various sites of erythropoiesis • Enlist the factors necessary for erythropoiesis. • Discuss the significance of Reticulocyte count	**Hem-S1-Phy-2** Development of RBCs (Erythropoiesis)		
5	• Examine hemoglobin concentration by Sahli's method	**Hem-S1-Phy-3** hemoglobin concentration (Sahli's method)	Practical	OSPE & OSVE
6	• Estimate erythrocyte sedimentation rate (ESR by wester green method)	**Hem-S1-Phy-4** Estimation of erythrocyte sedimentation rate (ESR by wester green method)		
Biochemistry				
7	• Explain Biochemical basis for the difference in plasma & serum. • Describe composition of blood & plasma protein.	**Hem-S1-Bio-1** Composition of blood & plasma proteins (Specialized body fluid)	Interactive Lecture	SBQs & OSVE
8	• Describe Chemistry& synthesis of Heme • Explain structure, types & forms of Hb.	**Hem-S1-Bio-2** Normal Hemoglobin		
9	• Identify abnormalities of Heme synthesis (PorPhyrias & its	**Hem-S1-Bio-3** Abnormal Heme		

	types).			
10	• Explain the Biochemical aspects of Hemoglobinpathies. (Thalassemia, sickle cell anemia)	**Hem-S1-Bio-4** Abnormal Hemoglobin (Hemoglobinopathies)		
11	• Describe degradation of heme. • Explain bile pigments, formation, types, transport & Excretion of bile.	**Hem-S1-Bio-5** Degradation of Heme		
12	• Discuss Iron Metabolism & identify its abnormalities.	**HemM-S1-Bio-6** Iron Metabolism		
13	• Explain the Biochemical importance of Vitamin B12 & Folic acid & their associated diseases.	**Hem-S1-Bio-7** Vitamin B12 & Folic acid		
14	• Describe importance of Vitamin K & E & their associated diseases.	**Hem-S1-Bio-8** Vitamin K & E		
Pathology				
15	• Describe classification ofAnemia • Differentiate the different types of anemias on the basis of Morphology & Patho-Physiology.	**Hem-S1-Path-1** Introduction of Anaemia	Interactive Lecture	SBQs & OSVE
16	• Identify the types of nutritional Anemias • Enlist causes of iron deficiency, Anemia & clinical features and Laboratory diagnosis	**Hem-S1-Path-2** Iron deficiency Anemia		
17	• Enlist causes of vitamin D-12 and folate deficiency • Explain the Patho-Physiology, clinical features and laboratory diagnosis.	**Hem-S1-Path-3** Megaloblastic Anemia		
Pharmacology				
18	Describe role of oral & injectable iron in iron deficiency anemia	**Hem1-S1-Pharm-1** Drugs for iron deficiency anemia	Interactive Lecture	SBQs & OSVE
19	Describe role of Vit. B12 & Folic acid in Macrocytic anemia	**Hem1-S1-Pharm-2** Drugs for Megaloblastic anemia		

Theme 2: Infections & Inflammation

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
21	• Discuss the embryological source of lymphoid organs	**Hem-S1-E2-Ana-** Development of lymphoid organs	Interactive Lecture	SBQs & OSVE
22	• Discuss the components, location & structure of	**Hem-S1-G1-Ana-** Gross features of lymphoid	Demonstrati on	SBQs,

	lymphoid issue. • Describe parts, surfaces and relations of Lymphoid organs	organs		OSPE & OSVE
23	• Discuss the histological classification & microscopic features of lymphoid organs.	**Hem-S1-H3-Ana** Microscopic anatomy of lymphoid organs	Interactive Lecture	SBQs & OSVE
24	• Define histological features of spleen & lymph node.	**Hem-S1-H4-Ana-** Spleen & Lymph node	Practical	OSPE & OSVE
25	• Define histological features of Thymus gland & Tonsil.	**Hem-S1-H5-Ana-** Thymus & Tonsil		
Physiology				
26	• Describe the process of leukocyte genesis, enlist various types of granulocytes and agranulocytes, their functions & normal values • Explain the significance of Reticuloendothelial system • Discuss the functions of T and B lymphocytes.	**Hem-S1-Phy-5** Genesis and general characteristics, and functions of white blood cells	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
Pathology				
27	• Define acute inflammation. • Describe the changes systemic effects & occurring in acute inflammation.	**Hem-S1-Path-4** Overview of acute and chronic inflammation	Interactive Lecture	SBQs & OSVE
28	• Describe causes of Neutrophilia and Neutropenia, Eosinophilia, Lymphocytosis, Monocytosis	**Hem-S1-Path-5** Non Neoplastic WBC Disorders		

Theme 3: Bleeding & thromboembolic disorders

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Physiology				
42	• Describe the four-basic mechanism of Hemostasis, • Explain the mechanism of formation of platelet plug.	**Hem-S1-Phy-6** Hemostasis & role of Thrombocytes	Interactive Lectures/Small Group Discussion	SBQs, OSPE & OSVE
43	• Explain steps involved in intrinsic and extrinsic pathway for coagulation, • Enlist the clotting factors, to describe the role of clotting factors in coagulation.	**Hem-S1-Phy-7** Clotting cascade & bleeding disorders		
Biochemistry				
44	• Describe importance of Vitamin K & E & their associated diseases.	**Hem-S1-Bio-9** Vitamin K & E	Interactive Lecture	SBQs & OSVE
Pathology				
45	• Discuss the different types of bleeding disorders.	**Hem-S1-Path-6** Platelet and Bleeding	Interactive Lecture	SBQs & OSVE

	• Discuss Quantitative & Qualitative platelets disorders • Describe classification& Lab. diagnosis of haemophilia and Von Willebrand disease.	disorder		
46	• Discuss thrombosis, pathogenesis, types and fate of thrombosis.	**Hem-S1-Path-7** Thrombosis		
47	• Define embolism, its types and morphological features of embolism.	**Hem-S1-Path-8** Embolism		

Theme 4: ABO & Rh-Incompatibility

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Physiology				
49	• Describe the antigens & antibodies for A,B,AB & O blood groups • Define Agglutinogen, agglutinin, and agglutination & what takes place when incompatible blood types are mixed. • Identify universal donor & recipient & explain why? • Enlist various Rh antigens & Rh immune response. • What is erythroblastosis fetalis & how it can be prevented	**Hem-S1-Phy-8** Blood groups ABO/RH system	Interactive Lectures/S mall Group Discussion/ Practical	SBQs, OSPE & OSVE
Pathology				
50	Recognize different types of blood transfusion reaction.	**Hem-S1-Path-9** Blood Transfusion	Interactive Lecture	SBQs & OSVE

Theme 5: Immunological Disorders

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Physiology				
51	• Discuss overall organization of immune system • Differentiate between innate & acquired immunity, • Discuss cell mediated immunity and humoral immunity, active and passive immunity.	**Hem-S1-Phy-9** Immunity.	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
Biochemistry				
52	• Define Immunoglobins. • Describe chemistry, structure & their classification.	**Hem-S1-Bio-10** Immunoglobins	Interactive Lecture	SBQs & OSVE
Pathology				
55	• Define hypersensitivity • Describe Pathogenesis of Type-I	**Hem-S1-Path-10** Hypersensitivity reaction	Interactive Lecture	SBQs & OSVE

	& II hypersensitivity reactions with examples	Type I & II		
56	• Describe type III & IV hypersensitivity reactions with examples.	**Hem-S1-Path-11** Hypersensitivity reaction Type III & IV		
58	• Discuss primary immunodeficiency and its causes • Discuss secondary immunodeficiency and its causes	**Hem-S1-Path-12** Immunodeficiency		
Pharmacology				
59	• Associate role immune-modulating drugs in autoimmune disorders	**Hem-S1-Pharm-4**	Interactive Lecture	SBQs & OSVE

MUSCULOSKELETAL MODULE - 1

Introduction This exciting module will serve as building block and is very essential to your future work as doctors. This module is designed to make your learning both interesting and productive by including several interactive activities.

Motility is the most important feature of life. Every living being shows locomotion in one or other form. Human locomotor system is very beautiful and well organized. Man is the only mammal that walks on two feet. So, our musculoskeletal system is well oriented to counter the effect of gravity. God Himself has said in Holly Quran that He has made man in the best of its form. Cerebral cortex, the highest center of brain causes controls various body movements by coordination of the muscles, bones, & joints.

Rationale This module is designed to build a solid foundation regarding knowledge of the structure and function of various muscles, bones and joints. This also provides information regarding its clinical applications. It has been estimated that one in four consultations in primary care is caused by problems of the musculoskeletal system.

It is likely that individuals at some time suffer from a problem related to the musculoskeletal system, ranging from a very common problem such as osteoarthritis or back pain to severely disabling limb trauma or rheumatoid arthritis. Many musculoskeletal problems are chronic conditions as well. The most common symptoms are pain and disability, with an impact not only on individuals' quality of life but also, importantly, on people's ability to earn a living and be independent.

Throughout this module, students will have the opportunity to link basic science knowledge to clinical problems. Teaching relevant basic sciences with clinical examples will help you make connections among concepts and retain the information for later clinical education.

Duration 10 weeks

Learning Outcomes

By the end of this module, the students should be able to describe, demonstrate & explain

Knowledge

- Muscles, bones, joints, fascia, fossa, compartments, nerves and blood vessels of upper limb
- Muscles, bones, joints, fascia, fossa, compartments, nerves and blood vessels of Lower limb
- Microscopic features of muscles, bones, cartilages, and skin.
- Collagen metabolism and collagen disorders.
- Development of muscles and bones & their congenital anomalies
- Fractures& their healing, bone remodeling, osteoporosis & its management.
- Nerve palsies and disability
- Pain Physiology and pain management including analgesics.
- Scheme & control of motor activity, motor cortical areas, motor pathways, and role of cerebellum and basal ganglia in motor activity.
- Mechanism of contraction of skeletal muscle & its molecular basis
- Muscle glycogen metabolism and glycogen storage diseases
- Neuromuscular junction, abnormalities of transmission across it, and drugs affecting this transmission
- Calcium homeostasis, role of hormones and their abnormalities
- Nutrition & adaptation of muscles in exercise
- Epidemiology of road accidents, their prevention, disability and rehabilitation
- Functions of skin, its common disorders and their treatment

Skills

- Histology of Cartilage
- Introduction to power lab
- Histology of Muscles
- Simple muscle twitch & summation
- The muscular twitch response and recruitment
- Physiological properties of skeletal muscle
- EMG
- Estimation of calcium
- Estimation of Phosphorus
- Fractures

Attitude Follow the basic laboratory protocols

- Participate in class and practical work professionally
- Communicate effectively in a team with pears, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, pears, staff and teachers.
- Communicate effectively in a team with pears and teachers.
- Demonstrate the ability to reflect on the performance.

Themes

Theme 1: Theme 1: Pectoral region and Breast
Theme 2: Back, Axilla and Shoulder joint
Theme 3: Brachial Plexus and Arm
Theme 4: Forearm, hand and carpal tunnel syndrome
Theme 5: Anterior thigh and femoral hernia
Theme 6: Gluteal region, hip joint and Sciatic nerve
Theme 7: Anterior compartment of leg and compartment syndrome
Theme 8: Posterior compartment of leg and foot

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Pectoral region and Breast

S #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
1	• Define different regions of the upper limb • Identify various compartments of arm, forearm & hand. • Define the axial and appendicular skeleton and define the girdle bones. • Identify joints of the upper limb.	**MSK-S1-Ana-G-1** Introduction to locomotor system & Organization of upper limb	Demonstration	SBQs, OSPE & OSVE
2	• Define the pectoral region. • Describe its muscles. • Identify the general features and different land marks for side determination and the attachments of various muscles on clavicle.	**MSK-S1-Ana-G-2** Pectoral region& the clavicle		
3	• Discuss development of Bone	**MSK-S1-Ana-E-1**	Interactive	SBQs & OSVE

	• Describe Intramembranous ossification • Describe endochondral ossification • Describe ossification of the limb bones • Describe development of the joints • Describe development of the cartilage	Development of skeletal system	Lecture	
4	• Identify general features and different land marks for side determination and the attachments of various muscles on the Scapula. • Define arrangement, attachments, neurova-scular bundle and actions of muscles of back	**MSK-S1-Ana-G-3** Scapular region (scapula bone, muscles & neurovascular Bundle of back)	Demonstration	SBQs, OSPE & OSVE
5	• Identify the bony components, type & variety & movements of sternoclavicular, acromioclavicular joints	**MSK-S1-Ana-G-4** Sternoclavicular acromioclavicular Joints		
6	• Define the extent and quadrants of the breast • Describe the blood supply and lymphatic drainage of breast in the female with its clinical significance.	**MSK-Ana-G-5** Anatomy of the breast	Interactive Lecture	SBQs & OSVE
7	• Identify histology of mammary gland in non-lactating, lactating & during pregnancy under microscope. • Identify and describe histological features of nipple and areola.	**MSK-S1-Ana-H-1** Histology of breast	Practical	OSPE & OSVE
Physiology				
8	• Describe the Physiology of Mammary gland. • Describe the Hormone responsible for milk production & ejection. • Describe the let-down reflex (milk ejection reflex)	**MSK-S1-Phy-1** Physiology of breast and lactation	Interactive Lecture	SBQs & OSVE
9	• Discuss the basic relationship between vitamin D, PTH, calcium and Phosphate in relation to bone formation • Describe the various cells of the bones and their function in Cahomeostasis	**MSK-S1-Phy-2** Hormones regulating calcium homeostasis		

10	• Identify and name various parts of power lab • Illustrate functions of various parts of the power lab	**MSK-S1-Phy-P1** Introduction to Power Lab	Practical	OSPE & OSVE
Biochemistry				
11	• Enlist classification, functions and Biochemical significance of Hetero polysaccharides in formation of Extracellular Matrix.	**MSK-S1-Bio-01** Role of Hetero polysaccharides (Glycosaminoglycans)	Interactive Lecture	SBQs & OSVE
12	• Explain Muco-polysacharridoses: • Classification, Deficient Enzymes Clinical Manifestation	**MSK-S1-Bio-02** Muco-polysaccharidoses		
13	• Discuss general introduction and classification of Minerals.	**MSK-S1-Bio-03** Classification of Minerals		
Clinical Lecture				
14	• Define bone density and factors which are responsible to maintain bone density • Define Pathogenesis and clinical course of change in bone density and conditions associated with lactation. • Discuss its complications and management.	**MSK-S1-Gyn & Obs-1** Changes in bone density with lactation	Interactive Lecture	SBQs & OSVE
15	• Describe the Patho-Physiology of mammary gland disorders • Describe the lactation reflex • Describe weaning • Describe the hormonal effect • Student guide for complete protocol of lactation and weaning	**MSK-S1-Paeds-1** Breast feeding guide for medical profession		

Theme 2: Back, Axilla and Shoulder joint

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
16	• Describe the attachments, nerve supply and the actions of the muscles of the back. • Define the effects of paralysis of these muscles	**MSK-S1-Ana-G-6** Muscles of back	Demonstration	SBQs, OSPE & OSVE
17	• Discuss the arterial anastomosis around the scapula. • Explain the neurovascular bundle of scapula.	**MSK-S1-Ana-G-7** Anastomosis around scapula & Neurovascular bundle of scapula		
18	• Enumerate bony components, type & variety, attachment of	**MSK-S1-Ana-G-8** The Shoulder Joint	Interactive Lecture	SBQs & OSVE

	capsule and ligaments of this joint. • Demonstrate various muscles & movements at the joint. • Identify the factors stabilizing or weakening the shoulder joint.			
19	• Discuss the developmental stages of skull and its clinicals	**MSK-S1-Ana-E-2** Development of skull		
20	• Define the shape, location, boundaries and contents of Axilla. • Discuss the formation, course and relations of axillary vessels • Describe arrangement of axillary lymph nodes and their area of drainage.	**MSK-S1-Ana-G-9** Axilla: Boundaries & Contents	Demonstration	SBQs, OSPE & OSVE
21	• Describe and draw formation of the brachial plexus. • Mention different parts of brachial plexus and their location. • Identify different nerves with their root values. • Discuss the effects of injury to different sites of brachial plexus.	**MSK-S1-Ana-G-10** Brachial Plexus	Interactive Lecture	SBQs & OSVE
22	• Identify the skeletal muscle under light microscope • Describe the structural basis of muscle striations. • Recognize the structural elements that produces muscle contraction and brings the movement of a body part.	**MSK-S1-Ana-H-2** Histology of skeletal muscle	Practical	OSPE & OSVE
Physiology				
23	• Describe the distribution of calcium in the bones. • Describe the mechanism by which Ca is released in blood from Bone	**MSK-S1-Phy-3** Role of Calcium in bones	Interactive Lecture	SBQs & OSVE
24	• Describe and classify properties of various types of muscle. • Describe the structure, functions and arrangements of Myosin, Actin, Troponin & Tropomyosin filaments	**MSK-S1-PHY-4** Properties of muscles & structure of skeletal muscles.		
Biochemistry				

25	• Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	**MSK-S1-Bio-4** Calcium metabolism.	Interactive Lecture	SBQs & OSVE
26	• Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	**MSK-S1-Bio-5** Magnesium & Phosphorus Metabolism		
27	• Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	**MSK-S1-Bio-6** Vitamin D metabolism.		
28	• Describe miscellaneous minerals: Iodine, Fluoride , Selenium, Cobalt, Zinc, Copper	**MSK-S1-Bio-7** Miscellaneous Minerals		
29	• Discuss role of Parathyroid, Calcitonin & Vitamin D	**MSK-S1-Bio-8** Regulation of Calcium & PO_4 Metabolism		
30	• Discuss chemical composition of bone, remodeling and normal composition of synovial fluid.	**MSK-S1-Bio-9** Chemical composition of bone		
31	• Demonstrate importance of calcium as macro-mineral. RDA, Absorption, factors influencing absorption. • clinical manifestation of excess and deficiency states.	**MSK-S1-Bio-10** Estimation of serum calcium	Practical	OSPE & OSVE
Pathology				
32	• Define Vitamin D • Explain significance of vitamin D in the body • Describe the different deficiency states related with vitamin D • Discuss the prevention of Vitamin D Deficiency	**MSK-S1-Path-1** Vitamin D deficiency	Interactive Lecture	SBQs & OSVE
Pharmacology				
33	•	**MSK-S1-Pharm-1** Introduction to Cholinergics	Interactive Lecture	SBQs & OSVE

Theme 3: Brachial Plexus and Arm

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSEMNT
		Anatomy		
34	• Explain the arrangement of different functional groups of muscles in the ant compartment of arm & their attachment • Demonstrate the actions of above muscles • Describe the neurovascular structures and their important relations	**MSK-S1-Ana-G-11** Humerus bone Anterior compartment of arm	Demonstration	SBQs, OSPE & OSVE
35	• Define cubital fossa. • Discuss its boundaries • Clinical correlates	**MSK-S1-Ana-G-12** Cubital fossa	Interactive Lecture	SBQs & OSVE
36	• Explain arrangement of different functional groups of muscles in the post compartment arm & their attachment • Demonstrate actions of muscles • Describe neurovascular structures and their important relations	**MSK-S1-Ana-G-13** Posterior compartment of arm & Elbow joint	Demonstration	SBQs, OSPE & OSVE
37	• Identify general features of the radius & ulna. • Discuss attachments of various muscles on the radius & ulna. • Discuss the radioulnar joints.	**MSK-S1-Ana-G-14** Radius & Ulna (radioulnar joints)	Demonstration	SBQs, OSPE & OSVE
38	• Explain arrangement of different functional groups of muscles in anterior compartment of fore-arm & their attachment. • Describe neurovascular structures and their important relations	**MSK-S1-Ana-G-15** Anterior compartment of forearm		
39	• Explain arrangement of different functional groups of muscles in the posterior compartment of forearm & their attachment. • Describe neurovascular structures and their important relations	**MSK-S1-ANA-G-16** Posterior compartment of forearm		
40	• Describe ossification of vertebra ribs &sternum and its	**MSK-S1-Ana-E-3** Development of	Interactive Lecture	SBQs & OSVE

	clinicals	vertebra, ribs, & sternum .		
41	• Identify smooth and cardiac muscles under light microscope • Describe structural basis of muscle striations & differentiate the two muscles. • Recognize function and organization of the connective tissue in muscle.	**MSK-S1-Ana-H-3** Histology of smooth and cardiac muscles	Practical	OSPE & OSVE
Physiology				
42	• Describe general mechanism of skeletal muscle contraction. • Describe molecular mechanism (sliding filament theory) of skeletal muscle contraction. • Describe walk along theory– power stroke. • Define motor unit, isotonic & isometric contraction	**MSK-S1-Phy-5** Mechanism & different theories of muscle contraction Types of muscle contraction	Interactive Lecture	SBQs & OSVE
43	• Define neuromuscular junction (NMJ) & list the components of NMJ • Explain sequence of events of neuromuscular transmission	**MSK-S1-Phy-6** Neuromuscular Junction & transmission		
44	• Define end plate potential • Describe excitation contraction coupling • Explain myasthenia gravis	**MSK-S1-Phy-7** Excitation contraction coupling		
45	• Demonstrate Nerve conduction velocity • Explain how electrical events are converted to mechanical events	**MSK-S1-Phy-P2** Action potential	Practical	OSPE & OSVE
Biochemistry				
46	• Demonstrate sources, daily requirements, intestinal absorption, transport and Biochemical role and regulation of Vit-D3	**MSK-S1-Bio-11** Estimation of Serum Vit.D3	Practical	OSPE & OSVE
Clinical Lecture				
48	• Enlist disorders of skeletal muscle disorders and factors which are responsible to it • Define Pathogenesis and clinical course of conditions associated with skeletal muscle disorders • Discuss it's complications and management	**MSK-S1-Ortho-1** Disorders of voluntary muscles	Interactive Lecture	SBQs & OSVE

Theme 4: Forearm, Hand and Carpal Tunnel Syndrome

S #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
53	• Describe the location, destination, course & relations of arteries & their branches in upper limb. • Identify and discuss the deep veins of upper limb. • Describe the location, destination, course & relations of nerves & their branches in upper limb.	**MSK-S1-Ana-G-17** Neuromuscular bundle of the upper limb	Demonstration	SBQs, OSPE & OSVE
54	• Describe the type, variety, attachment of capsule and ligaments of this joint. • demonstrate various movements at this joint. • Describe the structural organization of the Flexor & Extensor Retinaculum. • Discuss carpal tunnel syndrome.	**MSK-S1-Ana-G-18** Wrist joint	Interactive Lecture	SBQs & OSVE
55	• Describe the bony arrangement of the hand. • Describe the joints of the hand.	**MSK-S1-Ana-G-19** Osteology of the hand and the joints of the hand.	Demonstration	SBQs, OSPE & OSVE
56	• Discuss the cutaneous supply, arteries & veins of palm of hand. • define fibrous flexor sheath. • Define the palmer aponeurosis, facial spaces. • Describe small muscles of hand.	**MSK-S1-Ana-G-20** Palm of the hand		
57	• Discuss the dorsal venous arch. • Describe insertion of the long extensors tendons.	**MSK-S1-Ana-G-21** Dorsum of the hand		
58	• Describe different regions of lower limb. • Identify the various bones forming skeleton of lower limb. • Describe general arrangement of superficial & deep fasciae of lower limb • Demonstrate the bones of pelvic girdle. • Identify different landmarks in different regions of lower limb	**MSK-S1-Ana-G-22** Introduction to lower limb / Organization of skeleton of lower limb	Interactive Lecture	SBQs & OSVE
59	• Identify the superficial arteries of	**MSK-S1-Ana-G-23**	Demonstration	SBQs, OSPE &

	lower limb • Name and discuss superficial veins of lower limb • Highlight the course of great and small saphenous vein • Describe the superficial lymphatic vessels & lymph nodes of lower limb • Discuss clinical correlates.	Superficial veins, arteries , lymph nodes & cutaneous supply of the lower limbs		OSVE
60	• Describe the development of skeletal muscle. • Discuss the development of Myotomes • List derivatives of Ebaxial and Primaxial divisions of myotomes	**MSK-S1-ANA-E-4** Development of skeletal muscles	Interactive Lecture	SBQs & OSVE
61	• Classify bone on developmental and structural basis. • Differentiate between woven bone and lamellar bone under microscope. • Differentiate between compact bone and spongy bone under microscope.	**MSK-S1-Ana-H-4** Histology of bones	Practical	OSPE & OSVE
Physiology				
62	• Demonstrate SMT on power lab • What are the different periods of SMT & their duration? • Demonstrate the phenomenon of fatigue & Tetanus	**MSK-S1-Phy-P3** Muscular twitch response	Practical	OSPE & OSVE
63	• Describe types of muscle fibers (type I and II) • Determine effect of exercise on muscle blood flow • State effect of training, stamina and resistance on muscle fibers • State Hypoxia, muscle Fatigue during exercise and, its Biochemical reasons.	**MSK-S1-Phy-8** Muscle adaptation to exercise	Interactive Lecture	SBQs & OSVE
64	• Explain aerobic and anaerobic exercise and effect of exercise on muscles.	**MSK-S1-Phy-9** Role of muscle in exercise		
Biochemistry				
65	• Describe the Collagen Structure and synthesis, Types, Role of vitamin C in synthesis of Collagen	**MSK-S1-Bio-12** Collagen Structure and synthesis	Interactive Lecture	SBQs & OSVE
66	• Brief overview of inherited Collagen Disorders and their clinical manifestation	**MSK-S1-Bio-13** Overview of inherited Collagen		

		disorders		
67	• Estimation, RDA, Effects, regulation and clinical manifestation of excess and deficiencies.	**MSK-S1-Bio-14** Estimation of serum phosphorus	Practical	OSPE & OSVE
69	• Classify different muscle relaxants. • Discuss mechanism of their action • Explain clinical uses and their adverse effects	**MSK-S1-Pharm-2** Drugs used as Skeletal muscle relaxant		
Clinical Lecture				
70	• Define of osteoporosis • Describe generalized and localized osteoporosis • Enlist primary &secondary causes of generalized osteoporosis • Define Pathogenesis and clinical course • Discuss it's complications and management	**MSK-S1-Ortho-2** Clinical manifestation of Osteoporosis	Interactive Lecture	SBQs & OSVE

Theme 5: Anterior thigh and femoral hernia

Theme 6: Gluteal region, hip joint and Sciatic nerve

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
71	• Identify parts of the hip bone. • Determine side of the bone. • Describe general features of each part of hip bone. • Identify the bone. • Determine the side of the bone. • Describe the anatomical position of the bone.	**MSK-S1-Ana-G-24** Hip bone + Femur	Demonstration	SBQs, OSPE & OSVE
72	• Discuss division of the thigh into compartments • Enumerate muscles of the anterior compartment of thigh and their respective actions. • Describe the innervation and blood supply of muscles of anterior compartment.	**MSK-S1-Ana-G-25** Anterior compartment of thigh		
73	• Describe the Femoral triangle, its boundaries and contents. • Discuss femoral sheath and its contents and the clinical conditions associated.	**MSK-S1-Ana-G-26** Femoral triangle	Interactive Lecture	SBQs & OSVE

74	• Describe development of smooth and cardiac muscle. • Discuss development of Myotomes • Enlist derivatives of epaxial and hypaxial divisions of myotomes	**MSK-S1-Ana-E-5** Development of smooth & cardiac muscles		
75	• Discuss muscles of medial compartment of the thigh. • Discuss blood & nerve supply of these muscles. • Describe actions of the muscles of medial compartment of thigh.	**MSK-S1-Ana-G-27** Medial compartment of thigh	Demonstration	SBQs, OSPE & OSVE
76	• Describe location of gluteal region. • Discuss about bones and ligaments of gluteal region. • Discuss muscles of the gluteal region & their respective actions. • Discuss nerves and blood vessels of the gluteal region.	**MSK-S1-Ana-G-28** The Gluteal region	Demonstration	SBQs, OSPE & OSVE
77	• Describe articular surfaces of the hip joint along with capsular attachment • Enumerate ligaments of the hip joint & describe their attachments. • Discuss clinical correlates	**MSK-S1-Ana-G-29** Hip joint	Interactive Lecture	SBQs & OSVE
78	• Identify different types of cartilage under light Microscope. • Define distinctive microscopic features of each type.	**MSK-S1-Ana-H-5** Histology of Hyaline Cartilage	Practical	OSPE & OSVE
Physiology				
79	• Describe role of skin in homeostasis • Describe the function of skin • Describe medico-legal importance of the skin	**MSK-S1-Phy-12** Physiology of Skin	Interactive Lecture	SBQs & OSVE
Biochemistry				
80	• Describe metabolic pathway for synthesis of purines and pyrimidines	**MSK-S1-Bio-15** Metabolic pathway for synthesis of purines and pyrimidines	Interactive Lecture	SBQs & OSVE
81	• Discuss in detail metabolic pathways for nucleic acids degradation. Inherited associated disorders. Uric acid metabolic disorders.	**MSK-S1-Bio-16** Metabolic pathways for nucleic acids degradation and related disorders.		
82	• Demonstrate the methods to estimate the serum uric acid.	**MSK-S1-Bio-17** Estimation of serum uric acid	Practical	OSPE & OSVE
Pathology				

84	• Mention types of arthritis • Define Osteoarthritis& Rheumatoid arthritis • Describe their clinical features	**MSK-S1-Path-2** Arthritis	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
85	Explain clinical manifestations of arthritis	**MSK-S1-Ortho-3** Clinical manifestation of Arthritis	Interactive Lecture	SBQs & OSVE

Theme 7: Anterior Compartment of Leg and Compartment Syndrome

S #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
86	• Describe muscles of posterior compartment of thigh. • Describe arterial supply of posterior compartment of thigh. • Discuss trochanteric and cruciate anastomosis at back of thigh. • Describe venous drainage of this region.	**MSK-S1-Ana-G-30** Post: compartment of thigh + popliteal fossa	Demonstration	SBQs, OSPE & OSVE
87	• Describe anatomical position of the bone. • Identify the bone and its side determination. • Mark attachment of muscles and ligaments. • Describe the nerve injuries related to it.	**MSK-S1-Ana-G-31** Tibia & fibula		
88	• Discuss site and time of appearance of upper and lower limb buds. • Define source of mesoderm forming the limb muscles	**MSK-S1-Ana-E-6** Development of Limbs & its clinical 1	Interactive Lecture	SBQs & OSVE
89	• Discuss formation of different compartments of leg. • Explain arrangement of the muscles in anterior compartments of leg and their actions. • Describe neurovasculature of these compartments of leg. • Identify bones forming the architecture of foot. • Discuss joints formed by these bones.	**MSK-S1-Ana-G-32** Anterior compartment of leg & dorsum of foot	Demonstration	SBQs, OSPE & OSVE
90	• Explain arrangement of the muscles in lateral compartments	**MSK-S1-Ana-G-33** Lateral		

	of leg and their actions. • Describe the neurovasculature of these compartments of leg • Discuss clinical correlates like compartment syndrome of leg.	compartment of leg & tibiofibular joint		
91	• Describe articular surfaces of the knee joint along with capsular attachment. • Describe ligaments & bursa of the knee joint and discuss their attachments. • Describe movements of the knee joint. (locking & unlocking mechanism)	**MSK-S1-Ana-G-34** Knee joint	Interactive Lecture	SBQs & OSVE
92	• Identify different types of cartilage under light Microscope. • Define distinctive microscopic features of each type.	**MSK-S1-Histo-6** Histology of elastic and fibrous cartilage	Practical	OSPE & OSVE
Biochemistry				
93	• Demonstrate principals and types of chromatography. • Interpretation of clinical conditions and investigations related to use in chromatography.	**MSK-S1-Bio-18** Chromatography	Practical	OSPE & OSVE

Theme 8: Posterior compartment of leg and foot

S #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
96	• Explain arrangement of the muscles in posterior compartment of leg. • Describe nerve supply of these muscles. • Explain actions of the muscles of posterior compartment. • Discuss clinical correlates.	**MSK-S1-Ana-G-35** Posterior compartment of leg	Demonstration	SBQs, OSPE & OSVE
97	• Describe the architecture of arches of foot and the factors responsible for their maintenance. • Identify the bones forming these arches. • Describe the function of the arches of foot.	**MSK-S1-Ana-G-36** Skeleton of foot & arches of foot		
98	• Discuss the hand plate and formation of digital rays resulting into digits	**MSK-S1-Ana-E-7** Development of Limbs & its clinical 2	Interactive Lecture	SBQs & OSVE

	• Describe the muscles involved in and process of rotation of limb • Explain the congenital anomalies of the limbs			
99	• Describe the Ankle Joint. • Describe Superior and Inferior Tibiofibular Joints.	**MSK-S1-Ana-G-37** Ankle ,subtalar & small joints of foot	Demonstration	SBQs, OSPE & OSVE
100	• Identify the bones forming architecture of sole of foot. • Discuss the joints formed by these bones. • Describe clinical correlates like flat foot and club foot.	**MSK-S1-Ana-G-38** Sole of foot		
101	• Explain different nerve of lower limb and their root value. • Discuss causes of injuries. • Enumerate common sites of these nerve injuries • Discuss symptoms caused by these nerve injuries.	**MSK-S1-Ana-G-39** Neurovascular bundle of lower limb		
102	• Discuss the blood supply and nerve supply of sole of foot. • Describe vascular and nervous supply of dorsum of foot.	**MSK-S1-Ana-G-40** Neurovascular bundle of foot		
103	• Describe development of musculoskeletal system. • Discuss development of Myotomes • List derivatives of epaxial and hypaxial divisions of myotomes • Describe the development of bones, joints & cartilage	**MSK-S1-Ana-E-8** Overview of Embryological development of musculoskeletal system	Interactive Lecture	SBQs & OSVE
104	• Describe layers of the skin. • Discuss layers of the Epidermis. • Describe appendages of skin. • Discuss the functions of the skin.	**MSK-S1-Ana-H-7** Microscopic anatomy of the Skin		
105	• Identify three layers of skin under light microscope • Describe structural basis & elements of skin. • Recognize function and organization of connective tissue in skin	**MSK-S1-Ana-H-8** Histology of skin	Practical	OSPE & OSVE

106	• Identify three layers of skin under light microscope • Describe structural basis & elements of skin. • Recognize the function and organization of connective tissue in skin	**MSK-S1-Ana-H-9** Histology of skin appendages		
Clinical Interactive Lecture				
109	• Define terms related to fracture: Stress Fracture, Incomplete fracture, • Closed (simple fracture), Open (complicated) fracture, multi-fragmented fractures, complex fracture, Pathologic fractures • Describe mechanism of bone healing • Enlist complications of fracture • Describe etiology & Pathogenesis of Pathologic fractures.	**MSK-S1-Ortho-4** Fractures/Dislocations	Interactive Lecture	SBQs & OSVE
Pathology				
110	• Classify different types of osteomyelitis • List factors leading to their etiology • Explain its pathogenesis	**MSK-S1-Path-3** Osteomyelitis	Interactive Lecture	SBQs & OSVE

CARDIOVASCULAR MODULE-1

Introduction Welcome to the cardiovascular abnormalities' module. This exciting module will be very necessary to your future work as doctors. This module is designed to make your learning both interesting and productive by including interactive activities.

During this module, students will be encouraged to learn the structure and function of the cardiovascular system in an integrated manner i.e. subjects such as Anatomy, Physiology and Biochemistry, will be learned and assessed together (Horizontal Integration). We will also help you learn the basic sciences in a way that is relevant to their clinical applications (Vertical Integration). By adopting this approach, we are preparing you better for your future work as doctor, where patients will come to you with problems that are not categorized by discipline name.

In order to help you learn in an integrated manner, we have updated the learning of basic sciences around a few key health-related situations (real life situations), which you are likely to encounter as first year medical students. You will be expected to think about the scenarios and participate in case based learning sessions for clearing your concepts and better learning. It will also help you focus your attention on what you need to achieve from the Interactive Lectures, practical and tutorials that have been scheduled during this module.

Rationale An overall aim of this module is to help you form a cognitive base for understanding pathogenesis of cardiovascular diseases as they are major cause of morbidity and mortality. (Cardiovascular diseases module – Third-year) & practice of cardiovascular medicine (final-year clinical rotation). The module will prepare you for your future work in the medical course that will include learning in relation to the assessment and promotion of cardiovascular health and management of range of cardiovascular disease.

Duration 5 weeks

Learning Outcomes By the end of this foundation module, the students should be able to:

Knowledge: At the end of this module, the students will be able to:

- Describe the components of the cardiovascular system by learning and applying the relevant basic sciences.
- Apply the above knowledge to a few common real-life situations (Hypertension, Myocardial Infarction and Shock) to explain how the anatomy, Physiology and Biochemistry are altered in the given situation.
- Describe the anatomy of the different parts of the cardiovascular system in detail.
- Describe the development and anomalies of the cardiovascular system.
- Define and identify the microscopic features of the cardiovascular system.
- Describe the functions of the cardiovascular system.
- Interpret the Biochemical changes in the body related to the cardiovascular system.
- Enlist pathologies involving cardiovascular system.
- Describe the management of the cardiovascular diseases.
- Perform the cardiovascular system examination.
- Take the history of the patients and co-relate the cardiovascular sign & symptoms to reach the differential diagnosis
- To counsel the people in community regarding the risk factors of the cardiac diseases.

Clinical/ Practical skills

Measuring blood pressure using Sphygmomanometer with correct technique and interpretation of its values and calculation of mean arterial pressure. Identification of areas on the chest for auscultation of the heart sounds.

Placing electrodes and obtaining an electrocardiogram and interpretation of the basic ECG findings.
Identification of cardiac tissues and blood vessels under the microscope with points of Identification. (Students are required to draw and label microscopic sections of cardiovascular components in histology journal. The journal will be assessed during end-module examination).
Perform clinical examination of the cardiovascular system.

Attitude:

Follow the basic laboratory protocols.
Participate in class and practical work professionally.
Communicate effectively in a team with pears, staff and teachers.
Demonstrate professionalism and ethical values in dealing with patients, peers, staff and teachers.
Demonstrate the ability to reflect on the performance.

Themes

Theme 1: Arrhythmias and Myocardial Infarction
Theme 2: Congenital anomalies of Cardiovascular System
Theme 3: Hypertension
Theme 4: Heart Failure

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Arrhythmias, Myocardial Infarction

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
1	• Define the middle mediastinum. • Explain location and contents of the middle mediastinum. • Discuss fibrous and serous parts of the pericardium. • Define pericardial sinuses and nerve supply of the pericardium. • Discuss related clinical conditions.	**CVS-S1-Ana-G-1** Middle Mediastinum and The Pericardium	Interactive Lecture	SBQs & OSVE
2	• Define Anatomical position of the heart. • Identify and name structures constituting the borders and surfaces of the heart. Define the external features of the Chambers of the heart.	**CVS-S1-Ana-G-2** Anatomy of the Heart-1	Demonstra tion	SBQs, OSPE & OSVE
3	• Describe Internal features of each chamber of heart. • Discuss the related clinical conditions.	**CVS-S1-Ana-G-3** Anatomy of the Heart-2		
4	• Describe composition of the walls and the skeleton of the heart. • Describe conducting system of the heart. • Discuss related clinical conditions.	**CVS-S1-Ana-G-4** Structure of the heart and The Conducting system of the Heart		
5	Identify the histological features of heart; endocardium, myocardium, epicardium on light microscope.	**CVS-S1-Ana-H-1** Histology of the Heart	Practical	OSPE & OSVE
Physiology				

6	• Describe components/parts of CVS and their functions • Define systemic and pulmonary circulation • Mention distribution of blood (in percentage of total blood) in different parts of the circulatory system • Mention pressures in various portions of the circulatory system	**CVS-S1-Phy-1** Overview of CVS	Interactive Lecture	SBQs & OSVE
7	• Mention three major types of muscle • Describe properties of cardiac muscle (Functional syncytium, Automaticity, Rhythmicity, Conductivity, Long refractory period) • Describe cardiac muscle action potential • Discuss mechanism of excitation contraction coupling in cardiac muscle	**CVS-S1-Phy-2** Properties of cardiac muscle	Interactive Lecture	SBQs & OSVE
08	• Describe various parts/components of conducting system of the heart and their functions • Explain action potential and rhythmicity of sinus nodal fibers • Describe origin and spread of cardiac impulse • Mention AV nodal delay and its significance • Describe the effect of ANS on the functioning of conducting system of the heart	**CVS-S1-Phy-3** Excitatory and Conducting system of the heart	Interactive Lecture	SBQs & OSVE
09	• Define electrocardiogram and electrocardiography • Describe the waves, intervals and segments of a normal electrocardiogram (ECG) • Mention the uses/indications of ECG	**CVS-S1-Phy-4** Electrocardiogram (ECG)		
Biochemistry				
10	• Mention introduction of isoenzymes • Discuss diagnostic significance of isoenzymes	**CVS-S1-Bio-1** Diagnostic significance of Isoenzymes in cardiovascular disorders	Interactive Lecture	SBQs & OSVE
Pathology				
11	• Define ischemic heart diseases? • Classify different types of ischemic heart diseases. • Discuss causes and clinical manifestation of ischemic heart diseases.	**CVS-S1-Path-1** Ischemic heart disease	Interactive Lecture	SBQs & OSVE
Medicine (Cardiology)				
12	• Define Arrhythmias • Recognize the common abnormalities in rate and rhythm of the heart (tachycardia, bradycardia, flutter, fibrillations, heart blocks and extra systole) failure.	**CVS-S1-Cardio-1** Arrhythmias	Interactive Lecture	SBQs & OSVE

	• Describe the hemodynamic, neuroendocrine and cellular changes that occur in heart failure. • Describe the Physiological basis of the treatment principles in heart failure.			

Theme 2: Congenital Anomalies of Cardiovascular System

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
13	• Describe development of cardiogenic field and heart tube. • Enumerate the derivatives of heart tube. • Define formation of cardiac looping and dextrocardia and how sinus venous and cardiac septa formed.	**CVS-S1-Ana-E-1** Development of the heart tube	Interactive Lecture	SBQs & OSVE
14	• Explain atrial and interatrial septum development. • Explain ventricles and Inter-ventricular septum development. • Enlist common congenital anomalies of heart chambers.	**CVS-S1-Ana-E-2** Development of the heart chambers and their septa -1		
15	• Explain How atria and interatrial septum develops? • How ventricles and Inter-ventricular septum develops? • What are the common congenital anomalies of heart chambers?	**CVS-S1-Ana-E-3** Development of the heart chambers and their septa -2		
16	• Describe septa formation in bulbus cordis and truncus arteriousis. • Enlist congenital heart defects; transposition of great vessels, PDA, PTA	**CVS-S1-Ana-E-4** Development of septa in truncus arteriosus , valves and conducting system		
17	• Describe the microscopic features of the arteries • Identify the different types of arteries	**CVS-S1-Ana-H-2** Histology of the Arteries	Practical	OSPE & OSVE
Physiology				
18	• Define cardiac cycle • Mention duration of cardiac cycle and its relation with heart rate • Describe sequence of events of cardiac cycle • Mention pressure changes that occur during each cardiac cycle	**CVS-S1-Phy-5** Cardiac cycle and its mechanical Events-I	Interactive Lecture	SBQs & OSVE
19	• Describe the relationship of the electrocardiogram to mechanical events of cardiac cycle • Mention pressure changes in atria • Define JVP and mention its clinical importance	**CVS-S1-Phy-6** Cardiac cycle and its mechanical events-II		

	• Define EDV, ESV and Stroke volume • Define ejection fraction and mention its clinical importance • Define preload and afterload			
20	• Describe functions of heart valves • Mention normal heart sounds and explain their production • Define heart murmur • Mention the timing of the murmur produced by valvular defects and congenital heart diseases • Explain the hemodynamic changes in various valvular heart diseases	**CVS-S1-Phy-7** Heart valves, heart sounds and murmurs		
21	• Define Ohm's law of circulation • Describe main factors that determine vascular resistance • Define total peripheral vascular resistance and total pulmonary vascular resistance • Mention Poiseuille's law	**CVS-S1-Phy-8** Interrelationship among blood flow, pressure and resistance		
Biochemistry				
22	• Describe different aspects related to fatty acids and their clinical significance in the CVS diseases..	**CVS-S1-Bio-2** Fatty acids	Interactive Lecture	SBQs & OSVE
Pathology				
23	• Define aneurysm Classification of aneurysm What are the true and false aneurysms with their examples Pathogenesis of aneurysm	**CVS-S1-Path-2** Congenital anomalies of blood vessels	Interactive Lecture	SBQs & OSVE
24	• Define congenital heart disease. • Describe etiopathogenesis. • Discuss clinical features	**CVS-S1-Path-3** Congenital heart disease.		
Paediatrics				
25	• Describe the Hemodynamic changes in various congenital heart diseases including; Mitral Stenosis Mitral regurgitation Stenosis Aortic regurgitation	**CVS-S1-Paeds-I** Congenital heart diseases	Interactive Lecture	SBQs & OSVE

Theme 3: Hypertension

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
26	• Describe the arterial supply and venous drainage of heart. • Describe the branches of major arteries and their distribution. Define the nerve supply of the heart. Describe the cardiac plexus.	**CVS-S1-Ana-G-5** Blood and nerve supply of the Heart	Interactive Lecture	SBQs & OSVE
27	• Discuss development of arterial system; aortic arches, umbilical, vitelline and coronary arteries • Name the common congenital anomalies of arteries?	**CVS-S1-Ana-E-5** Development of arterial system of heart		

28	• Discuss development of venous system; cardinal veins, umbilical and vitelline. • Name the common congenital anomalies of venous system?	**CVS-S1-Ana-E-6** Development of venous system of heart		
29	Describe the microscopic structure of the veins	**CVS-S1-Ana-H-3** Histology of veins	Practical	OSPE & OSVE
Physiology				
30	• Mention the specific needs of the tissues for blood flow • Define local blood flow • Describe acute/short-term control of local blood flow • Describe long-term control of local blood flow • Explain the auto-regulation of blood flow	**CVS-S1-Phy-9** Control of local blood flow	Practical	OSPE & OSVE
31	• Describe structure of microcirculation and capillary wall • Explain flow of blood in capillaries • Define vasomotion • Define Starling forces and give their approximate values • Describe role of Starling forces in fluid exchange across the capillary wall • List the functions of lymphatics • Define edema and explain the patho Physiological basis for edema (i.e. increased capillary hydrostatic pressure, hypoalbuminemia, increased capillary permeability and lymphatic obstruction)	**CVS-S1-Phy-10** Capillary fluid exchange		
32	• Describe vasomotor center, its important areas and functions • Define vasomotor tone • Describe role of sympathetic nervous system in regulation of circulation • Describe role of parasympathetic nervous system in regulation of circulation	**CVS-S1-Phy-11** Nervous regulation of circulation		
33	• Define systolic blood pressure, diastolic blood pressure, pulse pressure and mean arterial pressure • Mention important factors on which blood pressure depends • List various mechanisms that regulate/control blood pressure • Describe role of baroreceptor reflex in regulation of blood pressure	**CVS-S1-Phy-12** Blood pressure and its Regulation-I (Baroreceptor reflex mechanism)		
Biochemistry				
34	Explain the metabolism and function of	**CVS-S1-Bio-3** Cholesterol	Interactive Lecture	SBQs & OSVE

	cholesterol and its clinical significance in CVS diseases			
35	Describe the prostaglandins & leukotriens, their synthesis and general functions.	**CVS-S1-Bio-4** Prostaglandins and Leukotriens		
36	Demonstrate the estimation of the serum cholesterol	**CVS-S1-Bio-P1** Serum Cholesterol estimation	Practical	OSPE & OSVE
Pharmacology				
37	To describe the drugs used in CVS	**CVS-S1-Pharm-1** Introduction to drugs used in CVS	Interactive Lecture	SBQs & OSVE
Medicine (Cardiology)				
38	• Define hypertension. List the causes of hypertension. • Describe the pathogenesis of hypertension. • Explain the compensatory measures that maintain the blood pressure on rising from supine positions. • Explain the Physiological basis of the treatment principles in hypertension	**CVS-S1-Cardio-2** Hypertension	Interactive Lecture	SBQs & OSVE

Theme 4: Heart Attack

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
39	• Identify different chambers/structures of the heart.	**CVS-S1-Ana-G-6** Model study of heart	Demonstration	SBQs & OSPE & OSVE
40	• Identify different chambers/structures of the heart.	**CVS-S1-Ana-G-7** Model study of heart		
41	• Describe circulatory changes before and after birth. • Name the adult derivatives of embryonic structures?	**CVS-S1-Ana-E-7** Circulation before and after birth	Interactive Lecture	SBQs & OSVE
42	Identify the capillaries with the help of light microscope.	**CVS-S1-Ana-H-4** Histology of capillaries	Practical	OSPE & OSVE
Physiology				
43	• Explain renal-body fluid system and its role in arterial pressure control • Describe Renin-Angiotensin system and its role in arterial pressure control	**CVS-S1-Phy-13** Blood pressure and its regulation-II (Role of kidneys in long-term control of blood pressure)	Interactive Lecture	SBQs & OSVE
44	• Define cardiac output and mention its relationship to stroke volume & heart rate • Describe factors regulating cardiac output • Describe Frank-Starling mechanism of heart	**CVS-S1-Phy-14** Cardiac output and venous return		
45	• Mention some pathological conditions that cause high cardiac output • Mention some pathological conditions that cause low cardiac output • Mention methods of measurement of cardiac output	**CVS-S1-Phy-15** Cardiac output and venous return		

	• Define venous return and mention factors that affect/regulate venous return • Describe central venous pressure			
46	• Define circulatory shock • Describe causes and major types of shock • Mention stages of shock • Describe Physiology of non-progressive and progressive hemorrhagic shock	**CVS-S1-Phy-16** Circulatory shock		
47	• Mention compensatory mechanisms that attempt to return cardiac output and arterial pressure back to normal in a hemorrhagic shock (hypovolemic shock) • Mention factors that lead to progression of shock (i.e. factors worsening the shock) • Describe the Physiological basis of treatment of circulatory shock	**CVS-S1-Phy-17** Circulatory shock		
48	• To record pulse rate manually & on power lab • To record blood pressure manually & on power lab • To record ECG on ECG machine & power lab • To auscultate heart sounds	**CVS-S1-Phy-18** Pulse rate, blood pressure, ECG recording on power lab. and ECG machine	Practical	OSPE & OSVE
Biochemistry				
49	Discuss lipoproteins' metabolism and their clinical significance in CVS diseases	**CVS-S1-Bio-5** Lipoproteins	Interactive Lecture	SBQs & OSVE
50	Interpret lipid profile and its significance	**CVS-S1-Bio-P2** Lipid Profile	Practical	OSPE & OSVE
Pathology				
51	• Define shock • Enlist types of shock • Describe causes, patho-physiology, signs and symptoms of shock	**CVS-S1-Path-4** Shock	Interactive Lecture	SBQs & OSVE
Medicine (Cardiology)				
52	• Define heart failure. • Explain the Physiological basis of common clinical manifestations of heart failure. • Describe different types of the heart failure. • Describe hemodynamic, neuroendocrine and cellular changes that occur in heart failure. • Describe Physiological basis of treatment principles in heart failure.	**CVS-S1-Cardio-3** Heart failure	Interactive Lecture	SBQs & OSVE

5 RESPIRATORY MODULE 1

Introduction This exciting module will serve as building block and is very essential to your future work as doctors. This module is designed to make your learning both interesting and productive by including several interactive activities. An understanding of the structure of the chest wall and the diaphragm is essential if one has to understand the normal movements of the chest wall. Contained within the protective thoracic cage are the important life sustaining organs, such as lungs, Heart and the major blood vessels. Although the chest wall is strong; blunt or penetrating wounds can injure the soft organs. Flail chest (stove-in chest) is an extremely painful injury and impairs ventilation, thereby affecting oxygenation of the blood. This module will explain the Patho-Physiology of all the related conditions.

Rationale There is a high prevalence of respiratory diseases in our community which may leads to increased morbidity and mortality. A practitioner can only be able to deal with the patients suffering from the respiratory diseases when he/she has the basic concepts regarding the structural and functional knowledge of respiratory system. Acute respiratory infections, like pneumonia are critical for children, older adults and people with immune system disorders. For the management certain respiratory diseases, oxygen administration and artificial ventilation are required, hence it is better to explain the students on these topics in earlier years. Smoking is high risk factor for the development of COPD and lung cancer; therefore, its Patho-Physiology is important to learn. Respiratory module is designed in such a way that a student can understand structure, functions, pathogenesis, prescriptions including drug prescription and can educate the community regarding prevention of diseases and promotion of health.

Duration 5 weeks

Learning Outcomes

Knowledge: At the end of this module, the students will be able to:

- Describe the development and anomalies of the respiratory system.
- Define and identify the microscopic features of the respiratory system
- Describe the anatomy of the different parts of the respiratory system in detail
- Describe the functions of the respiratory system
- Interpret the Biochemical changes in the body related to the respiratory system
- Explain obstructive and restrictive pathologies involving respiratory system
- Describe the management of the respiratory diseases
- Perform the respiratory system examination
- Take the history of the patients and co-relate the respiratory sign & symptoms to reach the differential diagnosis
- To counsel the people in community regarding the risk factors of the respiratory diseases.

Skills

- Microscopic identification of the different parts of the respiratory system.
- Perform the spirometry & plot a graph of lung volume
- Perform the cardiopulmonary resuscitation(CPR)
- Analysis of general properties of lipids
- Application of pH meter
- Interpretation of ABGs, PFT
- Perform clinical examination of the respiratory system

Attitude

- Follow the basic laboratory protocols

- Participate in class and practical work professionally
- Communicate effectively in a team with pears, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, pears, staff and teachers.
- Communicate effectively in a team with pears and teachers.
- Demonstrate the ability to reflect on the performance.

Themes

Theme 1: The Chest / Thoracic wall and trauma
Theme 2: Airways and their conditions or diseases
Theme 3: Lung parenchyma & interstitium and the related diseases

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: The Chest/ Thoracic Wall and Trauma

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
	Anatomy			
1	• Define anatomical classification of the respiratory system. • Define structure of the thoracic cage & wall. • Define thoracic inlet & thoracic outlet. • Discuss thoracic outlet syndrome.	**RESP-S1-Ana-G-1** General introduction of the Respiratory system and Anatomy of the thorax	Interactive Lecture	SBQs & OSVE
2	• Define general features of the sternum. • Define general features of the ribs. • Differentiate typical and atypical ribs. • Define costal cartilages. • Discuss attachment of various muscles.	**RESP-S1-Ana-G-2** Osteology of the Ribs and the Sternum	Demonstration	SBQs, OSPE & OSVE
3	• Define general features of the thoracic vertebra. • Differentiate typical and atypical thoracic vertebrae. • Discuss joints of the thoracic walls.	**RESP-S1-Ana-G-3** Osteology of the thoracic vertebrae		
4	• Define three morphological layers of the muscles of the thoracic wall. • Define intercostal spaces. • Define endothoracic fascia. • Discuss supra pleural membrane.	**RESP-S1-Ana-G-4** Muscles of the thoracic wall and intercostal spaces		
5	• Define intraembryonic mesoderm and its parts. • Discuss divisions of lateral plate mesoderm into visceral and parietal layers. • Define extent of intraembryonic coelom and its divisions. • Discuss formation of the pleuro-pericardial and pleuro-peritoneal membranes.	**RESP-S1-Ana-E-1** Formation of the intraembryonic cavity ,Serous membranes and thoracic cavity	Interactive Lecture	SBQs & OSVE
6	• Discuss steps of development of diaphragm from its composite	**RESP-S1-Ana-E-2** Development of the		

	embryonic derivatives. • Discuss anomalies related with its development.	diaphragm		
7	• Describe histological features of different layers of Trachea. • Identify tracheal epithelium and other microscopic features of the trachea with help of light microscope.	**RESP-S1-Ana-H-1** Histology of the Trachea	Practical	OSPE & OSVE
Physiology				
8	• Describe overview of respiration • Describe parts and functions of respiratory tract • Define pulmonary ventilation	**RESP-S1-Phy-1** Overview of respiratory tract, functions	Interactive Lecture	SBQs & OSVE
9	• Describe mechanics of pulmonary ventilation and muscles of respiration • Describe changes in the lung volume, alveolar pressure, pleural pressure & Trans-pulmonary pressure & its changes during respiration. • Discuss alveolar ventilation & dead space also describe cough & sneezing reflexes	**RESP-S1-Phy-2** The mechanics of breathing		
10	• Define lung compliance & list factors affecting lung compliance • Describe composition & role of surfactant in maintaining the alveolar stability & infant respiratory distress syndrome • Differentiate compliance work, tissue resistance work & airway resistance work	**RESP-S1-Phy-3** Lung compliance & work of breathing and surfactant		
11	• Define pulmonary volumes & capacities with their normal values & significance in pulmonary function test. • Discuss alveolar ventilation & dead space	**RESP-S1-Phy-4** Lung volumes & capacities		
12	• Record effect of respiration during sitting & standing of young adult on power lab & plot a graph. • Record the effect of swallowing & deglutition on respiration in healthy adult on power lab & plot a graph	**RESP-S1-Phy-5** Respiratory adaptations during standing, sitting and swallowing on power lab	Practical	OSPE & OSVE
Biochemistry				
13	• Concept of pH, Buffers & their mechanism of action, Types of Buffers in humans	**RESP-S1-Bio-1** Concept of pH, Buffers & their mechanism of action, Types of Buffers in	Interactive Lecture	SBQs & OSVE

		humans		
14	• Describe the acid base balance. • Explain the respiratory and metabolic acidosis & alkalosis with causes and compensatory mechanisms.	**RESP-S1-Bio-2** Acid Base Balance/ Metabolic & Respiratory Acidosis & Alkalosis		
15	• Description & Biomedical significance of Compound Lipids	**RESP-S1-Bio-3** Biomedical significance of Compound Lipids		
16	• Describe the Synthesis & Functions of Phospholipids. • Discuss role of lecithin in respiration	**RESP-S1-Bio-4** Synthesis of Phospholipids & Role of Lecithin in Respiration		
17	Demonstrate the pH Meter, Significance, interpretation	**RESP-S1-Bio-5** Introduction to pH Meter, Significance, interpretation	Practical	OSPE & OSVE
Pathology				
18	• Identify congenital anomalies of lungs. • Define acute lung injury • Describe causes ARDS. • Discuss characteristic features, morphology and pathogenesis of ARDS. • Describe its consequences and clinical course.	**RESP-S1-Patho-1** Congenital anomalies, acute lung injury and ARDS	Practical	OSPE & OSVE
CLINICAL CLASSES				
20	• Define Chyne-stokes breathing and effects on body. • Define COPD and RLD. • Differentiate between RLD & COLD & effects on body (obstructive & restrictive lung disease). Is COVID-19 RLD or COLD type of disease • Define emphysema, chronic bronchitis. • Define Bronchiectasis. • Define interstitial lung diseases	**RESP-S1-MED-1** Obstructive and Restrictive Lung Diseases	Interactive Lecture	SBQs & OSVE

Theme 2: Airways and Their Conditions or Diseases

S #	LEARNING OBJECTIVES	TOPICS	TEACHING STRATEGY	ASSESS MENT
Anatomy				
21	• Discuss attachments of the diaphragm. • Define blood and nerve supply of the diaphragm. • Identify openings in the diaphragm with levels.	**RESP-S1-Ana-G-5** The Diaphragm and its Openings	Demonstration	SBQs, OSPE & OSVE

	• Define structures passing through these openings. • Define functions of the diaphragm.			
22	• Describe mediastinum • Describe boundaries and divisions of mediastinum • Enumerate structures present in it	**RESP-S1-Ana-G-6** Mediastinum	Interactive Lecture	SBQs & OSVE
23	• Define anatomy of the trachea. • Discuss clinical conditions related with trachea.	**RESP-S1-Ana-G-7** Anatomy of the trachea		
24	• Define anatomy of the principal bronchi. • Discuss clinical conditions related with bronchi.	**RESP-S1-Ana-G-8** Anatomy of the bronchi	Demonstration	SBQs, OSPE & OSVE
25	• Describe development of the larynx, trachea and bronchi. • Discuss anomalies related with development of these structures.	**RESP-S1-Ana-E-3** Formation of the Larynx, Trachea and Bronchi	Interactive Lecture	SBQs & OSVE
26	• Describe microscopic features of the bronchi. • Differentiate primary bronchioles from the tertiary bronchioles. • Identify general histological features of bronchi and bronchioles with help of light microscope.	**RESP-S1-Ana-H-2** The Histology of the Bronchi: Primary and Tertiary Bronchioles	Practical	OSPE & OSVE
Physiology				
27	• Describe structure & functions of Respiratory membrane • Gasses exchange across the respiratory membrane • Factors affecting exchange through membrane	**RESP-S1-Phy-6** Diffusion of Gasses	Interactive Lecture	SBQs & OSVE
28	• Describe transport of oxygen in the blood & discuss the oxygen Hb dissociation curve & factors affecting it	**RESP-S1-Phy-7** Transport of oxygen		
29	• Describe transport of CO_2 in the blood & gasses exchange between blood & body cells (chloride shift)	**RESP-S1-Phy-8** Transport of CO_2		
30	• Enlist respiratory centers • Describe mechanisms of nervous regulation of respiration • Describe reflexes involve in nervous regulation	**RESP-S1-Phy-9** Nervous regulation of respiration		
31	• Record effect of exercise on respiration in healthy adult on power lab & plot a graph • Interpret Pulmonary Function Tests	**RESP-S1-Phy-10** Record the lung volumes and capacities on power lab & plot a graph	Practical	OSPE & OSVE

Biochemistry				
32	Describe the Glycosis in detail.	**RESP-S1-Bio-6** Glycosis	Interactive Lecture	SBQs & OSVE
33	Describe role of TCA Cycle in cellular respiration	**RESP-S1-Bio-7** Role of TCA Cycle in cellular respiration		
34	• Demonstrate the Arterial blood gases significance • Describe the ABG's interpretation with various respiratory disorders	**RESP-S1-Bio-8** Arterial blood gases (ABGs) interpretation	Practical	OSPE & OSVE
Pathology				
35	• Define chronic obstructive lung disease (COPD) • Classify the types of COPD • Describe its pathogenesis & clinical features.	**RESP-S1-Path-2** Chronic obstructive lung diseases (COPD)	Interactive Lecture	SBQs & OSVE
Pharmacology				
36	• Classify drugs used to treat dry and productive cough according to their mechanism of action. • Describe adverse effects, contraindications and drug interactions of the drugs used to treat various types of cough.	**RESP-S1-Pharm-1** The Anti-Tussives Drugs	Interactive Lecture	SBQs & OSVE
Clinical Classes				
37	• Define hypoxia and its types. • Explain effects of the hypoxia. • Explain psychogenic dyspnea & causes of psychogenic dyspnea • Define cyanosis. • Explain prevention strategies of cyanosis. • Enlist three principal reasons of cyanosis. • Define CO2 poisoning. • Explain the effects of CO2 poisoning and preventing measures of CO2.	**RESP-S1-MED-2** Hypoxia Cyanosis CO2 poisoning	Interactive Lecture	SBQs & OSVE

Theme 3: Lung Parenchyma and Interstitium and their Conditions or Diseases

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
38	Define structure and neve supply of pleura	**RESP-S1-Ana-G-9** Anatomy of the pleurae	Demonstration	SBQs, OSPE & OSVE
39	• Describe gross anatomy of the lungs. • Discuss the phases of the respiration	**RESP-S1-Ana-G-10** Anatomy of the lungs Mechanism of the		

		respiration-1		
40	• Define bronchopulmonary segments. • Define types of the respiration. • Discuss clinical conditions related with lungs.	**RESP-S1-Ana-G-11** Anatomy of the lungs Mechanism of the respiration-2 (bronchopulmonary segment)		
41	• Define blood and nerve supply of the lungs. • Discuss clinical conditions related with lungs.	**RESP-S1-Ana-G-12** Anatomy of the lungs-3 (Blood supply)	Interactive Lecture	SBQs & OSVE
42	• Define clinical significance of chest X-ray in respiratory diseases.	**RESP-S1-Ana-G-13** Radiology: Basics of chest X-ray		
43	• Discuss formation of laryngo-tracheal groove & respiratory diverticulum or lung buds. • Define anomalies related with development of the lung buds. • Discuss stages of development / maturation of the lungs. • Discuss anomalies related with the lung maturation	**RESP-S1-Ana-E-4** Formation of the lung buds The maturation of the Lungs		
44	• Identify structure of the alveoli and inter-alveolar septum under microscope and correlate functions of different types of cells, forming the alveolar wall. • Identify structure and function of the blood air barrier	**RESP-S1-Ana-H-3** The Histology of the Lungs: Alveoli	Practical	OSPE & OSVE
Physiology				
45	• Describe chemical control of respiration • Explain chemoreceptor involved in chemical respiration. • Describe regulation of respiration during exercise. • Explain Periodic breathing	**RESP-S1-Phy-9** Chemical regulation of respiration Regulation during exercise	Interactive Lecture	SBQs & OSVE
46	• Describe pulmonary circulation & blood flow through various zones of lung (1, 2, 3). • Explain pulmonary capillary dynamics. • Explain mechanism of development of pulmonary edema, pleural effusion • Ventilation perfusion ratio (V/Q ratio)	**RESP-S1-Phy-10** Pulmonary Circulation & V/Q relationships		
47	• Define respiratory changes associated with High altitude • Discuss hypoxia and its types.	**RESP-S1-Phy-11** High altitude & Hypoxia		

48	• Explain deep sea diving Physiology • Describe caisson's disease	**RESP-S1-Phy-12** Deep sea Diving Physiology		
Biochemistry				
49	Describe organization of the Electron Transport Chain	**RESP-S1-Bio-9** Organization of Electron Transport Chain	Interactive Lecture	SBQs & OSVE
50	Describe Oxidative phosphorylation & ATP Synthesis	**RESP-S1-Bio-10** Oxidative phosphorylation & ATP Synthesis		
51	Demonstrate role of emulsification in respiration and digestion.	**RESP-S1-Bio-11** Role of Emulsification in respiration and digestion	Practical	OSPE & OSVE
Pathology				
52	• Define pneumonia. • Discuss etiological classification of pneumonia. • Discuss its clinical presentation. • Describe diagnostic tools for pneumonia.	**RESP-S1-Path-3** Pneumonia	Interactive Lecture	SBQs & OSVE
Clinical				
53	• Define RDS. • Describe sign and symptoms of the respiratory distress syndrome. • Enlist the causes of the respiratory distress syndrome • Discuss the management	**RESP-S1-Med-3** Respiratory distress syndrome	Interactive Lecture	SBQs & OSVE

BEHAVIOURAL SCIENCES

Introduction

Behavioral sciences (BS) is the scientific study of human behavior, and it includes psychology, sociology, and anthropology. These three disciplines are taught together in undergraduate curricula around the world because they are all concerned with understanding human behavior from different perspectives. BS is similar to other basic medical sciences, such as anatomy, biochemistry, physiology, and pathology, in that it explains existing behavior and can be used to predict the behavior of patients and healthcare providers in both clinical and non-clinical situations.

Behavioral sciences are essential for physicians to understand the psychosocial aspects of medical disorders. A physician who has been trained in BS is aware of the impact of history, culture, environment, and psychology on the manifestation of various symptoms. This knowledge allows physicians to communicate more effectively and ethically with their patients, and to develop treatment plans that include not only the patient but also the family.

Behavioral sciences can also be beneficial to medical students on a personal level. By understanding the modern theories of learning, memory, and cognition, students can improve their own learning abilities. Additionally, the knowledge of behavioral sciences can help students to better understand themselves and their relationships with others.

In 2022, the Pakistan Medical & Dental Council (PM&DC) assigned 50 teaching hours to the subject of behavioral sciences in the curriculum of MBBS. This is a significant step in the right direction, as it acknowledges the importance of BS in medical education. It will help to produce physicians who are better equipped to understand and treat the psychosocial aspects of medical disorders. This will ultimately lead to improved patient care.

Rationale

- To provide medical and dental graduates with a broader bio-psycho-social perspective on health and illness.
- To teach students how to use principles of learning and behavior change to enhance their own learning capabilities and to help their patients make positive behavioral changes.
- To help medical graduates develop the ethical and personal qualities necessary to provide compassionate and effective care.

Learning Outcomes of Behavioral Sciences Among MBBS Students:

Upon completion of a BS course in undergraduate MBBS, students should be able to:

KNOWLEDGE:

- Comprehend BS in clinical practice.
- Conceptualize the holistic aspect of medical learning.
- Understand communication skills in clinical and non-clinical settings.
- Understand human cognitive faculties like learning, memory, perception, thinking, intelligence, and meta-cognition that regulate behavior.
- Demonstrate the psychological components of health and disease like defense mechanisms and personality in various behavioral states.
- Apprehend psychosocial issues in special hospital settings.
- Learn psychosocial aspects of aging, death, pain, and terrorism.
- Be aware of sex and gender issues in pre-clinical, clinical, and professional settings.
- Understand and recognize common psychiatric ailments like anxiety, depression, and stress.

SKILLS

- Keep an eye on behavioral issues while working in pre-clinical, clinical, and professional settings.
- Understand patients' stance while taking a comprehensive history or in any other scenario like breaking bad news, conflict resolution, disaster management, information care, etc.
- Communicate well his/her own understanding and strategy in interpersonal relationships.
- Use cognitive and behavioral theories while communicating with others and in any clinical or non-clinical activity.
- Believe in the implication of socio-cultural factors such as gender, race, social class, family, and occupations in health and disease.
- Be able to correlate the psychosocial aspects with the common clinical conditions (DM, Coronary Artery Disease, AIDS, etc.)
- Identify the social and anthropological factors that influence detection, management, compliance, and clinical outcome (stigma, myths, cultural taboo, somatization, etc.)
- Demonstrate stress management skills towards self, patients, and colleagues.
- Be highly concerned about the psychosocial factors in important clinical settings like hospitalization, emergency, ICU, cancer wards, etc.

ATTITUDE

- Exhibit the highest level of ethical and professional standards in his/her character with the patients, colleagues, teachers, relatives, attendants, pharmaceutical industry, and public as a whole.
- Be highly concerned about the rights of patients and doctors envisaged in law, constitution, and religion.
- Acknowledge the social, cultural, and anthropological aspects of health and disease.
- Demonstrate confidentiality and privacy of their patient's information in their clinical practice, interaction with colleagues, and medical/dental and other authorities.
- Undertake an informed consent from the patient.
- Demonstrate principles of these Medical/Dental Ethics in their interactions with patients, their relatives, colleagues, pharmaceutical industry, and medical/dental as well as other authorities.

In conclusion, BS is an essential component of medical education. It provides students with the knowledge, skills, and attitudes necessary to provide comprehensive and patient-centered care.

LEARNING METHODOLOGIES

The following teaching / learning methods are used to promote better understanding:

- Lectures
- Interactive Lectures
- Demonstrations
- Hospital / Clinic visits
- Problem- Based Learning (PBL)
- Case- Based Learning (CBL)
- Practical’s
- Skills session
- E-Learning
- Self-learning

THEME 1: Introduction to Behavioral Sciences and Its Importance in Health

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Comprehend the significance of behavioral sciences in medical practice. Understand the bio psycho-social model in clinical practice, along with the impact of culture on medical practice. gain a comprehensive understanding of psychology, sociology, anthropology, and the biological determinants of health and disease in clinical practice, and be able to identify normal and abnormal behaviors	**PAR-S-1-BS-1** **Introduction to Behavioral Sciences and its importance in health.** • The importance of behavioral sciences in healthcare • The Bio-psycho-social model of health and illness • The connection between health and behavioral sciences (psychology, sociology, anthropology). • The correlation between body, brain, mind and behavioral sciences • Normality vs. abnormality	**LECTURE**

THEME 2: Understanding Behavior

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Analyze human behavior by examining factors such as sensation, sensory organs, perception, attention, concentration, memory, thinking, and communication. Evaluate how these elements influence the development of psychological and behavioral disorders, applying clinical reasoning and fostering personal growth in learning and practice.	**PAR-S-1-BS-2** **Understanding Behavior: Sensation, Perception, Attention, Memory, Thinking, and Communication.** • Explore sensation and the functions of sensory organs. • Define perception, its influencing factors, and abnormalities, including extrasensory perception (ESP). • Examine attention and concentration, focusing on factors that affect their efficacy. • Discuss memory, including its stages, types, and strategies for enhancement. • Analyze thinking, its types, and related theories, along with levels of cognition, problem-solving techniques, and decision-making strategies. • Define communication, highlighting its types, modes, influencing factors, non-verbal cues, and the characteristics of effective communication.	**LECTURE**

THEME 3: THEME 3: Individual Differences

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Analyze the types of human personality and the stages of personality development, emphasizing their influence on behavior and growth. Assess the role of intelligence in shaping personal and professional success.	**PAR-S-1-BS-3** **Understanding Individual Differences: Personality, Intelligence.** • Explore the stages and key characteristics of psychological human growth and development. • Define personality and examine cognitive and psychodynamic theories, factors influencing personality development, and methods of assessment. Analyze how personality impacts responses to health, disease, hospitalization, and stress. • Define intelligence and its various types, including IQ and EQ, and their relevance in a doctor's life. Discuss strategies to enhance EQ and effectively utilize IQ. Examine factors influencing intelligence and methods of assessment.	**LECTURE**
2.	Explain the complex relationship between brain function and behavior, focusing on emotions, motivation, and learning, as well as strategies to manage and enhance these processes effectively.	**PAR-S-1-BS-4** **Interplay of Brain and Behavior: Emotions, Motivation/need/drive and Learning** • Define emotions, their types, and the concept of Emotional Quotient (EQ), emphasizing emotional literacy and its practical utility. • Define motivation, its types, and the application of motivational theories to improve learning and treatment adherence. • Define learning and explore its principles, modern methods, learning styles, and types of learners. Discuss cognitive theories of learning and strategies to enhance learning skills effectively	**LECTURE**

THEME 4: Doctor-Patient Relationship and Medical Ethics

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Critically evaluate complex clinical scenarios to identify and resolve ethical and practical challenges while upholding ethical boundaries within the doctor patient relationship. Demonstrate professionalism and strive for excellence in fostering trust and maintaining a healthy, effective doctor-patient dynamic.	**PAR-S-1-BS-5** **Doctor-Patient Relationship and Medical Ethics.** • Professional boundaries and psychological aspects (e.g., transference, counter-transference). • Ethical principles: Hippocratic Oath, medical/dental ethics, and patient-doctor rights (international law, Pakistan's Constitution, PM&DC, Islam). • Ethical dilemmas in interactions with families, colleagues, and the pharmaceutical industry. • Emerging issues: e-consultation, telemedicine, euthanasia, and physician-assisted suicide	**LECTURE**

THEME 5: Communication skills and Non-Pharmacological Interventions

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Demonstrate effective communication skills in clinical practice, including the use of non-pharmacological interventions such as counseling, providing informational care, and sensitively breaking bad news, in conjunction with appropriate medication management. Effectively handle patient information across diverse clinical scenarios while maintaining confidentiality and professionalism. Develop the ability to navigate and manage uncertain situations with confidence and empathy in clinical practice	**PAR-S-1-BS-6** **Communication skills and Non-Pharmacological Interventions (NPIs) in Clinical Practice.** • Principles of effective communication: active listening, the art of questioning, and the art of listening. Characteristics of good and bad listeners. • Counseling: Scope, indications, contraindications, steps, do's and don'ts. Managing real-life crisis and conflict situations in health settings. • Informational Care: Communicating with patients about disease, medications, prognosis, etc. • Breaking bad news: Introduction, model, and approach to patient and caregivers	**LECTURE**

COMMUNITY MEDICINE

LEARNING OUTCOMES:

- This module has been designed to introduce the basics of Community Medicine and Public health sciences.
- The course will cover the Introduction about community medicine and difference between clinical and community medicine.
- This module will also clear the concept of health and diseases and their determinants and help in understanding the level of prevention.
- This module will teach the various National and International health issues and their agendas.
- At the end of this module, students will be able to understand the basics of community medicine, its role and importance for clinicians.

RATIONALE:

Community Medicine is main branch of medicine concerned with the health of people. Its aim is to protect and promote the health and well-being of the community through Primary Health Care approach. Community Medicine plays an important role for making effective intervention and prevention strategies; it is also helpful for greater understanding of the risk factors of chronic disease processes and their effects on function and quality of life. So the essential mission of teaching Community Medicine is to contribute in the development of a well-formed health professionals.

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
01	• To define different definition of public health / Community Medicine • To learn evolution of public health, it importance in today's world • To discuss the basic functions of Public health / community Medicine • To define the difference between clinical and community medicine	**PAR-S-1-CM-1** Introduction to Community Medicine & public Health (introduction to course/ department/ faculty	**LECTURE**
02	• To understand the concept of disease and health • To discuss the Spectrum of health and Iceberg phenomenon of disease • To understand the Health Dimensions	**PAR-S-1-CM-2** Concept of Health and Disease	**LECTURE**
03	• To understand determinants of health with special focus on social determinants of health (SDH) • To define responsibility for Health • To define health indicator • To describe the Types of indicators	**PAR-S-1-CM-3** Determinants of health and Health Indicator	**LECTURE**
04	• To define Health • To discuss the "health for All", background, concepts and progress. • To define Primary health care • To discuss the Alma Ata Declaration • To discuss the Universal health coverage • To learn about health delivery system of Pakistan	**PAR-S-1-CM-4** Primary Health Care": Concepts and progress, and Health Delivery system of Pakistan	**LECTURE**

05	• To discuss the important global health issues • To understand the important public health issues of Pakistan • To define the health inequalities ○ Developing vs developed, ○ urban vs, rural, ○ rich vs poor, ○ male vs female • To discuss the Health and its relationship with development • To learn global development goals **I.** Millennium Development goals (MDGs) **II.** Sustainable Development Goals (SDGs)	**PAR-S-1-CM-5** Global and Local health issues & Global Health Agendas	**LECTURE**

INFORMATION TECHNOLOGY

Introduction/ Rationale

The integration of information technology into the MBBS (Bachelor of Medicine and Bachelor of Surgery) curriculum is essential in today's rapidly evolving healthcare landscape. IT proficiency is vital, as it will equip MBBS students with the skills needed to navigate electronic health records, telemedicine platforms, and advanced diagnostic tools. It enables efficient data management and evidence-based decision-making. Moreover, IT skills are crucial for facilitating interdisciplinary collaboration, ensuring that MBBS graduates can research, access academic literature, and adapt to emerging healthcare technologies. By incorporating an IT module, the MBBS curriculum aligns with the evolving healthcare environment. It is time that healthcare professionals stay updated with the latest medical research, clinical guidelines, and best practices. IT modules will help students leverage digital resources for continuous learning, including online courses, webinars, and virtual conferences, ultimately leading to ongoing professional development. Understanding healthcare management systems, hospital information systems (HIS), and administrative software is crucial for effective healthcare administration. IT modules will provide relatable knowledge to students.

Learning Outcomes

After completing this IT module, students will be able:

- To effectively use office software (e.g., Microsoft office, google workspace) for tasks such as word processing, spreadsheet analysis, and presentation creation.
- To organize, store, and manage medical documents and reports using office automation tools.
- To proficiently use medical databases (e.g., PubMed, The Cochrane Library) to access scholarly articles, research, and evidence-based resources.
- To edit medical images and videos for presentations, reports, and patient education, ensuring accuracy and clarity.
- To use visuals effectively to convey medical information, diagnoses, and treatment plans.
- To comprehend the fundamental principles of electronic health records (EHR), including their structure, purpose, and functionalities. They will learn to enter, update, and manage patient information and medical records in EHR systems.

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
01	To learn the basics of IT, importance, benefits, and major areas of Information Technology	**PAR-S-1-IT-1** Introduction to IT & its Importance in healthcare	Lecture
		PAR-S-1-IT-2 Advance applications of IT in healthcare (AI, EHR, mHealth, IoT)	
02	Learn efficient content delivery and resource management in a digital environment	**PAR-S-1-IT-3** Google Classroom	Practical
03	Comprehensive understanding of computer system components, their functions, and the skills necessary for hardware maintenance, troubleshooting, and optimization	**PAR-S-1-IT-4** Components of a Computer System	Lecture
		PAR-S-1-IT-5 Hardware & Software	
		PAR-S-1-IT-6 Types of Software	
		PAR-S-1-IT-7 Software Installation and Troubleshooting	Practical
		PAR-S-1-IT-8 Operating System	Lecture
		PAR-S-1-IT-9 Microprocessors, mobile computing	
04	Developing skills in document design, enhancing aesthetics for professional presentations and reports. Learn to Explore advanced techniques for data visualization	**PAR-S-1-IT-10** Word Processing Software	Practical
		PAR-S-1-IT-11 Presentation Software	
		PAR-S-1-IT-12 Data Analysis using MS Excel software	

Recommendation:

Relevant reading material and supplementary handouts will be provided during classes/ lectures

BIOMEDICAL ETHICS

Introduction/ Rationale

The rationale for teaching Biomedical Ethics to MBBS students at LUMHS is rooted in several important considerations related to the fields of medicine, healthcare, and related professions. This will provide ethical guidance and education, promote ethical behavior, protect patient rights and resolve ethical dilemmas. This will help students as future professionals to navigate complex ethical challenges and ensures that ethical principles and values are integrated into the practice of medicine, research, and other professional fields. Ultimately, this course will play a vital role in promoting ethical conduct and maintaining the trust and integrity of these professions.

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S #	LEARNING OUTCOMES	TOPIC	TEACHING STRATEGY
01	• Students should be able to understand the principles of bioethics and what is ethical practice and what is an ethical dilemma • Students should be able to understand harms and benefits in health care settings • Students should be able to understand the concepts of autonomy and individual responsibility and to understand their significance for the health care provider patient relationship • Students should be able to understand concept of non-maleficence and Hippocratic oath • Students should be able to understand concept of justice in health care setting and equity in resource allocation	**PAR-S-1-ETH-1** Introduction to Biomedical Ethics	**Lecture SGD**

RESEARCH

Introduction

The foundation of any institution is research. Advanced nations assert that their advancements in research and development have modernized them and enabled them to generate revenue. Globally, medical universities are essential to the advancement of healthcare. Beginning with health issue prediction surveys and continuing with the creation of innovative medications and diagnostic methods.

Any institution's greatest asset is its student population. Here, we offer the guidelines and framework for research curriculum, which will assist you in reaching degree program standards.

The scientific research element of the medical curriculum aims to develop a research-oriented mindset in students that promotes evidence-based practice, critical thinking, and a more comprehensive understanding of medical science. This module focuses on bridging the knowledge gap between theory and clinical application by giving students the tools they need to carry out significant medical research.

Rationale

Research is essential to expanding our understanding of medicine and enhancing patient care. Students who engage in research projects improve their analytical and critical thinking skills, strengthen their capacity to understand scientific literature, and make a positive impact on the continuous advancement of medical science. Students' academic journeys are further enhanced by research experiences, which equip them to make evidence-based decisions in their future healthcare endeavors.

Learning Objectives:

- **Develop Research Competence:** Get the know-how required to plan, carry out, and evaluate medical research on your own.
- **Critical Thinking:** Gain the capacity to evaluate scientific literature critically, understanding research techniques and coming to conclusions supported by data.
- **Communication Skills:** Improve your written and verbal communication abilities to effectively communicate research findings to a variety of audiences.
- **Ethical Considerations:** Show your dedication to responsible and open scientific inquiry by understanding and putting ethical principles into practice in your research.

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S #	LEARNING OBJECTIVE	TOPICS	TEACHING STRATEGY
1	Define Research Fundamentals	**PAR-S-1-RES-1** Introductory class	Lecture
2	Describe Fundamentals of Biostatistics	**PAR-S-1-RES-2** Introduction to Biostatistics	
3	Enlist the types of research variables	**PAR-S-1-RES-3** Types of Research Variables	
4	Identify methods of measuring Central Tendencies & Measures of Dispersion	**PAR-S-1-RES-4** Central Tendencies & Measures Of Dispersion	
5	Summarize Concepts of basic research	**PAR-S-1-RES-5** Basic Research	
6	Demonstrate an understanding of different research designs	**PAR-S-1-RES-6** Study Designs	
7	Summarize and synthesize relevant literature to establish the research context	**PAR-S-1-RES-7** Literature search	
8	Identify and apply appropriate research methods and techniques.	**PAR-S-1-RES-8** Basic Laboratory techniques	
9	Define research proposal and its contents	**PAR-S-1-RES-9** What is research proposal and how to write it?	
10	Define research proposal and its contents	**PAR-S-1-RES-10** What are the components of proposal writing?	
11	Define research proposal and its contents	**PAR-S-1-RES-11** Presentation of Research Proposal	Discussion

EXAMINATION ASSESSEMENT

ASSESSMENT PLAN FOR EACH PAPER	END OF YEAR ASSESMENT	INTERNAL EVALUATION	TOTAL %AGE
THEORY (SBQS)	80%	20%	100%
PRACTICAL EXAM (OSVE; OSPE)	80%		

ALLOCATION OF INTERNAL ASSESSMENT MARKS		
COMPONENT	**SCORING MATRIX**	**PERCENTAGE**
THEORY	ATTENDANCE (>90%=03; 89-80%=02; 79-70%=01;<70%=00	**3%**
	Module tests	**3%**
	Block tests	**4%**
		10%
PRACTICAL	ATTENDANCE (>90%=03; 89-80%=02; 79-70%=01;<70%=00	**3%**
	Module tests including ethics, conduct, practical's, assignments)	**3%**
	Block tests	**4%**
		10%
TOTAL		**20%**

7 LEARNING RESOURCES

Anatomy:

- **GROSS ANATOMY**
  - Clinical Anatomy by Richard S. Snell
  - K.L. Moore, Clinically Oriented Anatomy
  - Neuro Anatomy by Richard Snell
- **HISTOLOGY**
  - B. Young J. W. Health Wheather's Functional Histology
- **EMBRYOLOGY**
  - Keith L. Moore. The Developing Human
  - Langman's Medical Embryology

Biochemistry:

- **TEXTBOOKS**
  - Harper's Illustrated Biochemistry
  - Lehninger Principle of Biochemistry

- Biochemistry by Devlin

Community Medicine:

❖ **TEXT BOOKS**

- Community Medicine by Parikh
- Community Medicine by M Illyas
- Basic Statistics for the Health Sciences by Jan W Kuzma

Pathology / MicroBiology:

❖ **TEXT BOOKS**

- Robbins & Cotran, Pathologic Basis of Disease, 9th edition.
- Rapid Review Pathology, 4th edition by Edward F. Goljan MD

Pharmacology:

❖ **TEXT BOOKS**

- Lippincot Illustrated Pharmacology
- 2. Basic and Clinical Pharmacology by Katzung

Physiology:

❖ **TEXTBOOKS**

- Textbook of Medical Physiology by Guyton And Hall
- Ganong' S Review of Medical Physiology
- Human Physiology by Lauralee Sherwood
- Berne & Levy Physiology
- Best & Taylor Physiological Basis of Medical Practice

❖ **REFERENCE BOOKS**

- Guyton & Hall Physiological Review
- Essentials of Medical Physiology by Jaypee
- Textbook of Medical Physiology by InduKhurana
- Short Textbook of Physiology by Mrthur
- NMS Physiology
- Monoo's Physiology

- **Behavioral Sciences:**
  - Hand book of Behavioral Sciences by Brig (Rtd) Mowadat H Rana (3rd Edition)
  - Introduction To Psychology By Atkinson & Hilgard (15th Edition)
  - Shorter Oxford Textbook of Psychiatry (7th Edition)
- **Biomedical Ethics:**
  - Beauchamp TL, Childress JF. Principles of biomedical ethics. Oxford University Press, USA; 2001
- **Research:**

➢ Basic Biostatistics for Clinical Researchers" by Prof. Dr. Binafsha Manzoor Syed, PhD et al.
Weblink: https://www.lumhs.edu.pk/publishers/documents/basicbio.pdf

➢ Research Methodology in Medicine" by John K. Last
Weblink: https://kth.diva-portal.org/smash/get/diva2:1547062/FULLTEXT01.pdf

Journals:

- New England Journal of Medicine
- Nature Medicine
- Journal of clinical investigation (JCI)
- Circulation

Online Databases:

- PubMed

THE END