

# STUDENT STUDY GUIDE



**Integrated Modular System**  
**1st Professional MBBS**  
**Academic Year 2023-24**



**Liaquat University**  
of Medical & Health Sciences,  
Jamshoro.

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# P R E F A C E

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 centres 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 organising 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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# 1 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 peers, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, peers, staff and teachers.
- Communicate effectively in a team with peers 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	ASSESSMENT
<b>Anatomy</b>				
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	<b>Fnd-S1-Ana-G1</b> 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	<b>Fnd-S1-Ana-G2</b> Anatomical position, Anatomical planes & terms of position		
3	Interpret the movements of different parts of human body the knowledge of various terms of movement.	<b>Fnd-S1-Ana-G3</b> Terms of movements		
4	Explain the appendicular and axial skeleton	<b>Fnd-S1-Ana-G4</b> Introduction to the parts of axial and appendicular skeleton		
<b>Physiology</b>				
5	Define Physiology and Enumerate the branches of Physiology	<b>Fnd-S1-Phy-1</b> Introduction to Physiology	Interactive Lecture	SBQs & OSVE
<b>Biochemistry</b>				
6	<ul style="list-style-type: none"> <li>Define Biochemistry &amp;</li> <li>Discuss the role of Biochemistry in medicine</li> </ul>	<b>Fnd-S1-Bio-1</b> 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.	<b>Fnd-S1-Bio-2</b> Laboratory Hazards & Protection Protocols		
8	Demonstrate importance of chemicals and reagents in the different reactions of Biomolecules	<b>Fnd-S1-Bio-3</b> Chemicals and reagents	Practical	OSPE & OSVE
9	Illustrate techniques of using glassware and handling of Biochemical instruments during laboratory work.	<b>Fnd-S1-Bio-4</b> Use of glassware & Instruments for laboratory work		
<b>Pathology</b>				
10	<ul style="list-style-type: none"> <li>Define the pathology</li> <li>Enumerate the different branches of pathology</li> <li>Describe the terminologies used in Pathology</li> </ul>	<b>Fnd-S1-Path-1</b> Introduction to Pathology	Interactive Lecture	SBQs & OSVE
<b>Pharmacology</b>				
11	<ul style="list-style-type: none"> <li>Define the Pharmacology and role of Pharmacology in medicine</li> <li>Discuss Pharmaco-dynamics and Pharmacokinetics</li> </ul>	<b>Fnd-S1-Pharm-1</b> Introduction to Pharmacology and its implication in Medicine	Interactive Lecture	SBQs & OSVE



<b>Community Medicine</b>				
12	<ul style="list-style-type: none"> <li>Define different definition of public health/Community Medicine</li> <li>Discuss basic functions of Public health/community Medicine</li> <li>Define the difference between clinical and community medicine</li> <li>Discuss Non-Governmental organizations, International agencies and National Programs of Pakistan</li> </ul>	<b>Fnd-S1-CM-1</b> Introduction to Community Medicine & Public Health	Interactive Lecture	SBQs & OSVE
<b>Forensic Medicine</b>				
13	<ul style="list-style-type: none"> <li>Define Forensic Medicine, Forensic Pathology and state Medicine</li> <li>Know the branches and the history of Forensic Medicine briefly</li> <li>Discuss the scope of Forensic Medicine in practice</li> <li>Identify the essential facilities for medico legal investigation.</li> <li>Define medical jurisprudence and differentiate it from Forensic medicine</li> </ul>	<b>Fnd-S1-FM-1</b> Introduction to forensic Medicine and Toxicology	Interactive Lecture	SBQs & OSVE
<b>Medical Education</b>				
14	<ul style="list-style-type: none"> <li>Describe the curriculum and modules under implementation</li> <li>Describe the use of study guides (not to be assessed)</li> <li>Differentiate between various teaching &amp; learning strategies</li> <li>Enlist various assessment tools, and</li> <li>assessment policy</li> </ul>	<b>Fnd-S1-ME-1</b> Curriculum structure teaching learning strategies	Interactive Lecture	SBQs & OSVE
15	Describe various study skills strategies	<b>Fnd-S1-ME-2</b> Study skills strategies		
<b>Information Technology</b>				
16	Define IT and its importance in Medicine	<b>Fnd-S1-IT-1</b> Importance of IT skills	Interactive Lecture	SBQs & OSVE
<b>Library Sciences</b>				
17	Learn literature searchskills	<b>Fnd-S1-LIB-1</b> Literature search and library resources	Interactive Lecture	SBQs & OSVE



<b>Behavioral Sciences</b>				
18	Learn the significance of communication skills in Medical Sciences	<b>Fnd-S1-BS-1</b> Introduction to behavioral Sciences	Interactive Lecture	SBQs & OSVE
<b>Communication Skills</b>				
19	Learn the significance of communication skills in Medical Sciences	<b>Fnd-S1-CS-1</b> Introduction to communication skills	Interactive Lecture	SBQs & OSVE
<b>Biomedical Ethics</b>				
20	Learn the significance of ethics in Medical Sciences	<b>Fnd-S1-BE-1</b> Introduction to Bio Medical Ethics	Interactive Lecture	SBQs & OSVE
<b>Research Methodology</b>				
21	Learn the significance of ethics in Medical Sciences	<b>Fnd-S1-RM-1</b> Introduction to research methodology	Interactive Lecture	SBQs & OSVE

## Theme 1: Cell Structure, Chemistry & Functions

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
22	Describe the basic structure and functions of cell membrane. Describe the basic structure and functions of the Nucleus.	<b>Fnd-S1-Ana-H1</b> 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)	<b>Fnd-S1-Ana-H2</b> Cell Organelles		
24	<ul style="list-style-type: none"> <li>Operate the different parts of the light microscope.</li> <li>Explain how to use the light microscope to visualize a slide.</li> </ul>	<b>Fnd-S1-Ana-H3</b> Parts of Light microscope	Practical	OSPE & OSVE
<b>Physiology</b>				
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.	<b>Fnd-S1-Phy-2</b> 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	<b>Fnd-S1-Phy-3</b> Cell organelles-I (Lysosomes,		



	functions of lysosomes & peroxisomes, Endoplasmic Reticulum.	Peroxisomes, Endoplasmic Reticulum, Golgi complex)		
27	<ul style="list-style-type: none"> <li>Describe the functions of mitochondria, its special features &amp; its role in generation of ATP</li> <li>Describe the functions of ER, Golgi apparatus, Ribosomes, and cytoskeleton.</li> </ul>	<b>Fnd-S1-Phy-4</b> Cell organelles-II Mitochondria, Microtubules & Microfilaments, Ribosomes Vaults Centromere.		
28	Recognize the structure & functions of Nucleus	<b>Fnd-S1-Phy-5</b> Nucleus & its functions		
29	Show the Parts And Functions of the Microscope	<b>Fnd-S1-Phy-6</b> Introduction to Microscope	Practical	OSPE & OSVE
<b>Biochemistry</b>				
30	Describe the chemical structure and significance of mitochondria, functions and location of enzymes for metabolic pathways & chemical reactions that occur in mitochondria.	<b>Fnd-S1-Bio-5</b> 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.	<b>Fnd-S1-Bio-6</b> Solutions, concentration expression (Percent solutions, Molarity, Molality, Normality)	Practical	OSPE & OSVE
<b>Pathology</b>				
32	<ul style="list-style-type: none"> <li>Define Hypertrophy, Hyperplasia, Atrophy and Metaplasia.</li> <li>Enlist Physiological and pathological mechanisms of cellular adaptation</li> </ul>	<b>Fnd-S1-Path-2</b> Cellular adaptations	Interactive Lecture	SBQs & OSVE





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

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
33	Describe components of cell surface modifications and junction complex	<b>Fnd-S1-Ana-H-4</b> Cell surface modifications and cell Junctions	Interactive Lecture	SBQs & OSVE
34	Differentiate between normal and abnormal cell division and their consequences	<b>Fnd-S1-Ana-E-1</b> Cell cycle: Mitosis and Meiosis cell divisions		
35	<ul style="list-style-type: none"> <li>Enlist steps of tissue processing.</li> <li>Define the artifacts. Know the basic histological stains. Define H&amp;E Staining.</li> </ul>	<b>Fnd-S1-Ana-H-5</b> Slide preparation and the H&E Staining	Practical	OSPE & OSVE
<b>Physiology</b>				
36	Explain composition and basic structure of cell membrane, its functional importance and adaptation	<b>Fnd-S1-Phy-7</b> Plasma membrane & its structure and function	Interactive Lecture	SBQs & OSVE
37	Describe types and process of transport across the membrane and their effects.	<b>Fnd-S1-Phy-8</b> Types of transport, Simple Diffusion		
38	<ul style="list-style-type: none"> <li>Describe the Transport across cell membrane via protein mediated method.</li> <li>Describe the process of osmosis</li> </ul>	<b>Fnd-S1-Phy-9</b> Protein mediated transport Facilitated diffusion, Osmosis		
39	Explain the Physiological mechanism and types of transport. (Passive & Active)	<b>Fnd-S1-Phy-10</b> Active transport, Primary active transport, Secondary active transport Bulk transport		
40	<ul style="list-style-type: none"> <li>Describe the membrane potential its development &amp; maintenance of resting membrane potential.</li> <li>Explain Permeability of cell membrane</li> <li>Explain the Propagation of action potential and its ionic basis</li> </ul>	<b>Fnd-S1-Phy-11</b> Resting membrane Potential Graded potential, Factors affecting membrane potential		



41	<ul style="list-style-type: none"> <li>Discuss action potential</li> <li>Give mechanism of propagation of action potential &amp; its ionic changes</li> </ul>	<b>Fnd-S1-Phy-12</b> Action potential		
42	Employ types and methods of sterilization	<b>Fnd-S1-Phy-13</b> Sterilization	Practical	OSPE & OSVE
<b>Pathology</b>				
43	Demonstrate gross and microscopic features of cellular adaptations and Necrosis	<b>Fnd-S1-Path-3</b> Cell Pathology	Interactive Lecture	SBQs & OSVE
<b>Pharmacology</b>				
44	<ul style="list-style-type: none"> <li>Enlist different routes of drug administration</li> <li>Describe the merits &amp; demerits of the different routes of drug administration</li> </ul>	<b>Fnd-S1-Pharm-2</b> Routes of drug administration (Enteral, Parenteral) drugs	Interactive Lecture	SBQs & OSVE
45	Describe drug absorption & factors affecting rate and extent of drug absorption	<b>Fnd-S1-Pharm-3</b> Absorption: Process of absorption & Factors modifying drug absorption		

### Theme 3: **Body Fluids: Composition, Function & Homeostasis**

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Physiology</b>				
46	Describe the divisions of body fluids into intracellular, extracellular and intravascular compartments.	<b>Fnd-S1-Phy-14</b> 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.	<b>Fnd-S1-Phy-15</b> Homeostasis		
48	<ul style="list-style-type: none"> <li>Explain the concepts of homeostasis and its regulation through feedback mechanism.</li> <li>Negative feedback, Positive Feedback, Feed-forward Stress &amp; disease</li> </ul>	<b>Fnd-S1-Phy-16</b> Mechanisms of Homeo		
<b>Pharmacology</b>				
49	Explain Bioavailability & describe factors affecting Bioavailability	<b>Fnd-S1-Pharm-4</b> Bioavailability +half-life + 1st Pass Effect	Interactive Lecture	SBQs & OSVE



50	<ul style="list-style-type: none"> <li>Describe the distribution of a drug through various body compartments</li> <li>Explain clinical significance of Vd</li> </ul>	<b>Fnd-S1-Pharm-5</b> Drug Distribution & Reservoir		
<b>Pathology</b>				
51	<ul style="list-style-type: none"> <li>Define cell aging</li> <li>Discuss events in Cellular Aging</li> </ul>	<b>Fnd-S1-Path-4</b> Cell Aging	Interactive Lecture	SBQs & OSVE

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

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
52	<ul style="list-style-type: none"> <li>Define the divisions &amp; functions of skeletal system.</li> <li>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.</li> </ul>	<b>Fnd-S1-Ana-G5</b> The skeletal system (classification of bones.)	Demonstration	SBQs, OSPE & OSVE
53	<ul style="list-style-type: none"> <li>Describe general concepts of development, ossification and blood supply of bones</li> </ul>	<b>Fnd-S1-Ana-G6</b> Bone development (ossification), Blood supply of long bones		
54	<ul style="list-style-type: none"> <li>Define the joints. Classify joints on the basis of structure, regions and functions</li> <li>Discuss the characteristics of synovial joints and classify on basis of structure &amp; movement</li> </ul>	<b>Fnd-S1-Ana-G7</b> The joints and its types. The synovial joints.	Interactive Lecture	SBQs & OSVE
55	Define dislocation, sprain and inflammation of joints	<b>Fnd-S1-Orth-1</b> Fractures	Clinical Interactive Lecture	SBQs & OSVE
56	<ul style="list-style-type: none"> <li>Describe the microscopic features of epithelial tissues</li> <li>Explain their functional importance and their surface modifications</li> </ul>	<b>Fnd-S1-Ana-H-06</b> The Epithelium	Interactive Lecture	SBQs & OSVE
57	Discuss gross and microscopic features of exocrine glands	<b>Fnd-S1-Ana-H-07</b> Exocrine glands		
58	<ul style="list-style-type: none"> <li>Define the composition of the connective tissue.</li> </ul>	<b>Fnd-S1-Ana-H-08</b> Histology of		



	<ul style="list-style-type: none"> <li>Describe and differentiate the microscopic features of the different types of the connective tissues</li> </ul>	Connective tissue		
59	<ul style="list-style-type: none"> <li>Demonstrate histological features of cartilage.</li> <li>Describe the types of the cartilage.</li> </ul>	<b>Fnd-S1-Ana-H-09</b> The cartilage and its types		
60	Identify different types of the epithelia on the light microscope	<b>Fnd-S1-Ana-H-10</b> Epithelium	Practical	OSPE & OSVE
<b>Physiology</b>				
61	Explain Physiology experiments and introduction to power-lab.	<b>Fnd-S1-Phy-17</b> Power lab		
62	<ul style="list-style-type: none"> <li>Identify the indications of hand washing</li> <li>Demonstrate the protocols and steps of hand washing in sequential manner</li> </ul>	<b>Fnd-S1-Phy-18</b> Hand washing	Practical	OSPE & OSVE
<b>Biochemistry</b>				
63	Apply the basic knowledge of carbohydrates in chemistry for health	<b>Fnd-S1-Bio-07</b> carbohydrates: introduction, classification and its Biochemical significance		
44	Describe the Biochemical structure of polysaccharides with its clinical importance	<b>Fnd-S1-Bio-08</b> Monosaccharides: Classification, Structure, Functions		
65	Discuss functions of carbohydrates in cell membrane, energy provision and nutrition supply to different parts of body	<b>Fnd-S1-Bio-09</b> Chemical Properties & Derivatives of Monosaccharides & their Biochemical significance in Biological systems.	Interactive Lecture	SBQs & OSVE
66	Describe different isomers of monosaccharides e.g. Glactose, Mannose, Fructose, Dextrose.	<b>Fnd-S1-Bio-10</b> Isomerism: Structural & Optical Isomerism in carbohydrates & their Biochemical significance.		
67	Explain Structure of disaccharides and oligosaccharides	<b>Fnd-S1-Bio-11</b> Glycosidic Linkage, Biologically important disaccharides and oligosaccharides		



68	Describe classification of polysaccharides and their functions.	<b>Fnd-S1-Bio-12</b> 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	<b>Fnd-S1-Bio-13</b> Molisch's Test, Iodine Test, Benedict's Test	Practical	OSPE & OSVE
70	Detect carbohydrates by different tests	<b>Fnd-S1-Bio-14</b> Selivanoff's Test, Barfoed's Test, Osazone Test		
71	Classify amino acids on the basis of their polarity, charge & nutritional significance.	<b>Fnd-S1-Bio-15</b> Classification of Amino Acids on the basis of structure, Properties, Nutrition & their role in human metabolism	Interactive Lecture	SBQs & OSVE
72	<ul style="list-style-type: none"> <li>Describe Physio-chemical classification of proteins.</li> <li>Enumerate functional classification of proteins.</li> <li>Classify proteins on the basis of their axial ratio.</li> </ul>	<b>Fnd-S1-Bio-16</b> Classification of Proteins on the basis of their structures, functions & chemical reactions.		
73	Describe the structural levels of proteins and their important Biochemical features.	<b>Fnd-S1-Bio-17</b> Structural Organization of Proteins		
74	Able to detect unknown amino acid/protein in a given fluid	<b>Fnd-S1-Bio-18</b> General Tests for Proteins & Amino acids	Practical	OSPE & OSVE
75	Discuss the significance of Lipids for a balanced diet and Health	<b>Fnd-S1-Bio-22</b> Lipids: Classification & Biochemical significance.	Interactive Lecture	SBQs & OSVE
76	Able to detect proteins by colour reaction tests	<b>Fnd-S1-Bio-19</b> Colour Reaction Tests of Proteins	Practical	OSPE & OSVE
77	Able to detect proteins by Separation tests	<b>Fnd-S1-Bio-20</b> Separation Tests		
78	Able to detect proteins by precipitation tests	<b>Fnd-S1-Bio-21</b> Precipitation Tests		
79	Able to detect solubility, oily nature, emulsification, saponification tests	<b>Fnd-S1-Bio-23</b> Tests for Lipids		





Pharmacology				
80	Explain Biotransformation & enlist phase I and phase II Biotransformation reactions	<b>Fnd-S1-Phrm-6</b> Drug Biotransformation Phase-I Reactions	Interactive Lecture	SBQs & OSVE
81	<ul style="list-style-type: none"> <li>Explain Biotransformation</li> <li>Enlist phase I and phase II Biotransformation reactions</li> </ul>	<b>Fnd-S1-Phrm-7</b> Drug Biotransformation Phase-II reactions		

## Theme 5: Fundamental Tissues/Systems of the Human Body

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
82	<ul style="list-style-type: none"> <li>Define the parts of the skin</li> <li>Define the appendages of the skin.</li> <li>Recognize the role of Component tissues of Skin and fascia in Support and Protection</li> </ul>	<b>Fnd-S1-Ana-G-08</b> Introduction to Integumentary system (Skin and fascia)	Interactive Lecture	SBQs & OSVE
83	<ul style="list-style-type: none"> <li>Explain the types and functions of blood vessels. (Arteries, veins, capillaries and Anastomosis)</li> </ul>	<b>Fnd-S1-Ana-G-09</b> Blood vascular system		
84	Integrate the function of Defense with the structure of lymph nodes and lymphatic's	<b>Fnd-S1-Ana-G-10</b> Introduction to lymphatic system		
85	<ul style="list-style-type: none"> <li>Define the types of muscles</li> <li>Describe the internal structure of muscle action, nerve supply and naming of skeletal muscles</li> <li>Define smooth and cardiac muscles.</li> </ul>	<b>Fnd-S1-Ana-G-11</b> Definition and classification of muscles		
86	<ul style="list-style-type: none"> <li>Describe the Nervous system and classification of NS</li> <li>Define the central and peripheral nervous system</li> </ul>	<b>Fnd-S1-Ana-G-12</b> Introduction to Nervous System		
87	<ul style="list-style-type: none"> <li>Describe the structure and the structure of the typical spinal nerve.</li> </ul>	<b>Fnd-S1-Ana-G-13</b> Formation and structure of Typical Spinal Nerve		
88	<ul style="list-style-type: none"> <li>Define the autonomic nervous system.</li> <li>Describe the types and functions of Autonomic Nervous System.</li> </ul>	<b>Fnd-S1-Ana-G-14</b> General Concepts of Autonomic nervous system		



89	<ul style="list-style-type: none"> <li>Describe the process of Gametogenesis</li> </ul>	<b>Fnd-S1-Ana-E-2</b> Gametogenesis		
90	<ul style="list-style-type: none"> <li>Discuss ovulation and phases and outcomes of fertilization</li> </ul>	<b>Fnd-S1-Ana-E-3</b> Ovulation Fertilization		
91	<ul style="list-style-type: none"> <li>Enumerate the events of first week of development (cleavage and blastocyst formation and implantation)</li> </ul>	<b>Fnd-S1-Ana-E-4</b> The First week of development		
92	Enumerate the events of Second week of development (Formation of amniotic cavity, amnion, bilaminar embryonic disc, yolk sac, chorionic sac and primary chorionic villi)	<b>Fnd-S1-Ana-E-5</b> The second week of development		
93	<ul style="list-style-type: none"> <li>Recognize male &amp; female genitalia.</li> <li>Describe the process of fertilization (conception).</li> </ul>	<b>Fnd-S1-Cli-G&amp;O-1</b> Fertilization (The conception)		
<b>Physiology</b>				
94	<ul style="list-style-type: none"> <li>Describe the Physiological Concepts and organization of nervous system.</li> <li>State general physiological concepts and organization of Autonomic Nervous System</li> </ul>	<b>Fnd-S1-Phy-19</b> Introduction Organization of the Nervous system	Interactive Lecture	SBQs & OSVE
95	<ul style="list-style-type: none"> <li>Describe the basic Structure and function of neuron &amp; neuroglia</li> <li>Describe the Excitable cells and their types(Synapse)</li> </ul>	<b>Fnd-S1-Phy-20</b> Neuron and neuroglia synaptic transmission		
96	Definition, structure, functions and types of synapse, Properties of synapse	<b>Fnd-S1-Phy-21</b> Synapses and neural integration		
<b>Pharmacology</b>				
97	Describe drug excretion & enlist routes of drug excretion	<b>Fnd-S1-Pharm-8</b> Drug Excretion	Interactive Lecture	SBQs & OSVE

## Theme 6: Development, Differentiation and Growth

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
98	<ul style="list-style-type: none"> <li>Explain the main events of third week of development</li> <li>State formation of the primitive streak, Gastrulation and notochord</li> </ul>	<b>Fnd-S1-Ana-E-6</b> Third week of development (Trilaminar germ disc)	Interactive Lecture	SBQs & OSVE



99	<ul style="list-style-type: none"> <li>Explain formation of neural tube and somites</li> <li>Recognize external appearance of embryo during second month</li> </ul>	<b>Fnd-S1-Ana-E-7</b> Third week to eighth week of development (Embryonic period)		
100	Enlist the derivatives of Ectoderm and neural crest cells	<b>Fnd-S1-Ana-E-08</b> Derivatives of ectodermal germ layer and neural crest cells		
101	Enlist the derivatives of mesodermal and endodermal germ layers	<b>Fnd-S1-Ana-E-09</b> Derivatives of mesodermal and endodermal germ layers		
102	Describe the development of fetus & parturition	<b>Fnd-S1-Ana-E-10</b> 3 <sup>rd</sup> 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	<b>Fnd-S1-Ana-E-11</b> Placenta and fetal membranes		
104	Describe the Ectopic pregnancy & its consequences.	<b>Fnd-S1-CL-O&amp;G-2</b> Ectopic pregnancy		

## Theme 7: Genetics and Developmental Anomalies

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
105	<ul style="list-style-type: none"> <li>Define teratogenesis and the basic principles of teratogenesis.</li> <li>Categorize the common teratogens</li> </ul>	<b>Fnd-S1-Ana-E-12</b> Teratogenesis	Interactive Lecture	SBQs & OSVE
106	Explain the types of twin/ multiple pregnancies and clinical significance	<b>Fnd-S1-Ana-E-13</b> Twin pregnancy		
107	<ul style="list-style-type: none"> <li>Calculate the expected date of delivery (EDD)</li> <li>Describe various methods used to assess fetal wellbeing</li> </ul>	<b>Fnd-S1-Gyn &amp; Obs-3</b> The Fetal wellbeing & EDD		
<b>Biochemistry</b>				
108	Enlist different types of nucleotides and their basis in genetics.	<b>Fnd-S1-Bio-24</b> Structure and types of nucleotides.	Interactive Lecture	SBQs & OSVE
109	Enlist different types of nucleotides and their basis in genetics	<b>Fnd-S1-Bio-25</b> Structure of DNA & RNA	Interactive Lecture	SBQs & OSVE



Physiology				
110	Describe Physiological basis of gene and functions of DNA and RNA	<b>Fnd-S1-Phy-22</b> DNA, Gene, Genetic code RNA,Types, codan , anti codan	Interactive Lecture	SBQs & OSVE
		<b>Fnd-S1-Phy-23</b> Control of gene functions		
Pharmacology				
111	<ul style="list-style-type: none"> <li>• Explain the term Pharmacodynamics</li> <li>• Explain the terms affinity, efficacy, intrinsic activity &amp; potency</li> </ul>	<b>Fnd-S1-Pharm-09</b> Introduction to Dynamics Drug <b>Receptors</b> A. Relation between drug concentration & response & signaling Mechanism	Interactive Lecture	SBQs & OSVE
		<b>Fnd-S1-Pharm-10</b> <b>Drug Receptors</b> B. Second messengers & receptor regulation		
112	Describe the general mechanisms by which drugs act	<b>Fnd-S1-Pharm-11</b> Factors Modifying drug action &Therapeutics Index		
113	Correlate the principles of general Pharmacology for the appropriate therapy of disorders / diseases	<b>Fnd-S1-Pharm-12</b> Adverse drug reaction (ADR)		
		<b>Fnd-S1-Pharm-13</b> Teratogenicdrugs		
Pathology				
114	<ul style="list-style-type: none"> <li>• Define Mutation and its types.</li> <li>• Classification of genetic disorders</li> <li>• Define Mendelian Disorders</li> </ul>	<b>Fnd-S1-Path-5</b> Introduction to genetic disorder	Interactive Lecture	SBQs & OSVE
115	<ul style="list-style-type: none"> <li>• Describe the normal Karyotype</li> <li>• Discuss various numerical and structural abnormalities of chromosomes</li> </ul>	<b>Fnd-S1-Path-6</b> Chromosomal aberration.		
116	Describe causes and pathogenesis of congenital fetal abnormalities	<b>Fnd-S1-Path-7</b> Congenital fetal abnormalities		



## Blueprint of Assessment

Purpose of Assessment: Summative Assessment First Professional MBBS  
 Curriculum: Integrated Modular Curriculum  
 Module: Foundation Module I

Weeks	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8	Total hrs	Weight age %	Rounded off Weightage %	Total number of Qs
Teaching hours												
Gross Ana	02	01	02	02	01	01	01	----	10	9.6	10	10
Histology	01	01	01	01	---	01	--	--	05	4.8	05	05
Embryology	01	01	----	-----	-----	-----	-----	-----	13	12.5	12	12
Physiology	03	03	03	03	03	03	03	02	23	22.11	22	22
Biochemistry	01	01	02	01	01	01	02	01	25	25.03	25	25
Pathology	---	1	---	1	1	1	1	2	07	6.7	07	07
Pharmacology	01	02	02	01	02	02	02	01	13	12.5	12	12
Parallel subjects (CM, BS, IT, Mres, Prof, clinical)	01	01	01	01	01	01	01	01	08	7.6	07	07
Total									104		100%	100

Subject in Module	Proportion of subjects in module	Weightage	Test Instrument/tool/method				Explanation
What to assess?			How to assess?				
			MCQs (SBQs) Level 1 & 2	OSVE stations Level 1 & 2	OSPE/OSCE Level 3	Any Other	<b>Proportion of test instruments to be used:</b> Theory MCQs (SBAQs)= 100 % ; Practical OSVE=80% OSPE/OSCE= 20% <b>Competency level &amp; Learning Domain at Miller's Pyramid:</b> <b>Cognition:</b> Know (Level-1) & How to know (Level-2) <b>Skills &amp; Attitude:</b> Show (Level-3) & Does (Level-4)
Gross Anatomy		10	10				
Embryology		05	05				
Histology		12	12				
Physiology		22	22				
Biochemistry		25	25				
Pathology		07	07				
Pharmacology		12	12				
Parallel subjects (CM, IT, BS, Res, BME)		07	07				
		100%	100	80%	20%		





# 2 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 1<sup>st</sup> 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 Health 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	ASSESSMENT
<b>Anatomy</b>				
1	<ul style="list-style-type: none"> <li>• Illustrate the organization of hematopoietic tissue</li> <li>• Enlist the sites and source of hematopoiesis before and after the birth.</li> </ul>	<b>Hem-S1-E1-Ana-</b> Development of blood	Interactive Lecture	SBQs & OSVE
2	<ul style="list-style-type: none"> <li>• Examine structure of RBC, WBC &amp; platelets.</li> <li>• Illustrate methods use to study blood and bone marrow cells.</li> </ul>	<b>Hem-S1-H1-Ana-</b> Morphology of blood cells	Interactive Lecture/ Practical	SBQs & OSPE & OSVE
<b>Physiology</b>				
3	<ul style="list-style-type: none"> <li>• Discuss the cellular components</li> </ul>	<b>Hem-S1-Phy-1</b>	Interactive	SBQs & OSVE



	of blood <ul style="list-style-type: none"> <li>Define hematocrit, normal values &amp; factors affecting hematocrit</li> </ul>	Composition of blood & its cellular components	Lecture	
4	<ul style="list-style-type: none"> <li>Discuss the various stages of RBC'S formation.</li> <li>Discuss various sites of erythropoiesis</li> <li>Enlist the factors necessary for erythropoiesis.</li> <li>Discuss the significance of Reticulocyte count</li> </ul>	<b>Hem-S1-Phy-2</b> Development of RBCs (Erythropoiesis)		
5	Examine hemoglobin concentration by Sahli's method	<b>Hem-S1-Phy-3</b> hemoglobin concentration (Sahli's method)	Practical	OSPE & OSVE
6	Estimate erythrocyte sedimentation rate (ESR by wester green method)	<b>Hem-S1-Phy-4</b> Estimation of erythrocyte sedimentation rate (ESR by wester green method)		
<b>Biochemistry</b>				
7	<ul style="list-style-type: none"> <li>Explain Biochemical basis for the difference in plasma &amp; serum.</li> <li>Describe composition of blood &amp; plasma protein.</li> </ul>	<b>Hem-S1-Bio-1</b> Composition of blood & plasma proteins (Specialized body fluid)	Interactive Lecture	SBQs & OSVE
8	<ul style="list-style-type: none"> <li>Describe Chemistry &amp; synthesis of Heme</li> <li>Explain structure, types &amp; forms of Hb.</li> </ul>	<b>Hem-S1-Bio-2</b> Normal Hemoglobin		
9	<ul style="list-style-type: none"> <li>Identify abnormalities of Heme synthesis (PorPhyrias &amp; its types).</li> </ul>	<b>Hem-S1-Bio-3</b> Abnormal Heme		
10	<ul style="list-style-type: none"> <li>Explain the Biochemical aspects of Hemoglobinopathies. (Thalassemia, sickle cell anemia)</li> </ul>	<b>Hem-S1-Bio-4</b> Abnormal Hemoglobin (Hemoglobinopathies)		
11	<ul style="list-style-type: none"> <li>Describe degradation of heme.</li> <li>Explain bile pigments, formation, types, transport &amp; Excretion of bile.</li> </ul>	<b>Hem-S1-Bio-5</b> Degradation of Heme		
12	Discuss Iron Metabolism & identify its abnormalities.	<b>HemM-S1-Bio-6</b> Iron Metabolism		
13	Explain the Biochemical importance of Vitamin B12 & Folic acid & their associated diseases.	<b>Hem-S1-Bio-7</b> Vitamin B12 & Folic acid		



14	Describe importance of Vitamin K & E & their associated diseases.	<b>Hem-S1-Bio-8</b> Vitamin K & E		
<b>Pathology</b>				
15	<ul style="list-style-type: none"> <li>Describe classification of Anemia</li> <li>Differentiate the different types of anemias on the basis of Morphology &amp; Patho-Physiology.</li> </ul>	<b>Hem-S1-Path-1</b> Introduction of Anaemia	Interactive Lecture	SBQs & OSVE
16	<ul style="list-style-type: none"> <li>Identify the types of nutritional Anemias</li> <li>Enlist causes of iron deficiency, Anemia &amp; clinical features and Laboratory diagnosis</li> </ul>	<b>Hem-S1-Path-2</b> Iron deficiency Anemia		
17	<ul style="list-style-type: none"> <li>Enlist causes of vitamin D-12 and folate deficiency</li> <li>Explain the Patho-Physiology, clinical features and laboratory diagnosis.</li> </ul>	<b>Hem-S1-Path-3</b> Megaloblastic Anemia		
<b>Pharmacology</b>				
18	Describe role of oral & injectable iron in iron deficiency anemia	<b>Hem1-S1-Pharm-1</b>	Interactive Lecture	SBQs & OSVE
19	Describe role of Vit. B12 & Folic acid in Macrocytic anemia	<b>Hem1-S1-Pharm-2</b>		

## Theme 2: Infections & Inflammation

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
21	Discuss the embryological source of lymphoid organs	<b>Hem-S1-E2-Ana-</b> Development of lymphoid organs	Interactive Lecture	SBQs & OSVE
22	<ul style="list-style-type: none"> <li>Discuss the components, location &amp; structure of lymphoid issue.</li> <li>Describe parts, surfaces and relations of Lymphoid organs</li> </ul>	<b>Hem-S1-G1-Ana-</b> Gross features of lymphoid organs	Demonstration	SBQs, OSPE & OSVE
23	Discuss the histological classification & microscopic features of lymphoid organs.	<b>Hem-S1-H3-Ana</b> Microscopic anatomy of lymphoid organs	Interactive Lecture	SBQs & OSVE
24	Define histological features of spleen & lymph node.	<b>Hem-S1-H4-Ana-</b> Spleen & Lymph node	Practical	OSPE & OSVE
25	Define histological features of Thymus gland & Tonsil.	<b>Hem-S1-H5-Ana-</b> Thymus & Tonsil		
<b>Physiology</b>				



26	<ul style="list-style-type: none"> <li>Describe the process of leukocyte genesis, enlist various types of granulocytes and agranulocytes, their functions &amp; normal values</li> <li>Explain the significance of Reticuloendothelial system</li> <li>Discuss the functions of T and B lymphocytes.</li> </ul>	<b>Hem-S1-Phy-5</b> Genesis and general characteristics, and functions of white blood cells	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
<b>Pathology</b>				
27	<ul style="list-style-type: none"> <li>Define acute inflammation.</li> <li>Describe the changes systemic effects &amp; occurring in acute inflammation.</li> </ul>	<b>Hem-S1-Path-4</b> Overview of acute and chronic inflammation	Interactive Lecture	SBQs & OSVE
28	Describe causes of Neutrophilia and Neutropenia, Eosinophilia, Lymphocytosis, Monocytosis	<b>Hem-S1-Path-5</b> Non Neoplastic WBC Disorders		

### Theme 3: Bleeding & thromboembolic disorders

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Physiology</b>				
42	<ul style="list-style-type: none"> <li>Describe the four-basic mechanism of Hemostasis,</li> <li>Explain the mechanism of formation of platelet plug.</li> </ul>	<b>Hem-S1-Phy-6</b> Hemostasis & role of Thrombocytes	Interactive Lectures/Small Group Discussion	SBQs, OSPE & OSVE
43	<ul style="list-style-type: none"> <li>Explain steps involved in intrinsic and extrinsic pathway for coagulation,</li> <li>Enlist the clotting factors, to describe the role of clotting factors in coagulation.</li> </ul>	<b>Hem-S1-Phy-7</b> Clotting cascade & bleeding disorders		
<b>Biochemistry</b>				
44	Describe importance of Vitamin K & E & their associated diseases.	<b>Hem-S1-Bio-9</b> Vitamin K & E	Interactive Lecture	SBQs & OSVE
<b>Pathology</b>				
45	<ul style="list-style-type: none"> <li>Discuss the different types of bleeding disorders.</li> <li>Discuss Quantitative &amp; Qualitative platelets disorders</li> <li>Describe classification &amp; Lab. diagnosis of haemophilia and Von Willebrand disease.</li> </ul>	<b>Hem-S1-Path-6</b> Platelet and Bleeding disorder	Interactive Lecture	SBQs & OSVE
46	Discuss thrombosis, pathogenesis, types and fate of thrombosis.	<b>Hem-S1-Path-7</b> Thrombosis		
47	Define embolism, its types and morphological features of embolism.	<b>Hem-S1-Path-8</b> Embolism		



Pharmacology				
48	Discuss the role of commonly used coagulants & anticoagulants	Hem-S1-Pharm-3	Interactive Lecture	SBQs & OSVE

#### Theme 4: ABO & Rh-Incompatibility

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Physiology</b>				
49	<ul style="list-style-type: none"> <li>Describe the antigens &amp; antibodies for A,B,AB &amp; O blood groups</li> <li>Define Agglutinin, agglutination, and agglutination &amp; what takes place when incompatible blood types are mixed.</li> <li>Identify universal donor &amp; recipient &amp; explain why?</li> <li>Enlist various Rh antigens &amp; Rh immune response.</li> <li>What is erythroblastosis fetalis &amp; how it can be prevented</li> </ul>	Hem-S1-Phy-8 Blood groups ABO/RH system	Interactive Lectures/Small Group Discussion/ Practical	SBQs, OSPE & OSVE
<b>Pathology</b>				
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	ASSESSMENT
<b>Physiology</b>				
51	<ul style="list-style-type: none"> <li>Discuss overall organization of immune system</li> <li>Differentiate between innate &amp; acquired immunity,</li> <li>Discuss cell mediated immunity and humoral immunity, active and passive immunity.</li> </ul>	Hem-S1-Phy-9 Immunity.	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
<b>Biochemistry</b>				
52	<ul style="list-style-type: none"> <li>Define Immunoglobins.</li> <li>Describe chemistry, structure &amp; their classification.</li> </ul>	Hem-S1-Bio-10 Immunoglobins	Interactive Lecture	SBQs & OSVE
<b>Pathology</b>				
55	<ul style="list-style-type: none"> <li>Define hypersensitivity</li> <li>Describe Pathogenesis of Type-I &amp; II hypersensitivity reactions with examples</li> </ul>	Hem-S1-Path-10 Hypersensitivity reaction Type I & II	Interactive Lecture	SBQs & OSVE





56	<ul style="list-style-type: none"> <li>Describe type III &amp; IV hypersensitivity reactions with examples.</li> </ul>	<b>Hem-S1-Path-11</b> Hypersensitivity reaction Type III & IV		
58	<ul style="list-style-type: none"> <li>Discuss primary immunodeficiency and its causes</li> <li>Discuss secondary immunodeficiency and its causes</li> </ul>	<b>Hem-S1-Path-12</b> Immunodeficiency		
<b>Pharmacology</b>				
59	Associate role immunomodulating drugs in autoimmune disorders	<b>Hem-S1-Pharm-4</b>	Interactive Lecture	SBQs & OSVE



## Blueprint of Assessment

Purpose of Assessment: Summative Assessment First Professional MBBS  
 Curriculum: Integrated Modular Curriculum  
 Module: Haematology Module -1

Weeks	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8	Total hrs	Weight age %	Rounded off Weightage %	Total number of Qs
Teaching hours												
Gross Ana	----	01	----	-----	-----	-----	-----	----	01	1.01	01	01
Histology	01	01	01	01	---	01	--	--	05	9.2	09	09
Embryology	01	01	----	-----	-----	-----	-----	-----	02	3.7	04	04
Physiology	01	02	01	01	01	01	01	01	10	18.5	19	19
Biochemistry	01	01	02	01	01	01	02	01	10	18.5	19	19
Pathology	2	2	2	2	2	1	1	--	12	22.2	22	22
Micbio	---	---	---	---	----	----	-----	-----	00	00	00	00
Pharmacology	---	01	----	01	-----	01	-----	01	04	7.4	07	07
Parallel subjects (CM, BS, IT, Mres, Prof, clinical)	01		01	01	01	01	01	01	10	18.5	19	19
Total									54		100%	100

Subject in Module	Proportion of subjects in module	Weightage	Test Instrument/tool/method				Explanation
What to assess?			How to assess?				
			MCQs (SBQs) Level 1 & 2	OSVE stations Level 1 & 2	OSPE/OSCE Level 3	Any Other	<b>Proportion of test instruments to be used:</b> Theory MCQs (SBAQs)= 100 % ; Practical OSVE=80% OSPE/OSCE= 20% <b>Competency level &amp; Learning Domain at Miller's Pyramid:</b> <b>Cognition:</b> Know (Level-1) & How to know (Level-2) <b>Skills &amp; Attitude:</b> Show (Level-3) & Does (Level-4)
Gross Anatomy		01	01				
Embryology		09	09				
Histology		04	04				
Physiology		19	19				
Biochemistry		19	19				
Pathology		22	22				
Pharmacology		00	00				
Parallel subjects (CM, IT, BS, Res, BME)		07	07				
		100%	100%	80%	20%		



# 3 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 Holy 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 peers, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, peers, staff and teachers.
- Communicate effectively in a team with peers and teachers.
- Demonstrate the ability to reflect on the performance.



## Themes

- 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 #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
1	<ul style="list-style-type: none"> <li>Define different regions of the upper limb</li> <li>Identify various compartments of arm, forearm &amp; hand.</li> <li>Define the axial and appendicular skeleton and define the girdle bones.</li> <li>Identify joints of the upper limb.</li> </ul>	<b>MSK-S1-Ana-G-1</b> Introduction to locomotor system & Organization of upper limb	Demonstration	SBQs, OSPE & OSVE
2	<ul style="list-style-type: none"> <li>Define the pectoral region.</li> <li>Describe its muscles.</li> <li>Identify the general features and different land marks for side determination and the attachments of various muscles on clavicle.</li> </ul>	<b>MSK-S1-Ana-G-2</b> Pectoral region & the clavicle		
3	<ul style="list-style-type: none"> <li>Discuss development of Bone</li> <li>Describe Intramembranous ossification</li> <li>Describe endochondral ossification</li> <li>Describe ossification of the limb bones</li> <li>Describe development of the joints</li> <li>Describe development of the cartilage</li> </ul>	<b>MSK-S1-Ana-E-1</b> Development of skeletal system	Interactive Lecture	SBQs & OSVE



4	<ul style="list-style-type: none"> <li>Identify general features and different land marks for side determination and the attachments of various muscles on the Scapula.</li> <li>Define arrangement, attachments, neurovascular bundle and actions of muscles of back</li> </ul>	<b>MSK-S1-Ana-G-3</b> 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	<b>MSK-S1-Ana-G-4</b> Sternoclavicular acromioclavicular Joints		
6	<ul style="list-style-type: none"> <li>Define the extent and quadrants of the breast</li> <li>Describe the blood supply and lymphatic drainage of breast in the female with its clinical significance.</li> </ul>	<b>MSK-Ana-G-5</b> Anatomy of the breast	<b>Interactive Lecture</b>	<b>SBQs &amp; OSVE</b>
7	<ul style="list-style-type: none"> <li>Identify histology of mammary gland in non-lactating, lactating &amp; during pregnancy under microscope.</li> <li>Identify and describe histological features of nipple and areola.</li> </ul>	<b>MSK-S1-Ana-H-1</b> Histology of breast	<b>Practical</b>	<b>OSPE &amp; OSVE</b>
<b>Physiology</b>				
8	<ul style="list-style-type: none"> <li>Describe the Physiology of Mammary gland.</li> <li>Describe the Hormone responsible for milk production &amp; ejection.</li> <li>Describe the let-down reflex (milk ejection reflex)</li> </ul>	<b>MSK-S1-Phy-1</b> Physiology of breast and lactation	Interactive Lecture	SBQs & OSVE
9	<ul style="list-style-type: none"> <li>Discuss the basic relationship between vitamin D, PTH, calcium and Phosphate in relation to bone formation</li> <li>Describe the various cells of the bones and their function in Homeostasis</li> </ul>	<b>MSK-S1-Phy-2</b> Hormones regulating calcium homeostasis		
10	<ul style="list-style-type: none"> <li>Identify and name various parts of power lab</li> <li>Illustrate functions of various parts of the powerlab</li> </ul>	<b>MSK-S1-Phy-P1</b> Introduction to Power Lab	Practical	OSPE & OSVE
<b>Biochemistry</b>				
11	Enlist classification, functions and Biochemical significance of Heteropolysaccharides in formation of Extracellular Matrix.	<b>MSK-S1-Bio-01</b> Role of Heteropolysaccharides (Glycosaminoglycans)	Interactive Lecture	SBQs & OSVE



12	Explain Mucopolysacharridoses: Classification, Deficient Enzymes Clinical Manifestation	<b>MSK-S1-Bio-02</b> Mucopolysaccharidoses		
13	Discuss general introduction and classification of Minerals.	<b>MSK-S1-Bio-03</b> Classification of Minerals		
<b>Clinical Interactive Lecture</b>				
14	<ul style="list-style-type: none"> <li>Define bone density and factors which are responsible to maintain bone density</li> <li>Define Pathogenesis and clinical course of change in bone density and conditions associated with lactation.</li> <li>Discuss its complications and management.</li> </ul>	<b>MSK-S1-Gyn &amp; Obs-1</b> Changes in bone density with lactation	Interactive Lecture	SBQs & OSVE
15	<ul style="list-style-type: none"> <li>Describe the Patho-Physiology of mammary gland disorders</li> <li>Describe the lactation reflex</li> <li>Describe weaning</li> <li>Describe the hormonal effect</li> <li>Student guide for complete protocol of lactation and weaning</li> </ul>	<b>MSK-S1-Paeds-1</b> Breast feeding guide for medical profession		

## Theme 2: Back, Axilla and Shoulder joint

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
16	<ul style="list-style-type: none"> <li>Describe the attachments, nerve supply and the actions of the muscles of the back.</li> <li>Define the effects of paralysis of these muscles</li> </ul>	<b>MSK-S1-Ana-G-6</b> Muscles of back	Demonstration	SBQs, OSPE & OSVE
17	Discuss the arterial anastomosis around the scapula. Explain the neurovascular bundle of scapula.	<b>MSK-S1-Ana-G-7</b> Anastomosis around scapula & Neurovascular bundle of scapula		
18	<ul style="list-style-type: none"> <li>Enumerate bony components, type &amp; variety, attachment of capsule and ligaments of this joint.</li> <li>Demonstrate various muscles &amp; movements at the joint.</li> <li>Identify the factors stabilizing or weakening the shoulder joint.</li> </ul>	<b>MSK-S1-Ana-G-8</b> The Shoulder Joint	Interactive Lecture	SBQs & OSVE





19	Discuss the developmental stages of skull and its clinicals	<b>MSK-S1-Ana-E-2</b> Development of skull		
20	<ul style="list-style-type: none"> <li>Define the shape, location, boundaries and contents of Axilla.</li> <li>Discuss the formation, course and relations of axillary vessels</li> <li>Describe arrangement of axillary lymph nodes and their area of drainage.</li> </ul>	<b>MSK-S1-Ana-G-9</b> Axilla: Boundaries & Contents	Demonstration	SBQs, OSPE & OSVE
21	<ul style="list-style-type: none"> <li>Describe and draw formation of the brachial plexus.</li> <li>Mention different parts of brachial plexus and their location.</li> <li>Identify different nerves with their root values.</li> <li>Discuss the effects of injury to different sites of brachial plexus.</li> </ul>	<b>MSK-S1-Ana-G-10</b> Brachial Plexus	Interactive Lecture	SBQs & OSVE
22	<ul style="list-style-type: none"> <li>Identify the skeletal muscle under light microscope</li> <li>Describe the structural basis of muscle striations.</li> <li>Recognize the structural elements that produces muscle contraction and brings the movement of a body part.</li> </ul>	<b>MSK-S1-Ana-H-2</b> Histology of skeletal muscle	Practical	OSPE & OSVE
<b>Physiology</b>				
23	<ul style="list-style-type: none"> <li>Describe the distribution of calcium in the bones.</li> <li>Describe the mechanism by which Ca is released in blood from Bone</li> </ul>	<b>MSK-S1-Phy-3</b> Role of Calcium in bones	Interactive Lecture	SBQs & OSVE
24	<ul style="list-style-type: none"> <li>Describe and classify properties of various types of muscle.</li> <li>Describe the structure, functions and arrangements of Myosin, Actin, Troponin &amp; Tropomyosin filaments</li> </ul>	<b>MSK-S1-PHY-4</b> Properties of muscles & structure of skeletal muscles.		
<b>Biochemistry</b>				
25	Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	<b>MSK-S1-Bio-4</b> Calcium metabolism.	Interactive Lecture	SBQs & OSVE
26	Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	<b>MSK-S1-Bio-5</b> Magnesium & Phosphorus Metabolism		
27	Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	<b>MSK-S1-Bio-6</b> Vitamin D metabolism.		



28	Describe miscellaneous minerals: Iodine, Fluoride, Selenium, Cobalt, Zinc, Copper	<b>MSK-S1-Bio-7</b> Miscellaneous Minerals		
29	Discuss role of Parathyroid, Calcitonin & Vitamin D	<b>MSK-S1-Bio-8</b> Regulation of Calcium & PO <sub>4</sub> Metabolism		
30	Discuss chemical composition of bone, remodeling and normal composition of synovial fluid.	<b>MSK-S1-Bio-9</b> Chemical composition of bone		
31	Demonstrate importance of calcium as macro-mineral. RDA, Absorption, factors influencing absorption. clinical manifestation of excess and deficiency states.	<b>MSK-S1-Bio-10</b> Estimation of serum calcium	Practical	OSPE & OSVE
<b>Pathology</b>				
32	<ul style="list-style-type: none"> <li>Define Vitamin D</li> <li>Explain significance of vitamin D in the body</li> <li>Describe the different deficiency states related with vitamin D</li> <li>Discuss the prevention of Vitamin D Deficiency</li> </ul>	<b>MSK-S1-Path-1</b> Vitamin D deficiency	Interactive Lecture	SBQs & OSVE
<b>Pharmacology</b>				
33	<ul style="list-style-type: none"> <li>Enlist various drugs used in hypocalcemia</li> <li>Discuss their clinical uses</li> <li>Explain their adverse effects</li> </ul>	<b>MSK-S1-Pharm-1</b> Drugs used in Hypocalcemia	Interactive Lecture	SBQs & OSVE

### Theme 3: Brachial Plexus and Arm

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
34	<ul style="list-style-type: none"> <li>Explain the arrangement of different functional groups of muscles in the ant compartment of arm &amp; their attachment</li> <li>Demonstrate the actions of above muscles</li> <li>Describe the neurovascular structures and their important relations</li> </ul>	<b>MSK-S1-Ana-G-11</b> Humerus bone Anterior compartment of arm	Demonstration	SBQs, OSPE & OSVE
35	<ul style="list-style-type: none"> <li>Define cubital fossa.</li> <li>Discuss its boundaries</li> <li>Clinical correlates</li> </ul>	<b>MSK-S1-Ana-G-12</b> Cubital fossa	Interactive Lecture	SBQs & OSVE
36	<ul style="list-style-type: none"> <li>Explain arrangement of different functional groups of muscles in the post compartment arm &amp;</li> </ul>	<b>MSK-S1-Ana-G-13</b> Posterior compartment of arm & Elbow joint	Demonstration	SBQs, OSPE & OSVE



	<ul style="list-style-type: none"> <li>their attachment</li> <li>Demonstrate actions of muscles</li> <li>Describe neurovascular structures and their important relations</li> </ul>			
37	<ul style="list-style-type: none"> <li>Identify general features of the radius &amp; ulna.</li> <li>Discuss attachments of various muscles on the radius &amp; ulna.</li> <li>Discuss the radioulnar joints.</li> </ul>	<b>MSK-S1-Ana-G-14</b> Radius & Ulna (radioulnar joints)	Demonstration	SBQs, OSPE & OSVE
38	<ul style="list-style-type: none"> <li>Explain arrangement of different functional groups of muscles in anterior compartment of forearm &amp; their attachment.</li> <li>Describe neurovascular structures and their important relations</li> </ul>	<b>MSK-S1-Ana-G-15</b> Anterior compartment of forearm		
39	<ul style="list-style-type: none"> <li>Explain arrangement of different functional groups of muscles in the posterior compartment of forearm &amp; their attachment.</li> <li>Describe neurovascular structures and their important relations</li> </ul>	<b>MSK-S1-ANA-G-16</b> Posterior compartment of forearm		
40	<ul style="list-style-type: none"> <li>Describe ossification of vertebra ribs &amp; sternum and its clinicals</li> </ul>	<b>MSK-S1-Ana-E-3</b> Development of vertebra, ribs, & sternum .	Interactive Lecture	SBQs & OSVE
41	<ul style="list-style-type: none"> <li>Identify smooth and cardiac muscles under light microscope</li> <li>Describe structural basis of muscle striations &amp; differentiate the two muscles.</li> <li>Recognize function and organization of the connective tissue in muscle.</li> </ul>	<b>MSK-S1-Ana-H-3</b> Histology of smooth and cardiac muscles	Practical	OSPE & OSVE
<b>Physiology</b>				
42	<ul style="list-style-type: none"> <li>Describe general mechanism of skeletal muscle contraction.</li> <li>Describe molecular mechanism (sliding filament theory) of skeletal muscle contraction.</li> <li>Describe walk along theory–power stroke.</li> <li>Define motor unit, isotonic &amp; isometric contraction</li> </ul>	<b>MSK-S1-Phy-5</b> Mechanism & different theories of muscle contraction Types of muscle contraction	Interactive Lecture	SBQs & OSVE
43	<ul style="list-style-type: none"> <li>Define neuromuscular junction (NMJ) &amp; list the components of NMJ</li> </ul>	<b>MSK-S1-Phy-6</b> Neuromuscular Junction & transmission		



	<ul style="list-style-type: none"> <li>Explain sequence of events of neuromuscular transmission</li> </ul>			
44	<ul style="list-style-type: none"> <li>Define end plate potential</li> <li>Describe excitation contraction coupling</li> <li>Explain myasthenia gravis</li> </ul>	<b>MSK-S1-Phy-7</b> Excitation contraction coupling		
45	<ul style="list-style-type: none"> <li>Demonstrate Nerve conduction velocity</li> <li>Explain how electrical events are converted to mechanical events</li> </ul>	<b>MSK-S1-Phy-P2</b> Action potential	Practical	OSPE & OSVE
<b>Biochemistry</b>				
46	Demonstrate sources, daily requirements, intestinal absorption, transport and Biochemical role and regulation of Vit-D3	<b>MSK-S1-Bio-11</b> Estimation of Serum Vit.D3	Practical	OSPE & OSVE
<b>Pharmacology</b>				
47	<ul style="list-style-type: none"> <li>Enlist various drugs used in hypercalcemia</li> <li>Discuss their clinical uses</li> <li>Explain their adverse effects</li> </ul>	<b>MSK-S1-Pharm-2</b> Drugs used in Hypercalcemia	Interactive Lecture	SBQs & OSVE
<b>Clinical Interactive Lecture</b>				
48	<ul style="list-style-type: none"> <li>Enlist disorders of skeletal muscle disorders and factors which are responsible to it</li> <li>Define Pathogenesis and clinical course of conditions associated with skeletal muscle disorders</li> <li>Discuss its complications and management</li> </ul>	<b>MSK-S1-Ortho-1</b> Disorders of voluntary muscles	Interactive Lecture	SBQs & OSVE

#### Theme 4: Forearm, Hand and Carpal Tunnel Syndrome

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
53	<ul style="list-style-type: none"> <li>Describe the location, destination, course &amp; relations of arteries &amp; their branches in upper limb.</li> <li>Identify and discuss the deep veins of upper limb.</li> <li>Describe the location, destination, course &amp; relations of nerves &amp; their branches in upper limb.</li> </ul>	<b>MSK-S1-Ana-G-17</b> Neuromuscular bundle of the upper limb	Demonstration	SBQs, OSPE & OSVE



54	<ul style="list-style-type: none"> <li>Describe the type, variety, attachment of capsule and ligaments of this joint.</li> <li>demonstrate various movements at this joint.</li> <li>Describe the structural organization of the Flexor &amp; Extensor Retinaculum.</li> <li>Discuss carpal tunnel syndrome.</li> </ul>	<b>MSK-S1-Ana-G-18</b> Wrist joint	Interactive Lecture	SBQs & OSVE
55	<ul style="list-style-type: none"> <li>Describe the bony arrangement of the hand.</li> <li>Describe the joints of the hand.</li> </ul>	<b>MSK-S1-Ana-G-19</b> Osteology of the hand and the joints of the hand.	Demonstration	SBQs, OSPE & OSVE
56	<ul style="list-style-type: none"> <li>Discuss the cutaneous supply, arteries &amp; veins of palm of hand.</li> <li>define fibrous flexor sheath.</li> <li>Define the palmer aponeurosis, facial spaces.</li> <li>Describe small muscles of hand.</li> </ul>	<b>MSK-S1-Ana-G-20</b> Palm of the hand		
57	<ul style="list-style-type: none"> <li>Discuss the dorsal venous arch.</li> <li>Describe insertion of the long extensors tendons.</li> </ul>	<b>MSK-S1-Ana-G-21</b> Dorsum of the hand		
58	<ul style="list-style-type: none"> <li>Describe different regions of lower limb.</li> <li>Identify the various bones forming skeleton of lower limb.</li> <li>Describe general arrangement of superficial &amp; deep fasciae of lower limb</li> <li>Demonstrate the bones of pelvic girdle.</li> <li>Identify different landmarks in different regions of lower limb</li> </ul>	<b>MSK-S1-Ana-G-22</b> Introduction to lower limb / Organization of skeleton of lower limb	Interactive Lecture	SBQs & OSVE
59	<ul style="list-style-type: none"> <li>Identify the superficial arteries of lower limb</li> <li>Name and discuss superficial veins of lower limb</li> <li>Highlight the course of great and small saphenous vein</li> <li>Describe the superficial lymphatic vessels &amp; lymph nodes of lower limb</li> <li>Discuss clinical correlates.</li> </ul>	<b>MSK-S1-Ana-G-23</b> Superficial veins, arteries, lymph nodes & cutaneous supply of the lower limbs	Demonstration	SBQs, OSPE & OSVE
60	<ul style="list-style-type: none"> <li>Describe the development of skeletal muscle.</li> <li>Discuss the development of Myotomes</li> <li>List derivatives of Ebaxial and Primaxial divisions of myotomes</li> </ul>	<b>MSK-S1-ANA-E-4</b> Development of skeletal muscles	Interactive Lecture	SBQs & OSVE



61	<ul style="list-style-type: none"> <li>Classify bone on developmental and structural basis.</li> <li>Differentiate between woven bone and lamellar bone under microscope.</li> <li>Differentiate between compact bone and spongy bone under microscope.</li> </ul>	<b>MSK-S1-Ana-H-4</b> Histology of bones	Practical	OSPE & OSVE
<b>Physiology</b>				
62	<ul style="list-style-type: none"> <li>Demonstrate SMT on power lab</li> <li>What are the different periods of SMT &amp; their duration?</li> <li>Demonstrate the phenomenon of fatigue &amp; Tetanus</li> </ul>	<b>MSK-S1-Phy-P3</b> Muscular twitch response	Practical	OSPE & OSVE
63	<ul style="list-style-type: none"> <li>Describe types of muscle fibers (type I and II)</li> <li>Determine effect of exercise on muscle blood flow</li> <li>State effect of training, stamina and resistance on muscle fibers</li> <li>State Hypoxia, muscle Fatigue during exercise and, its Biochemical reasons.</li> </ul>	<b>MSK-S1-Phy-8</b> Muscle adaptation to exercise	Interactive Lecture	SBQs & OSVE
64	Explain aerobic and anaerobic exercise and effect of exercise on muscles.	<b>MSK-S1-Phy-9</b> Role of muscle in exercise		
<b>Biochemistry</b>				
65	Describe the Collagen Structure and synthesis, Types, Role of vitamin C in synthesis of Collagen	<b>MSK-S1-Bio-12</b> Collagen Structure and synthesis	Interactive Lecture	SBQs & OSVE
66	Brief overview of inherited Collagen Disorders and their clinical manifestation	<b>MSK-S1-Bio-13</b> Overview of inherited Collagen disorders		
67	Estimation, RDA, Effects, regulation and clinical manifestation of excess and deficiencies.	<b>MSK-S1-Bio-14</b> Estimation of serum phosphorus	Practical	OSPE & OSVE
<b>Pharmacology</b>				
68	<ul style="list-style-type: none"> <li>List the drugs used in the treatment of osteoporosis Explain their mode of action</li> <li>Explain their Pharmacokinetics</li> <li>State the side effects of these drug</li> </ul>	<b>MSK-S1-Pharm-3</b> Drugs used in Osteoporosis	Interactive Lecture	SBQs & OSVE
69	<ul style="list-style-type: none"> <li>Classify different muscle relaxants.</li> <li>Discuss mechanism of their action</li> <li>Explain clinical uses and their</li> </ul>	<b>MSK-S1-Pharm-4</b> Drugs used as Skeletal muscle relaxant		



	adverse effects			
<b>Clinical Interactive Lecture</b>				
70	<ul style="list-style-type: none"> <li>Define of osteoporosis</li> <li>Describe generalized and localized osteoporosis</li> <li>Enlist primary &amp; secondary causes of generalized osteoporosis</li> <li>Define Pathogenesis and clinical course</li> <li>Discuss it's complications and management</li> </ul>	<b>MSK-S1-Ortho-2</b> 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
<b>Anatomy</b>				
71	<ul style="list-style-type: none"> <li>Identify parts of the hip bone.</li> <li>Determine side of the bone.</li> <li>Describe general features of each part of hip bone.</li> <li>Identify the bone.</li> <li>Determine the side of the bone.</li> <li>Describe the anatomical position of the bone.</li> </ul>	<b>MSK-S1-Ana-G-24</b> Hip bone + Femur	Demonstration	SBQs, OSPE & OSVE
72	<ul style="list-style-type: none"> <li>Discuss division of the thigh into compartments</li> <li>Enumerate muscles of the anterior compartment of thigh and their respective actions.</li> <li>Describe the innervation and blood supply of muscles of anterior compartment.</li> </ul>	<b>MSK-S1-Ana-G-25</b> Anterior compartment of thigh		
73	<ul style="list-style-type: none"> <li>Describe the Femoral triangle, its boundaries and contents.</li> <li>Discuss femoral sheath and its contents and the clinical conditions associated.</li> </ul>	<b>MSK-S1-Ana-G-26</b> Femoral triangle	Interactive Lecture	SBQs & OSVE
74	<ul style="list-style-type: none"> <li>Describe development of smooth and cardiac muscle.</li> <li>Discuss development of Myotomes</li> <li>Enlist derivatives of epaxial and hypaxial divisions of myotomes</li> </ul>	<b>MSK-S1-Ana-E-5</b> Development of smooth & cardiac muscles		
75	<ul style="list-style-type: none"> <li>Discuss muscles of medial compartment of the thigh.</li> </ul>	<b>MSK-S1-Ana-G-27</b> Medial compartment of	Demonstration	SBQs, OSPE





	<ul style="list-style-type: none"> <li>Discuss blood &amp; nerve supply of these muscles.</li> <li>Describe actions of the muscles of medial compartment of thigh.</li> </ul>	thigh		& OSVE
76	<ul style="list-style-type: none"> <li>Describe location of gluteal region.</li> <li>Discuss about bones and ligaments of gluteal region.</li> <li>Discuss muscles of the gluteal region &amp; their respective actions.</li> <li>Discuss nerves and blood vessels of the gluteal region.</li> </ul>	<b>MSK-S1-Ana-G-28</b> The Gluteal region	Demonstration	SBQs, OSPE & OSVE
77	<ul style="list-style-type: none"> <li>Describe articular surfaces of the hip joint along with capsular attachment</li> <li>Enumerate ligaments of the hip joint &amp; describe their attachments.</li> <li>Discuss clinical correlates</li> </ul>	<b>MSK-S1-Ana-G-29</b> Hip joint	Interactive Lecture	SBQs & OSVE
78	<ul style="list-style-type: none"> <li>Identify different types of cartilage under light Microscope.</li> <li>Define distinctive microscopic features of each type.</li> </ul>	<b>MSK-S1-Ana-H-5</b> Histology of Hyaline Cartilage	Practical	OSPE & OSVE
<b>Physiology</b>				
79	<ul style="list-style-type: none"> <li>Describe role of skin in homeostasis</li> <li>Describe the function of skin</li> <li>Describe medico-legal importance of the skin</li> </ul>	<b>MSK-S1-Phy-12</b> <b>Physiology of Skin</b>	Interactive Lecture	SBQs & OSVE
<b>Biochemistry</b>				
80	Describe metabolic pathway for synthesis of purines and pyrimidines	<b>MSK-S1-Bio-15</b> 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.	<b>MSK-S1-Bio-16</b> Metabolic pathways for nucleic acids degradation and related disorders.		
82	Demonstrate the methods to estimate the serum uric acid.	<b>MSK-S1-Bio-17</b> Estimation of serum uric acid	Practical	OSPE & OSVE
<b>Pharmacology</b>				
83	<ul style="list-style-type: none"> <li>Classify the drugs</li> <li>Describe their general properties.</li> <li>Explain mechanism of action.</li> <li>State their actions in general.</li> </ul>	<b>MSK-S1-Pharm-5</b> Drugs used in Osteoporosis	Interactive Lecture	SBQs & OSVE



Pathology				
84	<ul style="list-style-type: none"> <li>Mention types of arthritis</li> <li>Define Osteoarthritis &amp; Rheumatoid arthritis</li> <li>Describe their clinical features</li> </ul>	<b>MSK-S1-Path-2</b> Arthritis	Interactive Lecture	SBQs & OSVE
Clinical Interactive Lecture				
85	Explain clinical manifestations of arthritis	<b>MSK-S1-Ortho-3</b> Clinical manifestation of Arthritis	Interactive Lecture	SBQs & OSVE

## Theme 7: Anterior Compartment of Leg and Compartment Syndrome

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
86	<ul style="list-style-type: none"> <li>Describe muscles of posterior compartment of thigh.</li> <li>Describe arterial supply of posterior compartment of thigh.</li> <li>Discuss trochanteric and cruciate anastomosis at back of thigh.</li> <li>Describe venous drainage of this region.</li> </ul>	<b>MSK-S1-Ana-G-30</b> Post: compartment of thigh + popliteal fossa	Demonstration	SBQs, OSPE & OSVE
87	<ul style="list-style-type: none"> <li>Describe anatomical position of the bone.</li> <li>Identify the bone and its side determination.</li> <li>Mark attachment of muscles and ligaments.</li> <li>Describe the nerve injuries related to it.</li> </ul>	<b>MSK-S1-Ana-G-31</b> Tibia & fibula		
88	<ul style="list-style-type: none"> <li>Discuss site and time of appearance of upper and lower limb buds.</li> <li>Define source of mesoderm forming the limb muscles</li> </ul>	<b>MSK-S1-Ana-E-6</b> Development of Limbs & its clinical 1	Interactive Lecture	SBQs & OSVE
89	<ul style="list-style-type: none"> <li>Discuss formation of different compartments of leg.</li> <li>Explain arrangement of the muscles in anterior compartments of leg and their actions.</li> <li>Describe neurovasculature of these compartments of leg.</li> <li>Identify bones forming the architecture of foot.</li> <li>Discuss joints formed by these bones.</li> </ul>	<b>MSK-S1-Ana-G-32</b> Anterior compartment of leg & dorsum of foot	Demonstration	SBQs, OSPE & OSVE



90	<ul style="list-style-type: none"> <li>Explain arrangement of the muscles in lateral compartments of leg and their actions.</li> <li>Describe the neurovasculature of these compartments of leg</li> <li>Discuss clinical correlates like compartment syndrome of leg.</li> </ul>	<b>MSK-S1-Ana-G-33</b> Lateral compartment of leg & tibiofibular joint		
91	<ul style="list-style-type: none"> <li>Describe articular surfaces of the knee joint along with capsular attachment.</li> <li>Describe ligaments &amp; bursa of the knee joint and discuss their attachments.</li> <li>Describe movements of the knee joint. (locking &amp; unlocking mechanism)</li> </ul>	<b>MSK-S1-Ana-G-34</b> Knee joint	Interactive Lecture	SBQs & OSVE
92	<ul style="list-style-type: none"> <li>Identify different types of cartilage under light Microscope.</li> <li>Define distinctive microscopic features of each type.</li> </ul>	<b>MSK-S1-Histo-6</b> Histology of elastic and fibrous cartilage	Practical	OSPE & OSVE
<b>Biochemistry</b>				
93	<ul style="list-style-type: none"> <li>Demonstrate principals and types of chromatography.</li> <li>Interpretation of clinical conditions and investigations related to use in chromatography.</li> </ul>	<b>MSK-S1-Bio-18</b> Chromatography	Practical	OSPE & OSVE
<b>Pharmacology</b>				
94	<ul style="list-style-type: none"> <li>Classify the drugs</li> <li>Describe their general properties.</li> <li>Explain the mechanism of action.</li> <li>State their actions in general.</li> </ul>	<b>MSK-S1-Pharm-6</b> Drugs used in Rheumatoid Arthritis	Interactive Lecture	SBQs & OSVE
95	<ul style="list-style-type: none"> <li>Classify the drugs</li> <li>Describe their general properties.</li> <li>Explain the mechanism of action.</li> <li>State their actions in general.</li> </ul>	<b>MSK-S1-Pharm-7</b> Drugs used in Gout	Interactive Lecture	SBQs & OSVE

## Theme 8: Posterior compartment of leg and foot

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
96	<ul style="list-style-type: none"> <li>Explain arrangement of the muscles in posterior compartment of leg.</li> <li>Describe nerve supply of these muscles.</li> <li>Explain actions of the muscles of</li> </ul>	<b>MSK-S1-Ana-G-35</b> Posterior compartment of leg	Demonstration	SBQs, OSPE & OSVE



	<p>posterior compartment.</p> <ul style="list-style-type: none"> <li>Discuss clinical correlates.</li> </ul>			
97	<ul style="list-style-type: none"> <li>Describe the architecture of arches of foot and the factors responsible for their maintenance.</li> <li>Identify the bones forming these arches.</li> <li>Describe the function of the arches of foot.</li> </ul>	<p><b>MSK-S1-Ana-G-36</b> Skeleton of foot &amp; arches of foot</p>		
98	<ul style="list-style-type: none"> <li>Discuss the hand plate and formation of digital rays resulting into digits</li> <li>Describe the muscles involved in and process of rotation of limb</li> <li>Explain the congenital anomalies of the limbs</li> </ul>	<p><b>MSK-S1-Ana-E-7</b> Development of Limbs &amp; its clinical 2</p>	Interactive Lecture	SBQs & OSVE
99	<ul style="list-style-type: none"> <li>Describe the Ankle Joint.</li> <li>Describe Superior and Inferior Tibiofibular Joints.</li> </ul>	<p><b>MSK-S1-Ana-G-37</b> Ankle ,subtalar &amp; small joints of foot</p>		
100	<ul style="list-style-type: none"> <li>Identify the bones forming architecture of sole of foot.</li> <li>Discuss the joints formed by these bones.</li> <li>Describe clinical correlates like flat foot and club foot.</li> </ul>	<p><b>MSK-S1-Ana-G-38</b> Sole of foot</p>		
101	<ul style="list-style-type: none"> <li>Explain different nerve of lower limb and their root value.</li> <li>Discuss causes of injuries.</li> <li>Enumerate common sites of these nerve injuries</li> <li>Discuss symptoms caused by these nerve injuries.</li> </ul>	<p><b>MSK-S1-Ana-G-39</b> Neurovascular bundle of lower limb</p>	Demonstration	SBQs, OSPE & OSVE
102	<ul style="list-style-type: none"> <li>Discuss the blood supply and nerve supply of sole of foot.</li> <li>Describe vascular and nervous supply of dorsum of foot.</li> </ul>	<p><b>MSK-S1-Ana-G-40</b> Neurovascular bundle of foot</p>		
103	<ul style="list-style-type: none"> <li>Describe development of musculoskeletal system.</li> <li>Discuss development of Myotomes</li> <li>List derivatives of epaxial and hypaxial divisions of myotomes</li> <li>Describe the development of bones, joints &amp; cartilage</li> </ul>	<p><b>MSK-S1-Ana-E-8</b> Overview of Embryological development of musculoskeletal system</p>	Interactive Lecture	SBQs & OSVE
104	<ul style="list-style-type: none"> <li>Describe layers of the skin.</li> <li>Discuss layers of the Epidermis.</li> <li>Describe appendages of skin.</li> <li>Discuss the functions of the skin.</li> </ul>	<p><b>MSK-S1-Ana-H-7</b> Microscopic anatomy of the Skin</p>		



105	<ul style="list-style-type: none"> <li>Identify three layers of skin under light microscope</li> <li>Describe structural basis &amp; elements of skin.</li> <li>Recognize function and organization of connective tissue in skin</li> </ul>	<b>MSK-S1-Ana-H-8</b> Histology of skin	Practical	OSPE & OSVE
106	<ul style="list-style-type: none"> <li>Identify three layers of skin under light microscope</li> <li>Describe structural basis &amp; elements of skin.</li> <li>Recognize the function and organization of connective tissue in skin</li> </ul>	<b>MSK-S1-Ana-H-9</b> Histology of skin appendages		
<b>Pharmacology</b>				
107	<ul style="list-style-type: none"> <li>Classify different Nicotinic blocking agents</li> <li>Discuss mechanism of their action</li> <li>Explain clinical uses and adverse effects</li> </ul>	<b>MSK-S1-Pharm-8</b> Nicotinic receptor agonists	Interactive Lecture	SBQs & OSVE
108	<ul style="list-style-type: none"> <li>Classify different Nicotinic blocking agents</li> <li>Discuss mechanism of their action</li> <li>Explain clinical uses and adverse effects</li> </ul>	<b>LMS-S1-Pharm-9</b> Nicotinic receptor antagonists		
<b>Clinical Interactive Lecture</b>				
109	<ul style="list-style-type: none"> <li>Define terms related to fracture: Stress Fracture, Incomplete fracture,</li> <li>Closed (simple fracture), Open (complicated) fracture, multi-fragmented fractures, complex fracture, Pathologic fractures</li> <li>Describe mechanism of bone healing</li> <li>Enlist complications of fracture</li> <li>Describe etiology &amp; Pathogenesis of Pathologic fractures.</li> </ul>	<b>MSK-S1-Ortho-4</b> Fractures/Dislocations	Interactive Lecture	SBQs & OSVE
<b>Pathology</b>				
110	<ul style="list-style-type: none"> <li>Classify different types of osteomyelitis</li> <li>List factors leading to their etiology</li> <li>Explain its pathogenesis</li> </ul>	<b>MSK-S1-Path-3</b> Osteomyelitis	Interactive Lecture	SBQs & OSVE



## Blueprint of Assessment

Purpose of Assessment:

Summative Assessment First Professional MBBS

Curriculum:

Integrated Modular Curriculum

Module:

Musculoskeletal Module -1

Weeks	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8	Week9	Week10	Total hrs	Weight age %	Rounded off Weightage %	Total number of Qs
Teaching hours														
Gross Ana	04	04	04	04	04	04	04	04	04	04	40	35.39	35	35
Histology	01	01	01	01	01	01	01	01	01	00	09	7.96	8	8
Embryology	01	01	01	01	01	01	01	01	00	00	08	7.07	7	7
Physiology	02	01	03	01	01	01	01	01			12	10.61	11	11
Biochemistry	02	02	02	02	02	01	02	02	02	01	18	15.92	16	16
Pathology	----	01	----	01	----	01	----	---			03	2.65	3	3
Pharmacology	---	01	01	02	01	02	01	01			09	7.96	8	8
Parallel subjects (CM, BS, IT, Mres, Prof, clinical)	01		01	01	01	01	01	01			14	12.38	12	12
Total											113		100%	100

Subject in Module	Proportion of subjects in module	Weightage	Test Instrument/tool/method				Explanation
What to assess?			How to assess?				<b>Proportion of test instruments to be used:</b>  Theory MCQs (SBAQs)= 100 %; Practical OSVE=80% OSPE/OSCE= 20%  <b>Competency level &amp; Learning Domain at Miller's Pyramid:</b> <b>Cognition:</b> Know (Level-1) & How to know (Level-2) <b>Skills &amp; Attitude:</b> Show (Level-3) & Does (Level-4)
			MCQs (SBQs) Level 1 & 2	OSVE stations Level 1 & 2	OSPE/OSCE Level 3	Any Other	
Gross Anatomy		35	35	01			
Embryology		8	8	01			
Histology		7	7	01			
Physiology		11	11	03			
Biochemistry		16	16	03			
Pathology		3	3	01			
Pharmacology		8	8	01			
Parallel subjects (CM, IT, BS, Res, BME)		12	12	01			
		100%	100%	80%	20%		



# 4 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 peers, 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	ASSESSMENT
<b>Anatomy</b>				
1	<ul style="list-style-type: none"> <li>Define the middle mediastinum.</li> <li>Explain location and contents of the middle mediastinum.</li> <li>Discuss fibrous and serous parts of the pericardium.</li> <li>Define pericardial sinuses and nerve supply of the pericardium.</li> <li>Discuss related clinical conditions.</li> </ul>	<b>CVS-S1-Ana-G-1</b> Middle Mediastinum and The Pericardium	Interactive Lecture	SBQs & OSVE
2	<ul style="list-style-type: none"> <li>Define Anatomical position of the heart.</li> <li>Identify and name structures constituting the borders and surfaces of the heart.</li> <li>Define the external features of the Chambers of the heart.</li> </ul>	<b>CVS-S1-Ana-G-2</b> Anatomy of the Heart-1	Demonstration	SBQs, OSPE & OSVE
3	<ul style="list-style-type: none"> <li>Describe Internal features of each chamber of heart.</li> <li>Discuss the related clinical conditions.</li> </ul>	<b>CVS-S1-Ana-G-3</b> Anatomy of the Heart-2		
4	<ul style="list-style-type: none"> <li>Describe composition of the walls and the skeleton of the heart.</li> <li>Describe conducting system of the heart.</li> <li>Discuss related clinical conditions.</li> </ul>	<b>CVS-S1-Ana-G-4</b> Structure of the heart and The Conducting system of the Heart		
5	Identify the histological features of heart; endocardium, myocardium, epicardium on light microscope.	<b>CVS-S1-Ana-H-1</b> Histology of the Heart	Practical	OSPE & OSVE
<b>Physiology</b>				
6	<ul style="list-style-type: none"> <li>Describe components/parts of CVS and their functions</li> <li>Define systemic and pulmonary circulation</li> <li>Mention distribution of blood (in percentage of total blood) in different parts of the circulatory system</li> <li>Mention pressures in various portions of the circulatory system</li> </ul>	<b>CVS-S1-Phy-1</b> Overview of CVS	Interactive Lecture	SBQs & OSVE
7	<ul style="list-style-type: none"> <li>Mention three major types of muscle</li> <li>Describe properties of cardiac muscle</li> </ul>	<b>CVS-S1-Phy-2</b> Properties of	Interactive Lecture	SBQs & OSVE



	(Functional syncytium, Automaticity, Rhythmicity, Conductivity, Long refractory period) <ul style="list-style-type: none"> <li>Describe cardiac muscle action potential</li> <li>Discuss mechanism of excitation contraction coupling in cardiac muscle</li> </ul>	cardiac muscle		
08	<ul style="list-style-type: none"> <li>Describe various parts/components of conducting system of the heart and their functions</li> <li>Explain action potential and rhythmicity of sinus nodal fibers</li> <li>Describe origin and spread of cardiac impulse</li> <li>Mention AV nodal delay and its significance</li> <li>Describe the effect of ANS on the functioning of conducting system of the heart</li> </ul>	<b>CVS-S1-Phy-3</b> Excitatory and Conducting system of the heart	Interactive Lecture	SBQs & OSVE
09	<ul style="list-style-type: none"> <li>Define electrocardiogram and electrocardiography</li> <li>Describe the waves, intervals and segments of a normal electrocardiogram (ECG)</li> <li>Mention the uses/indications of ECG</li> </ul>	<b>CVS-S1-Phy-4</b> Electrocardiogram (ECG)		
<b>Biochemistry</b>				
10	<ul style="list-style-type: none"> <li>Mention introduction of isoenzymes</li> <li>Discuss diagnostic significance of isoenzymes</li> </ul>	<b>CVS-S1-Bio-1</b> Diagnostic significance of Isoenzymes in cardiovascular disorders	Interactive Lecture	SBQs & OSVE
<b>Pathology</b>				
11	<ul style="list-style-type: none"> <li>Define ischemic heart diseases?</li> <li>Classify different types of ischemic heart diseases.</li> <li>Discuss causes and clinical manifestation of ischemic heart diseases.</li> </ul>	<b>CVS-S1-Path-1</b> Ischemic heart disease	Interactive Lecture	SBQs & OSVE
<b>Medicine (Cardiology)</b>				
12	<ul style="list-style-type: none"> <li>Define Arrhythmias</li> <li>Recognize the common abnormalities in rate and rhythm of the heart (tachycardia, bradycardia, flutter, fibrillations, heart blocks and extrasystole) failure.</li> <li>Describe the hemodynamic, neuroendocrine and cellular changes that occur in heart failure.</li> <li>Describe the Physiological basis of the treatment principles in heart failure.</li> </ul>	<b>CVS-S1-Cardio-1</b> Arrhythmias	Interactive Lecture	SBQs & OSVE



## Theme 2: Congenital Anomalies of Cardiovascular System

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
13	<ul style="list-style-type: none"> <li>Describe development of cardiogenic field and heart tube.</li> <li>Enumerate the derivatives of heart tube.</li> <li>Define formation of cardiac looping and dextrocardia and how sinus venous and cardiac septa formed.</li> </ul>	<b>CVS-S1-Ana-E-1</b> Development of the heart tube	Interactive Lecture	SBQs & OSVE
14	<ul style="list-style-type: none"> <li>Explain atrial and interatrial septum development.</li> <li>Explain ventricles and Inter-ventricular septum development.</li> <li>Enlist common congenital anomalies of heart chambers.</li> </ul>	<b>CVS-S1-Ana-E-2</b> Development of the heart chambers and their septa -1		
15	<ul style="list-style-type: none"> <li>Explain How atria and interatrial septum develops?</li> <li>How ventricles and Inter-ventricular septum develops?</li> <li>What are the common congenital anomalies of heart chambers?</li> </ul>	<b>CVS-S1-Ana-E-3</b> Development of the heart chambers and their septa -2		
16	<ul style="list-style-type: none"> <li>Describe septa formation in bulbus cordis and truncus arteriosus.</li> <li>Enlist congenital heart defects; transposition of great vessels, PDA, PTA</li> </ul>	<b>CVS-S1-Ana-E-4</b> Development of septa in truncus arteriosus , valves and conducting system		
17	<ul style="list-style-type: none"> <li>Describe the microscopic features of the arteries</li> <li>Identify the different types of arteries</li> </ul>	<b>CVS-S1-Ana-H-2</b> Histology of the Arteries	Practical	OSPE & OSVE
<b>Physiology</b>				
18	<ul style="list-style-type: none"> <li>Define cardiac cycle</li> <li>Mention duration of cardiac cycle and its relation with heart rate</li> <li>Describe sequence of events of cardiac cycle</li> <li>Mention pressure changes that occur during each cardiac cycle</li> </ul>	<b>CVS-S1-Phy-5</b> Cardiac cycle and its mechanical events-I	Interactive Lecture	SBQs & OSVE
19	<ul style="list-style-type: none"> <li>Describe the relationship of the electrocardiogram to mechanical events of cardiac cycle</li> <li>Mention pressure changes in atria</li> <li>Define JVP and mention its clinical importance</li> <li>Define EDV, ESV and Stroke volume</li> </ul>	<b>CVS-S1-Phy-6</b> Cardiac cycle and its mechanical events-II		



	<ul style="list-style-type: none"> <li>Define ejection fraction and mention its clinical importance</li> <li>Define preload and afterload</li> </ul>			
20	<ul style="list-style-type: none"> <li>Describe functions of heart valves</li> <li>Mention normal heart sounds and explain their production</li> <li>Define heart murmur</li> <li>Mention the timing of the murmur produced by valvular defects and congenital heart diseases</li> <li>Explain the hemodynamic changes in various valvular heart diseases</li> </ul>	<b>CVS-S1-Phy-7</b> Heart valves, heart sounds and murmurs		
21	<ul style="list-style-type: none"> <li>Define Ohm's law of circulation</li> <li>Describe main factors that determine vascular resistance</li> <li>Define total peripheral vascular resistance and total pulmonary vascular resistance</li> <li>Mention Poiseuille's law</li> </ul>	<b>CVS-S1-Phy-8</b> Interrelationship among blood flow, pressure and resistance		
<b>Biochemistry</b>				
22	Describe different aspects related to fatty acids and their clinical significance in the CVS diseases..	<b>CVS-S1-Bio-2</b> Fatty acids	Interactive Lecture	SBQs & OSVE
<b>Pathology</b>				
23	Define aneurysm Classification of aneurysm What are the true and false aneurysms with their examples Pathogenesis of aneurysm	<b>CVS-S1-Path-2</b> Congenital anomalies of blood vessels	Interactive Lecture	SBQs & OSVE
24	<ul style="list-style-type: none"> <li>Define congenital heart disease.</li> <li>Describe etiopathogenesis.</li> <li>Discuss clinical features</li> </ul>	<b>CVS-S1-Path-3</b> Congenital heart disease.		
<b>Paediatrics</b>				
25	Describe the Hemodynamic changes in various congenital heart diseases including; Mitral Stenosis Mitral regurgitation Stenosis Aortic regurgitation	<b>CVS-S1-Paeds-I</b> Congenital heart diseases	Interactive Lecture	SBQs & OSVE

### Theme 3: Hypertension

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
26	<ul style="list-style-type: none"> <li>Describe the arterial supply and venous drainage of heart.</li> <li>Describe the branches of major arteries and their distribution. Define the nerve</li> </ul>	<b>CVS-S1-Ana-G-5</b> Blood and nerve supply of the Heart	Interactive Lecture	SBQs & OSVE



	supply of the heart. Describe the cardiac plexus.			
27	<ul style="list-style-type: none"> <li>Discuss development of arterial system; aortic arches, umbilical, vitelline and coronary arteries</li> <li>Name the common congenital anomalies of arteries?</li> </ul>	<b>CVS-S1-Ana-E-5</b> Development of arterial system of heart		
28	<ul style="list-style-type: none"> <li>Discuss development of venous system; cardinal veins, umbilical and vitelline.</li> <li>Name the common congenital anomalies of venous system?</li> </ul>	<b>CVS-S1-Ana-E-6</b> Development of venous system of heart		
29	Describe the microscopic structure of the veins	<b>CVS-S1-Ana-H-3</b> Histology of veins	Practical	OSPE & OSVE
<b>Physiology</b>				
30	<ul style="list-style-type: none"> <li>Mention the specific needs of the tissues for blood flow</li> <li>Define local blood flow</li> <li>Describe acute/short-term control of local blood flow</li> <li>Describe long-term control of local blood flow</li> <li>Explain the auto-regulation of blood flow</li> </ul>	<b>CVS-S1-Phy-9</b> Control of local blood flow		
31	<ul style="list-style-type: none"> <li>Describe structure of microcirculation and capillary wall</li> <li>Explain flow of blood in capillaries</li> <li>Define vasomotion</li> <li>Define Starling forces and give their approximate values</li> <li>Describe role of Starling forces in fluid exchange across the capillary wall</li> <li>List the functions of lymphatics</li> <li>Define edema and explain the pathophysiological basis for edema (i.e. increased capillary hydrostatic pressure, hypoalbuminemia, increased capillary permeability and lymphatic obstruction)</li> </ul>	<b>CVS-S1-Phy-10</b> Capillary fluid exchange	Practical	OSPE & OSVE
32	<ul style="list-style-type: none"> <li>Describe vasomotor center, its important areas and functions</li> <li>Define vasomotor tone</li> <li>Describe role of sympathetic nervous system in regulation of circulation</li> <li>Describe role of parasympathetic nervous system in regulation of circulation</li> </ul>	<b>CVS-S1-Phy-11</b> Nervous regulation of circulation		
33	<ul style="list-style-type: none"> <li>Define systolic blood pressure, diastolic blood pressure, pulse pressure and mean arterial pressure</li> <li>Mention important factors on which blood pressure depends</li> </ul>	<b>CVS-S1-Phy-12</b> Blood pressure and its Regulation-I (Baroreceptor		



	<ul style="list-style-type: none"> <li>List various mechanisms that regulate/control blood pressure</li> <li>Describe role of baroreceptor reflex in regulation of blood pressure</li> </ul>	reflex mechanism)		
<b>Biochemistry</b>				
34	Explain the metabolism and function of cholesterol and its clinical significance in CVS diseases	<b>CVS-S1-Bio-3</b> Cholesterol	Interactive Lecture	SBQs & OSVE
35	Describe the prostaglandins & leukotriens, their synthesis and general functions.	<b>CVS-S1-Bio-4</b> Prostaglandins and Leukotriens		
36	Demonstrate the estimation of the serum cholesterol	<b>CVS-S1-Bio-P1</b> Serum Cholesterol estimation	Practical	OSPE & OSVE
<b>Pharmacology</b>				
37	To describe the Physiological targets of drugs used in systemic hypertension.	<b>CVS-S1-Pharm-1</b> Introduction to targets of drugs used in hypertension	Interactive Lecture	SBQs & OSVE
<b>Medicine (Cardiology)</b>				
38	<ul style="list-style-type: none"> <li>Define hypertension. List the causes of hypertension.</li> <li>Describe the pathogenesis of hypertension.</li> <li>Explain the compensatory measures that maintain the blood pressure on rising from supine positions.</li> <li>Explain the Physiological basis of the treatment principles in hypertension</li> </ul>	<b>CVS-S1-Cardio-2</b> Hypertension	Interactive Lecture	SBQs & OSVE

## Theme 4: Heart Attack

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
39	Identify different chambers/structures of the heart.	<b>CVS-S1-Ana-G-6</b> Model study of heart	Demonstration	SBQs & OSPE & OSVE
40	Identify different chambers/structures of the heart.	<b>CVS-S1-Ana-G-7</b> Model study of heart		
41	<ul style="list-style-type: none"> <li>Describe circulatory changes before and after birth.</li> <li>Name the adult derivatives of embryonic structures?</li> </ul>	<b>CVS-S1-Ana-E-7</b> Circulation before and after birth	Interactive Lecture	SBQs & OSVE





42	Identify the capillaries with the help of light microscope.	<b>CVS-S1-Ana-H-4</b> Histology of capillaries	Practical	OSPE & OSVE
<b>Physiology</b>				
43	<ul style="list-style-type: none"> <li>Explain renal-body fluid system and its role in arterial pressure control</li> <li>Describe Renin-Angiotensin system and its role in arterial pressure control</li> </ul>	<b>CVS-S1-Phy-13</b> Blood pressure and its regulation-II (Role of kidneys in long-term control of blood pressure)	Interactive Lecture	SBQs & OSVE
44	<ul style="list-style-type: none"> <li>Define cardiac output and mention its relationship to stroke volume &amp; heart rate</li> <li>Describe factors regulating cardiac output</li> <li>Describe Frank-Starling mechanism of heart</li> </ul>	<b>CVS-S1-Phy-14</b> Cardiac output and venous return		
45	<ul style="list-style-type: none"> <li>Mention some pathological conditions that cause high cardiac output</li> <li>Mention some pathological conditions that cause low cardiac output</li> <li>Mention methods of measurement of cardiac output</li> <li>Define venous return and mention factors that affect/regulate venous return</li> <li>Describe central venous pressure</li> </ul>	<b>CVS-S1-Phy-15</b> Cardiac output and venous return		
46	<ul style="list-style-type: none"> <li>Define circulatory shock</li> <li>Describe causes and major types of shock</li> <li>Mention stages of shock</li> <li>Describe Physiology of non-progressive and progressive hemorrhagic shock</li> </ul>	<b>CVS-S1-Phy-16</b> Circulatory shock		
47	<ul style="list-style-type: none"> <li>Mention compensatory mechanisms that attempt to return cardiac output and arterial pressure back to normal in a hemorrhagic shock (hypovolemic shock)</li> <li>Mention factors that lead to progression of shock (i.e. factors worsening the shock)</li> <li>Describe the Physiological basis of treatment of circulatory shock</li> </ul>	<b>CVS-S1-Phy-17</b> Circulatory shock		
48	<ul style="list-style-type: none"> <li>To record pulse rate manually &amp; on power lab</li> <li>To record blood pressure manually &amp; on power lab</li> <li>To record ECG on ECG machine &amp; power lab</li> <li>To auscultate heart sounds</li> </ul>	<b>CVS-S1-Phy-18</b> Pulse rate, blood pressure, ECG recording on power lab. and ECG machine	Practical	OSPE & OSVE



<b>Biochemistry</b>				
<b>49</b>	Discuss lipoproteins' metabolism and their clinical significance in CVS diseases	<b>CVS-S1-Bio-5</b> Lipoproteins	Interactive Lecture	SBQs & OSVE
<b>50</b>	Interpret lipid profile and its significance	<b>CVS-S1-Bio-P2</b> Lipid Profile	Practical	OSPE & OSVE
<b>Pathology</b>				
<b>51</b>	<ul style="list-style-type: none"> <li>Define shock</li> <li>Enlist types of shock</li> <li>Describe causes, patho-physiology, signs and symptoms of shock</li> </ul>	<b>CVS-S1-Path-4</b> Shock	Interactive Lecture	SBQs & OSVE
<b>Medicine (Cardiology)</b>				
<b>52</b>	<ul style="list-style-type: none"> <li>Define heart failure.</li> <li>Explain the Physiological basis of common clinical manifestations of heart failure.</li> <li>Describe different types of the heart failure.</li> <li>Describe hemodynamic, neuroendocrine and cellular changes that occur in heart failure.</li> <li>Describe Physiological basis of treatment principles in heart failure.</li> </ul>	<b>CVS-S1-Cardio-3</b> Heart failure	Interactive Lecture	SBQs & OSVE



## Blueprint of Assessment

Purpose of Assessment: Summative Assessment First Professional MBBS  
 Curriculum: Integrated Modular Curriculum  
 Module: CVS Module -1

S. No	Subject	Week-1	Week-2	Week-3	Week-4	Week-5	Total	Weightage %	Weightage after Rounding	Total Number of Questions (100)
	Gross Anatomy	02	02	01	05	01	07	12.96	13	13
	Embryo	01	02	02	01	01	07	12.96	13	13
	Histo	01	01	01	01	00	04	7.40	07	07
	Physiology	04	04	03	04	03	18	33.33	33	33
	Biochemistry	01	01	01	02	02	07	12.96	13	13
	Pharmacology	00	00	00	01	00	01	1.85	02	02
	Pathology	01	01	00	01	01	04	7.40	07	07
	Parallel subjects (CM, IT, BS, Res, BME)	02	02	02	02	01	06	11.11	11	11
	<b>TOTAL</b>	-----	-----	-----			54		100%	100

Subject in Module	Proportion of subjects in module	Weightage	Test Instrument/tool/method				Explanation
			MCQs (SBQs) Level 1 & 2	OSVE stations Level 1 & 2	OSPE/OSCE Level 3	Any Other	
What to assess?			How to assess?				
							<b>Proportion of test instruments to be used:</b> Theory MCQs (SBAQs)= 100 %; Practical OSVE=80% OSPE/OSCE= 20%  <b>Competency level &amp; Learning Domain at Miller's Pyramid:</b> <b>Cognition:</b> Know (Level-1)& How to know (Level-2) <b>Skills &amp; Attitude:</b> Show (Level-3) & Does (Level-4)
Gross Anatomy		13	13	01			
Embryology		13	13	01			
Histology		07	07	01			
Physiology		33	33	03			
Biochemistry		13	13	03			
Pathology		02	02	01			
Pharmacology		07	07	01			
Parallel subjects (CM, IT, BS, Res, BME)		11	11	01			
		100%	100%	80%	20%		



# 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 peers, staff and teachers
- Demonstrate professionalism and ethical values in dealing with patients, cadavers, peers, staff and teachers.
- Communicate effectively in a team with peers 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	Assessment
<b>Anatomy</b>				
1	<ul style="list-style-type: none"> <li>• Define anatomical classification of the respiratory system.</li> <li>• Define structure of the thoracic cage &amp; wall.</li> </ul>	<b>RESP-S1-Ana-G-1</b> General introduction of the Respiratory system	Interactive Lecture	SBQs & OSVE



	<ul style="list-style-type: none"> <li>Define thoracic inlet &amp; thoracic outlet.</li> <li>Discuss thoracic outlet syndrome.</li> </ul>	and Anatomy of the thorax		
2	<ul style="list-style-type: none"> <li>Define general features of the sternum.</li> <li>Define general features of the ribs.</li> <li>Differentiate typical and atypical ribs.</li> <li>Define costal cartilages.</li> <li>Discuss attachment of various muscles.</li> </ul>	<b>RESP-S1-Ana-G-2</b> Osteology of the Ribs and the Sternum	Demonstration	SBQs, OSPE & OSVE
3	<ul style="list-style-type: none"> <li>Define general features of the thoracic vertebra.</li> <li>Differentiate typical and atypical thoracic vertebrae.</li> <li>Discuss joints of the thoracic walls.</li> </ul>	<b>RESP-S1-Ana-G-3</b> Osteology of the thoracic vertebrae		
4	<ul style="list-style-type: none"> <li>Define three morphological layers of the muscles of the thoracic wall.</li> <li>Define intercostal spaces.</li> <li>Define endothoracic fascia.</li> <li>Discuss suprapleural membrane.</li> </ul>	<b>RESP-S1-Ana-G-4</b> Muscles of the thoracic wall and intercostal spaces		
5	<ul style="list-style-type: none"> <li>Define intraembryonic mesoderm and its parts.</li> <li>Discuss divisions of lateral plate mesoderm into visceral and parietal layers.</li> <li>Define extent of intraembryonic coelom and its divisions.</li> <li>Discuss formation of the pleuro-pericardial and pleuro-peritoneal membranes.</li> </ul>	<b>RESP-S1-Ana-E-1</b> Formation of the intraembryonic cavity , Serous membranes and thoracic cavity	Interactive Lecture	SBQs & OSVE
6	<ul style="list-style-type: none"> <li>Discuss steps of development of diaphragm from its composite embryonic derivatives.</li> <li>Discuss anomalies related with its development.</li> </ul>	<b>RESP-S1-Ana-E-2</b> Development of the diaphragm		
7	<ul style="list-style-type: none"> <li>Describe histological features of different layers of Trachea.</li> <li>Identify tracheal epithelium and other microscopic features of the trachea with help of light microscope.</li> </ul>	<b>RESP-S1-Ana-H-1</b> Histology of the Trachea	Practical	OSPE & OSVE



Physiology				
8	<ul style="list-style-type: none"> <li>Describe overview of respiration</li> <li>Describe parts and functions of respiratory tract</li> <li>Define pulmonary ventilation</li> </ul>	<b>RESP-S1-Phy-1</b> Overview of respiratory tract, functions	Interactive Lecture	SBQs & OSVE
9	<ul style="list-style-type: none"> <li>Describe mechanics of pulmonary ventilation and muscles of respiration</li> <li>Describe changes in the lung volume, alveolar pressure, pleural pressure &amp; Transpulmonary pressure &amp; its changes during respiration.</li> <li>Discuss alveolar ventilation &amp; dead space also describe cough &amp; sneezing reflexes</li> </ul>	<b>RESP-S1-Phy-2</b> The mechanics of breathing		
10	<ul style="list-style-type: none"> <li>Define lung compliance &amp; list factors affecting lung compliance</li> <li>Describe composition &amp; role of surfactant in maintaining the alveolar stability &amp; infant respiratory distress syndrome</li> <li>Differentiate compliance work, tissue resistance work &amp; airway resistance work</li> </ul>	<b>RESP-S1-Phy-3</b> Lung compliance & work of breathing and surfactant		
11	<ul style="list-style-type: none"> <li>Define pulmonary volumes &amp; capacities with their normal values &amp; significance in pulmonary function test.</li> <li>Discuss alveolar ventilation &amp; dead space</li> </ul>	<b>RESP-S1-Phy-4</b> Lung volumes & capacities		
12	<ul style="list-style-type: none"> <li>Record effect of respiration during sitting &amp; standing of young adult on power lab &amp; plot a graph.</li> <li>Record the effect of swallowing &amp; deglutition on respiration in healthy adult on power lab &amp; plot a graph</li> </ul>	<b>RESP-S1-Phy-5</b> 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	<b>RESP-S1-Bio-1</b> Concept of pH, Buffers & their mechanism of action, Types of Buffers in humans	Interactive Lecture	SBQs & OSVE
14	<ul style="list-style-type: none"> <li>Describe the acid base balance.</li> <li>Explain the respiratory and metabolic acidosis &amp; alkalosis</li> </ul>	<b>RESP-S1-Bio-2</b> Acid Base Balance/ Metabolic &		





	with causes and compensatory mechanisms.	Respiratory Acidosis & Alkalosis		
15	Description & Biomedical significance of Compound Lipids	<b>RESP-S1-Bio-3</b> Biomedical significance of Compound Lipids		
16	<ul style="list-style-type: none"> <li>Describe the Synthesis &amp; Functions of Phospholipids.</li> <li>Discuss role of lecithin in respiration</li> </ul>	<b>RESP-S1-Bio-4</b> Synthesis of Phospholipids & Role of Lecithin in Respiration		
17	Demonstrate the pH Meter, Significance, interpretation	<b>RESP-S1-Bio-5</b> Introduction to pH Meter, Significance, interpretation	Practical	OSPE & OSVE
<b>Pathology</b>				
18	<ul style="list-style-type: none"> <li>Identify congenital anomalies of lungs.</li> <li>Define acute lung injury</li> <li>Describe causes ARDS.</li> <li>Discuss characteristic features, morphology and pathogenesis of ARDS.</li> <li>Describe its consequences and clinical course.</li> </ul>	<b>RESP-S1-Patho-1</b> Congenital anomalies, acute lung injury and ARDS	Practical	OSPE & OSVE
<b>CLINICAL</b>				
20	<ul style="list-style-type: none"> <li>Define Chyne-stokes breathing and effects on body.</li> <li>Define COPD and RLD.</li> <li>Differentiate between RLD &amp; COLD &amp; effects on body (obstructive &amp; restrictive lung disease). Is COVID-19 RLD or COLD type of disease</li> <li>Define emphysema, chronic bronchitis.</li> <li>Define Bronchiectasis.</li> <li>Define interstitial lung diseases</li> </ul>	<b>RESP-S1-MED-1</b> Obstructive and Restrictive Lung Diseases	Interactive Lecture	SBQs & OSVE

## Theme 2: Airways and Their Conditions or Diseases

S #	LEARNING OBJECTIVES	TOPICS	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
21	<ul style="list-style-type: none"> <li>Discuss attachments of the diaphragm.</li> <li>Define blood and nerve supply of</li> </ul>	<b>RESP-S1-Ana-G-5</b> The Diaphragm and its Openings	Demonstration	SBQs, OSPE & OSVE



	<p>the diaphragm.</p> <ul style="list-style-type: none"> <li>Identify openings in the diaphragm with levels.</li> <li>Define structures passing through these openings.</li> <li>Define functions of the diaphragm.</li> </ul>			
22	<ul style="list-style-type: none"> <li>Describe mediastinum</li> <li>Describe boundaries and divisions of mediastinum</li> <li>Enumerate structures present in it</li> </ul>	<b>RESP-S1-Ana-G-6</b> Mediastinum	Interactive Lecture	SBQs & OSVE
23	<ul style="list-style-type: none"> <li>Define anatomy of the trachea.</li> <li>Discuss clinical conditions related with trachea.</li> </ul>	<b>RESP-S1-Ana-G-7</b> Anatomy of the trachea		
24	<ul style="list-style-type: none"> <li>Define anatomy of the principal bronchi.</li> <li>Discuss clinical conditions related with bronchi.</li> </ul>	<b>RESP-S1-Ana-G-8</b> Anatomy of the bronchi	Demonstration	SBQs, OSPE & OSVE
25	<ul style="list-style-type: none"> <li>Describe development of the larynx, trachea and bronchi.</li> <li>Discuss anomalies related with development of these structures.</li> </ul>	<b>RESP-S1-Ana-E-3</b> Formation of the Larynx, Trachea and Bronchi	Interactive Lecture	SBQs & OSVE
26	<ul style="list-style-type: none"> <li>Describe microscopic features of the bronchi.</li> <li>Differentiate primary bronchioles from the tertiary bronchioles.</li> <li>Identify general histological features of bronchi and bronchioles with help of light microscope.</li> </ul>	<b>RESP-S1-Ana-H-2</b> The Histology of the Bronchi: Primary and Tertiary Bronchioles	Practical	OSPE & OSVE
<b>Physiology</b>				
27	<ul style="list-style-type: none"> <li>Describe structure &amp; functions of Respiratory membrane</li> <li>Gasses exchange across the respiratory membrane</li> <li>Factors affecting exchange through membrane</li> </ul>	<b>RESP-S1-Phy-6</b> Diffusion of Gasses	Interactive Lecture	SBQs & OSVE
28	<ul style="list-style-type: none"> <li>Describe transport of oxygen in the blood &amp; discuss the oxygen Hb dissociation curve &amp; factors affecting it</li> </ul>	<b>RESP-S1-Phy-7</b> Transport of oxygen		
29	<ul style="list-style-type: none"> <li>Describe transport of CO<sub>2</sub> in the blood &amp; gasses exchange between blood &amp; body cells (chloride shift)</li> </ul>	<b>RESP-S1-Phy-8</b> Transport of CO <sub>2</sub>		
30	<ul style="list-style-type: none"> <li>Enlist respiratory centers</li> <li>Describe mechanisms of nervous regulation of respiration</li> <li>Describe reflexes involve in nervous regulation</li> </ul>	<b>RESP-S1-Phy-9</b> Nervous regulation of respiration		



31	<ul style="list-style-type: none"> <li>Record effect of exercise on respiration in healthy adult on power lab &amp; plot a graph</li> <li>Interpret Pulmonary Function Tests</li> </ul>	<b>RESP-S1-Phy-10</b> Record the lung volumes and capacities on power lab & plot a graph	Practical	OSPE & OSVE
<b>Biochemistry</b>				
32	Describe the Glycolysis in detail.	<b>RESP-S1-Bio-6</b> Glycolysis	Interactive Lecture	SBQs & OSVE
33	Describe role of TCA Cycle in cellular respiration	<b>RESP-S1-Bio-7</b> Role of TCA Cycle in cellular respiration		
34	<ul style="list-style-type: none"> <li>Demonstrate the Arterial blood gases significance</li> <li>Describe the ABG's interpretation with various respiratory disorders</li> </ul>	<b>RESP-S1-Bio-8</b> Arterial blood gases (ABGs) interpretation	Practical	OSPE & OSVE
<b>Pathology</b>				
35	<ul style="list-style-type: none"> <li>Define chronic obstructive lung disease (COPD)</li> <li>Classify the types of COPD</li> <li>Describe its pathogenesis &amp; clinical features.</li> </ul>	<b>RESP-S1-Path-2</b> Chronic obstructive lung diseases (COPD)	Interactive Lecture	SBQs & OSVE
<b>Pharmacology</b>				
36	<ul style="list-style-type: none"> <li>Classify drugs used to treat dry and productive cough according to their mechanism of action.</li> <li>Describe adverse effects, contraindications and drug interactions of the drugs used to treat various types of cough.</li> </ul>	<b>RESP-S1-Pharm-1</b> The treatment of the dry and productive cough	Interactive Lecture	SBQs & OSVE
<b>Clinical</b>				
37	<ul style="list-style-type: none"> <li>Define hypoxia and its types.</li> <li>Explain effects of the hypoxia.</li> <li>Explain psychogenic dyspnea &amp; causes of psychogenic dyspnea</li> <li>Define cyanosis.</li> <li>Explain prevention strategies of cyanosis.</li> <li>Enlist three principal reasons of cyanosis.</li> <li>Define CO<sub>2</sub> poisoning.</li> <li>Explain the effects of CO<sub>2</sub> poisoning and preventing measures of CO<sub>2</sub>.</li> </ul>	<b>RESP-S1-MED-2</b> Hypoxia Cyanosis CO <sub>2</sub> poisoning	Interactive Lecture	SBQs & OSVE



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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
<b>Anatomy</b>				
38	Define structure and nerve supply of pleura	<b>RESP-S1-Ana-G-9</b> Anatomy of the pleurae	Demonstration	SBQs, OSPE & OSVE
39	<ul style="list-style-type: none"> <li>Describe gross anatomy of the lungs.</li> <li>Discuss the phases of the respiration</li> </ul>	<b>RESP-S1-Ana-G-10</b> Anatomy of the lungs Mechanism of the respiration-1		
40	<ul style="list-style-type: none"> <li>Define bronchopulmonary segments.</li> <li>Define types of the respiration.</li> <li>Discuss clinical conditions related with lungs.</li> </ul>	<b>RESP-S1-Ana-G-11</b> Anatomy of the lungs Mechanism of the respiration-2 (bronchopulmonary segment)		
41	<ul style="list-style-type: none"> <li>Define blood and nerve supply of the lungs.</li> <li>Discuss clinical conditions related with lungs.</li> </ul>	<b>RESP-S1-Ana-G-12</b> Anatomy of the lungs-3 (Blood supply)	Interactive Lecture	SBQs & OSVE
42	<ul style="list-style-type: none"> <li>Define clinical significance of chest X-ray in respiratory diseases.</li> </ul>	<b>RESP-S1-Ana-G-13</b> Radiology: Basics of chest X-ray		
43	<ul style="list-style-type: none"> <li>Discuss formation of laryngo-tracheal groove &amp; respiratory diverticulum or lung buds.</li> <li>Define anomalies related with development of the lung buds.</li> <li>Discuss stages of development / maturation of the lungs.</li> <li>Discuss anomalies related with the lung maturation</li> </ul>	<b>RESP-S1-Ana-E-4</b> Formation of the lung buds The maturation of the Lungs		
44	<ul style="list-style-type: none"> <li>Identify structure of the alveoli and interalveolar septum under microscope and correlate functions of different types of cells, forming the alveolar wall.</li> <li>Identify structure and function of the blood air barrier.</li> </ul>	<b>RESP-S1-Ana-H-3</b> The Histology of the Lungs: Alveoli	Practical	OSPE & OSVE



Physiology				
45	<ul style="list-style-type: none"> <li>Describe chemical control of respiration</li> <li>Explain chemoreceptor involved in chemical respiration.</li> <li>Describe regulation of respiration during exercise.</li> <li>Explain Periodic breathing</li> </ul>	<b>RESP-S1-Phy-9</b> Chemical regulation of respiration Regulation during exercise	Interactive Lecture	SBQs & OSVE
46	<ul style="list-style-type: none"> <li>Describe pulmonary circulation &amp; blood flow through various zones of lung (1, 2, 3).</li> <li>Explain pulmonary capillary dynamics.</li> <li>Explain mechanism of development of pulmonary edema, pleural effusion</li> <li>Ventilation perfusion ratio (V/Q ratio)</li> </ul>	<b>RESP-S1-Phy-10</b> Pulmonary Circulation & V/Q relationships		
47	<ul style="list-style-type: none"> <li>Define respiratory changes associated with High altitude</li> <li>Discuss hypoxia and its types.</li> </ul>	<b>RESP-S1-Phy-11</b> High altitude & Hypoxia		
48	<ul style="list-style-type: none"> <li>Explain deep sea diving Physiology</li> <li>Describe caisson's disease</li> </ul>	<b>RESP-S1-Phy-12</b> Deep sea Diving Physiology		
Biochemistry				
49	Describe organization of the Electron Transport Chain	<b>RESP-S1-Bio-9</b> Organization of Electron Transport Chain	Interactive Lecture	SBQs & OSVE
50	Describe Oxidative phosphorylation & ATP Synthesis	<b>RESP-S1-Bio-10</b> Oxidative phosphorylation & ATP Synthesis		
51	Demonstrate role of emulsification in respiration and digestion.	<b>RESP-S1-Bio-11</b> Role of Emulsification in respiration and digestion	Practical	OSPE & OSVE
Pathology				
52	<ul style="list-style-type: none"> <li>Define pneumonia.</li> <li>Discuss etiological classification of pneumonia.</li> <li>Discuss its clinical presentation.</li> <li>Describe diagnostic tools for pneumonia.</li> </ul>	<b>RESP-S1-Path-3</b> Pneumonia	Interactive Lecture	SBQs & OSVE



Clinical				
53	<ul style="list-style-type: none"> <li>• Define RDS.</li> <li>• Describe sign and symptoms of the respiratory distress syndrome.</li> <li>• Enlist the causes of the respiratory distress syndrome</li> <li>• Discuss the management</li> </ul>	<b>RESP-S1-Med-3</b> Respiratory distress syndrome	Interactive Lecture	SBQs & OSVE



## Blueprint of Assessment

Purpose of Assessment: Summative Assessment First Professional MBBS  
 Curriculum: Integrated Modular Curriculum  
 Module: Respiratory Module-1

S. No	Subject	Week-1	Week-2	Week-3	Week-4	Week-5	Total	Weightage %	Weightage after Rounding	Total Number of Questions (100)
	Gross Anatomy	03	02	02	02		09	17.3	17	17
	Embryo	02	02	02	01		07	13.4	13	13
	Histo	01	00	01	01		04	7.6	08	08
	Physiology	04	04	03	02		13	24.07	24	24
	Biochemistry	01	01	03	02		07	13.4	13	13
	Pharmacology	00	00	01	00		02	3.8	04	04
	Pathology	01	01	00	01		03	5.7	06	08
	Parallel subjects (CM, IT, BS, Res, BME)	02	02	02	01		07	13.4	13	13
	<b>TOTAL</b>	-----	-----	-----			52		100%	100

Subject in Module	Proportion of subjects in module	Weightage	Test Instrument/tool/method				Explanation
What to assess?			How to assess?				<b>Proportion of test instruments to be used:</b> Theory MCQs (SBAQs)= 100 %; Practical OSVE=80% OSPE/OSCE= 20%  <b>Competency level &amp; Learning Domain at Miller's Pyramid:</b> <b>Cognition:</b> Know (Level-1)& How to know (Level-2) <b>Skills &amp; Attitude:</b> Show (Level-3) & Does (Level-4)
			MCQs (SBQs) Level 1 & 2	OSVE stations Level 1 & 2	OSPE/OSCE Level 3	Any Other	
Gross Anatomy		17	17	01			
Embryology		13	13	01			
Histology		08	08	01			
Physiology		24	24	03			
Biochemistry		13	13	03			
Pathology		04	04	01			
Pharmacology		06	08	01			
Parallel subjects (CM, IT, BS, Res, BME)		13	13	01			
		100%	100%	80%	20%		





# 6 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, practicals, assignments)	3%
	Block tests	4%
		10%
<b>TOTAL</b>		<b>20%</b>



# 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

