



INDUS MEDICAL COLLEGE

FIRST YEAR MBBS

STUDY GUIDE



Academic Session
2024-25

ACADEMIC CALENDAR
Academic Session 2024-2025

Activity	Class Year	Dates
Classes starts	First Prof MBBS	February 24, 2025
Eid-ul-Fitr	Holiday	March 31 to April 06, 2025
Classes Resumes	All Batches of MBBS	April 07, 2025
Summer Vacation	1 st to 4 th Year MBBS	June 07 to July 06, 2025
Classes Resumes	All Batches of MBBS	July 07, 2025
Classes Ends	First Year MBBS	November 14, 2025
Exam Preparation	First Year MBBS	November 15 to December 07, 2026
Annual Examination	First Year MBBS	December 08 to January 04, 2026

PREFACE

The MBBS program is intended to prepare medical students to take on the primary responsibility of caring for patients. The majority of education in the basic and clinical science fields is aimed at achieving this goal. The student shall acquire a significant amount of knowledge and specificity in order to complete the entire MBBS curriculum. Subject-based training allows students to build a thorough and profound understanding of each individual subject. However, this educational paradigm may lead to students failing to comprehend the interconnection of knowledge across disciplines (interdisciplinary), their interrelation, and, most importantly, their importance in the context of patient care and safety.

Several innovative ways have been developed throughout the years to address these challenges. One such technique is to integrate training at various levels, which eliminates and minimizes vertical and horizontal borders between subjects and phases. Indus Medical College, while appreciating the virtues of these techniques, has attempted to grab the chance to understand the interdependencies and eliminate duplication in the disciplines being taught through the use of an integrated modular approach.

The cardiovascular system, musculoskeletal system, and respiratory system are only a few examples of system-based modules in an integrated modular curriculum that applies basic scientific knowledge to clinical issues. Integrated education presents subjects as a coherent whole. Students can improve their understanding of basic scientific principles by consistently and simultaneously using clinical cases in their studies. An integrated teaching method includes Case-Based Discussions (CBL), Self-Directed Learning (SDL), and a Skills Lab (SL) for early exposure to skill acquisition.

MISSION

The prime objective of Indus Medical College is to provide Quality Medical Education and care for ailing humanity through the Quality Health Delivery System. To prepare the Medical Graduates in the field of Medicine as the most competent learned doctors, able to serve the population in general, poor and downtrodden in particular. Be also compatible at national & international levels to take up the challenges of community and accept the sole responsibility with strong desire and remain focused to achieve academic excellence, strongly believe in themselves and in the very basic principle of Medicine as the "Most Noble Profession" and maintain the professional honor and dignity throughout their life and uphold the principles of medical ethics.

VISION

The pursuits of excellence and advancement in all the disciplines of Medical / Surgical Practices through Leadership, Innovation and Standard setting in Education, Training and Collaborative Research for Benefit of Community and Country.

Goals

The MBBS Program is geared to provide you with quality medical education in an environment designed to:

- Provide a thorough grounding in the fundamental theoretical ideas supporting medical practice.
- Develop and meticulously polish the skills required for providing medical services at all levels of the Health care delivery system.
- Help you attain and maintain the highest possible levels of ethical and professional conduct in your future life.
- Kindle a spirit of inquiry and acquisition of knowledge to help you attain personal and professional growth & excellence.

PROGRAM LEARNING OUTCOMES

	Program Learning outcomes (PLO)	Educational Domain
	At the end of the MBBS Program the graduates shall be able to:	
1	Correctly recognize the basic scientific principles that are needed for provision of high standard health care in patients.	Cognitive (Knowledge)
2	Correctly identify rights of patients.	Cognitive (Knowledge)
3	Diagnose, discuss and treat common diseases in our community	Cognitive (Knowledge)
4	Interpret medical reports of patients efficiently and make proper referrals	Cognitive (Knowledge)
5	Demonstrate lifelong learning abilities, critical thinking, creativity and keeping informed about latest developments in Medical care	Psychomotor (Skill)
6	Demonstrate evidence based Medicine in clinics for high standard of health care in patients	Psychomotor (Skill)
7	Display interest in medical research activities	Affective (Attitude)
8	Demonstrate practice of ethical principles in medical profession	Affective (Attitude)
9	Perform basic medical/surgical procedures efficiently with appropriate professional attitude and communication skills	Affective (Attitude)

LEARNING STRATEGIES

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

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

INTERACTIVE LECTURES

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

SMALL GROUP TEACHING (SGT):

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

CASE- BASED LEARNING:

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

PRACTICAL:

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

SKILLS LAB SESSION:

Skills relevant to respective module are observed and practiced where applicable in skills laboratory.

SELF DIRECTED LEARNING:

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

DEMONSTRATIONS:

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

FIELD VISITS:

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

STUDY GUIDE

A study guide is a strategic and effective approach to

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

ABBREVIATIONS

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

FACULTY

DEPARTMENT OF ANATOMY	
HEAD OF DEPARTMENT	
01	Prof. Dr. Zaheer Ahmed Memon
PROFESSOR	
02	Prof: Dr. Hina Mawani
ASSISTANT PROFESSOR	
03	Dr. Nayab Qazi
04	Dr. Sehar Khowaja
05	Dr. Javed Ahmed
06	Dr. Rida Qureshi
LECTURER	
07	Dr. Joti Rajnesh
08	Dr. Ishrat Rajper
09	Dr. Aaisha Khan
10	Dr. Samina Sarwar
11	Dr. Ayesha
12	Dr. Umar Farooq
13	Dr. Sanam Habib
14	Dr. Hunaina Yousfani
15	Dr. Sania Ali

DEPARTMENT OF BIOCHEMISTRY	
HEAD OF DEPARTMENT	
01	Prof. Dr. Syed Ali Akbar Shah
ASSISTANT PROFESSOR	
02	Dr. Muhammad Ishaque Bhatti
LECTURER	
03	Dr. Sana Mahesar
04	Dr. Fariha Naz
05	Dr. Arti Lohana
06	Dr. Shazina Shah
07	Dr. Hina Kumari
08	Dr. Janeeta Tehreem

DEPARTMENT OF PHYSIOLOGY	
HEAD OF DEPARTMENT	
01	Prof. Dr. Azhar Iqbal
ASSOCIATE PROFESSOR	
02	Dr. Ghulam Mujadid Qureshi
ASSISTANT PROFESSOR	
03	Dr. Ghulam Nabi Pathan
04	Dr. Sidra Binte Saleem
LECTURER	
05	Dr. Muhammad Ismail Soomro
06	Dr. Sajjad Ahmed
07	Dr. Sidra Ghor
08	Dr. Aneeta Siddiqui
09	Dr. Anesh Gordhan
10	Dr. Kanwal Raja
11	Dr. Aqsa
12	Dr. Sidra Yousaf

DEPARTMENT OF PATHALOGY	
HEAD OF DEPARTMENT	
01	Prof. Dr. Naseer Ahmed Shaikh
PROFESSOR	
02	Prof: Dr. Inayatullah Memon
03	Prof: Dr. Muhammad Saeed Talpur
04	Prof: Dr. Umair Ali Soomro
05	Prof: Dr. Shomail Saeed
06	Prof: Dr. Ashok Kumar
ASSISTANT PROFESSOR	
07	Dr. Qandeel Abbas Soomro
08	Dr. Kiran Memon
09	Dr. Huma Abbasi
LECTURER	
10	Dr. Maleeha Sikandar (Senior Lecturer)
11	Dr. Yalpa Kumari (Senior Lecturer)
12	Dr. Urmela Kumari Sharda
13	Dr. Naseema Khoso
14	Dr. Misri Khan
15	Dr. Dasrath Kumar
16	Dr. Sandhiya Kumari
17	Dr. Shereen
18	Dr. Kiran Devi

DEPARTMENT OF PHARMACOLOGY	
HEAD OF DEPARTMENT	
01	Prof. Dr. Ghulam Rasool Bhurgri
PROFESSOR	
02	Prof: Dr. Gulshan Ara Jalbani
SENIOR LECTURER	
03	Dr. Ahsan Aslam
04	Dr. Madiha Naimat
LECTURER	
05	Dr. Durdana Asif
06	Dr. Muhammad Saeed
07	Dr. Noreen Shaikh
08	Dr. Sheeba
09	Dr. Sadia Begum Rashid
10	Dr. Tahrim Shah

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

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

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

Theme 1: Cell Structure, Chemistry & Functions

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

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

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

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

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

Theme 3: Body Fluids: Composition, Function & Homeostasis

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

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

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

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

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

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

Theme 5: Fundamental Tissues/Systems of the Human Body

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

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

Theme 6: Development, Differentiation and Growth

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

Theme 7: Genetics and Developmental Anomalies

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

HAEMATOLOGY MODULE-1

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

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

DURATION: 8 weeks

Learning outcomes

- Knowledgeable
- Skillful
- Community 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
Anatomy				
1	<ul style="list-style-type: none">Illustrate the organization of hematopoietic tissueEnlist the sites and source of hematopoiesis before and after the birth.	Hem-S1-E1-Ana- Development of blood	Interactive Lecture	SBQs & OSVE
2	<ul style="list-style-type: none">Examine structure of RBC, WBC & platelets.Illustrate methods use to study blood and bone marrow cells.	Hem-S1-H1-Ana- Morphology of blood cells	Interactive Lecture/ Practical	SBQs & OSPE & OSVE
Physiology				
3	<ul style="list-style-type: none">Discuss the cellular components of bloodDefine hematocrit, normal values & factors affecting hematocrit	Hem-S1-Phy-1 Composition of blood & its cellular components	Interactive Lecture	SBQs & OSVE
4	<ul style="list-style-type: none">Discuss the various stages of RBC'S formation.Discuss various sites of erythropoiesisEnlist the factors necessary for erythropoiesis.Discuss the significance of Reticulocyte count	Hem-S1-Phy-2 Development of RBCs (Erythropoiesis)		
5	<ul style="list-style-type: none">Examine hemoglobin concentration by Sahli's method	Hem-S1-Phy-3 hemoglobin concentration (Sahli's method)	Practical	OSPE & OSVE
6	<ul style="list-style-type: none">Estimate erythrocyte sedimentation rate (ESR by wester green method)	Hem-S1-Phy-4 Estimation of erythrocyte sedimentation rate (ESR by wester green method)		
Biochemistry				
7	<ul style="list-style-type: none">Explain Biochemical basis for the difference in plasma & serum.Describe composition of blood & plasma protein.	Hem-S1-Bio-1 Composition of blood & plasma proteins (Specialized body fluid)	Interactive Lecture	SBQs & OSVE
8	<ul style="list-style-type: none">Describe Chemistry& synthesis of HemeExplain structure, types & forms of Hb.	Hem-S1-Bio-2 Normal Hemoglobin		
9	<ul style="list-style-type: none">Identify abnormalities of Heme synthesis (PorPhyrias & its	Hem-S1-Bio-3 Abnormal Heme		

	types).			
10	<ul style="list-style-type: none"> Explain the Biochemical aspects of Hemoglobinopathies. (Thalassemia, sickle cell anemia) 	Hem-S1-Bio-4 Abnormal Hemoglobin (Hemoglobinopathies)		
11	<ul style="list-style-type: none"> Describe degradation of heme. Explain bile pigments, formation, types, transport & Excretion of bile. 	Hem-S1-Bio-5 Degradation of Heme		
12	<ul style="list-style-type: none"> Discuss Iron Metabolism & identify its abnormalities. 	HemM-S1-Bio-6 Iron Metabolism		
13	<ul style="list-style-type: none"> Explain the Biochemical importance of Vitamin B12 & Folic acid & their associated diseases. 	Hem-S1-Bio-7 Vitamin B12 & Folic acid		
14	<ul style="list-style-type: none"> Describe importance of Vitamin K & E & their associated diseases. 	Hem-S1-Bio-8 Vitamin K & E		

Pathology

15	<ul style="list-style-type: none"> Describe classification of Anemia Differentiate the different types of anemias on the basis of Morphology & Patho-Physiology. 	Hem-S1-Path-1 Introduction of Anaemia		
16	<ul style="list-style-type: none"> Identify the types of nutritional Anemias Enlist causes of iron deficiency, Anemia & clinical features and Laboratory diagnosis 	Hem-S1-Path-2 Iron deficiency Anemia	Interactive Lecture	SBQs & OSVE
17	<ul style="list-style-type: none"> Enlist causes of vitamin D-12 and folate deficiency Explain the Patho-Physiology, clinical features and laboratory diagnosis. 	Hem-S1-Path-3 Megaloblastic Anemia		

Pharmacology

18	Describe role of oral & injectable iron in iron deficiency anemia	Hem1-S1-Pharm-1 Drugs for iron deficiency anemia	Interactive Lecture	SBQs & OSVE
19	Describe role of Vit. B12 & Folic acid in Macrocytic anemia	Hem1-S1-Pharm-2 Drugs for Megaloblastic anemia		

Theme 2: Infections & Inflammation

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
21	<ul style="list-style-type: none"> Discuss the embryological source of lymphoid organs 	Hem-S1-E2-Ana- Development of lymphoid organs	Interactive Lecture	SBQs & OSVE
22	<ul style="list-style-type: none"> Discuss the components, location & structure of 	Hem-S1-G1-Ana- Gross features of lymphoid	Demonstration	SBQs,

	lymphoid issue. <ul style="list-style-type: none">Describe parts, surfaces and relations of Lymphoid organs	organs		OSPE & OSVE
23	<ul style="list-style-type: none">Discuss the histological classification & microscopic features of lymphoid organs.	Hem-S1-H3-Ana Microscopic anatomy of lymphoid organs	Interactive Lecture	SBQs & OSVE
24	<ul style="list-style-type: none">Define histological features of spleen & lymph node.	Hem-S1-H4-Ana- Spleen & Lymph node	Practical	OSPE & OSVE
25	<ul style="list-style-type: none">Define histological features of Thymus gland & Tonsil.	Hem-S1-H5-Ana- Thymus & Tonsil		
Physiology				
26	<ul style="list-style-type: none">Describe the process of leukocyte genesis, enlist various types of granulocytes and agranulocytes, their functions & normal valuesExplain the significance of Reticuloendothelial systemDiscuss the functions of T and B lymphocytes.	Hem-S1-Phy-5 Genesis and general characteristics, and functions of white blood cells	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
Pathology				
27	<ul style="list-style-type: none">Define acute inflammation.Describe the changes systemic effects & occurring in acute inflammation.	Hem-S1-Path-4 Overview of acute and chronic inflammation	Interactive Lecture	SBQs & OSVE
28	<ul style="list-style-type: none">Describe causes of Neutrophilia and Neutropenia, Eosinophilia, Lymphocytosis, Monocytosis	Hem-S1-Path-5 Non Neoplastic WBC Disorders		

Theme 3: Bleeding & thromboembolic disorders

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Physiology				
42	<ul style="list-style-type: none">Describe the four-basic mechanism of Hemostasis,Explain the mechanism of formation of platelet plug.	Hem-S1-Phy-6 Hemostasis & role of Thrombocytes	Interactive Lectures/Sm all Group Discussion	SBQs, OSPE & OSVE
43	<ul style="list-style-type: none">Explain steps involved in intrinsic and extrinsic pathway for coagulation,Enlist the clotting factors, to describe the role of clotting factors in coagulation.	Hem-S1-Phy-7 Clotting cascade & bleeding disorders		
Biochemistry				
44	<ul style="list-style-type: none">Describe importance of Vitamin K & E & their associated diseases.	Hem-S1-Bio-9 Vitamin K & E	Interactive Lecture	SBQs & OSVE
Pathology				
45	<ul style="list-style-type: none">Discuss the different types of bleeding disorders.	Hem-S1-Path-6 Platelet and Bleeding	Interactive Lecture	SBQs & OSVE

	<ul style="list-style-type: none"> Discuss Quantitative & Qualitative platelets disorders Describe classification& Lab. diagnosis of haemophilia and Von Willebrand disease. 	disorder		
46	<ul style="list-style-type: none"> Discuss thrombosis, pathogenesis, types and fate of thrombosis. 	Hem-S1-Path-7 Thrombosis		
47	<ul style="list-style-type: none"> Define embolism, its types and morphological features of embolism. 	Hem-S1-Path-8 Embolism		

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

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Physiology				
49	<ul style="list-style-type: none"> Describe the antigens & antibodies for A,B,AB & O blood groups Define Agglutinin, agglutinin, and agglutination & what takes place when incompatible blood types are mixed. Identify universal donor & recipient & explain why? Enlist various Rh antigens & Rh immune response. What is erythroblastosis fetalis & how it can be prevented 	Hem-S1-Phy-8 Blood groups ABO/RH system	Interactive Lectures/S small Group Discussion/ Practical	SBQs, OSPE & OSVE
Pathology				
50	Recognize different types of blood transfusion reaction.	Hem-S1-Path-9 Blood Transfusion	Interactive Lecture	SBQs & OSVE

Theme 5: **Immunological Disorders**

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Physiology				
51	<ul style="list-style-type: none"> Discuss overall organization of immune system Differentiate between innate & acquired immunity, Discuss cell mediated immunity and humoral immunity, active and passive immunity. 	Hem-S1-Phy-9 Immunity.	Interactive Lectures/ Small Group Discussion	SBQs, OSPE & OSVE
Biochemistry				
52	<ul style="list-style-type: none"> Define Immunoglobins. Describe chemistry, structure & their classification. 	Hem-S1-Bio-10 Immunoglobins	Interactive Lecture	SBQs & OSVE
Pathology				
55	<ul style="list-style-type: none"> Define hypersensitivity Describe Pathogenesis of Type-I 	Hem-S1-Path-10 Hypersensitivity reaction	Interactive Lecture	SBQs & OSVE

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

MUSCULOSKELETAL MODULE - 1

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

Motility is the most important feature of life. Every living being shows locomotion in one or other form. Human locomotor system is very beautiful and well organized. Man is the only mammal that walks on two feet. So, our musculoskeletal system is well oriented to counter the effect of gravity. God Himself has said in 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: 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
Anatomy				
1	<ul style="list-style-type: none">• Define different regions of the upper limb• Identify various compartments of arm, forearm & hand.• Define the axial and appendicular skeleton and define the girdle bones.• Identify joints of the upper limb.	MSK-S1-Ana-G-1 Introduction to locomotor system & Organization of upper limb	Demonstration	SBQs, OSPE & OSVE
2	<ul style="list-style-type: none">• Define the pectoral region.• Describe its muscles.• Identify the general features and different land marks for side determination and the attachments of various muscles on clavicle.	MSK-S1-Ana-G-2 Pectoral region & the clavicle		
3	<ul style="list-style-type: none">• Discuss development of Bone	MSK-S1-Ana-E-1	Interactive	SBQs & OSVE

	<ul style="list-style-type: none"> Describe Intramembranous ossification Describe endochondral ossification Describe ossification of the limb bones Describe development of the joints Describe development of the cartilage 	Development of skeletal system	Lecture	
4	<ul style="list-style-type: none"> Identify general features and different land marks for side determination and the attachments of various muscles on the Scapula. Define arrangement, attachments, neurovascular bundle and actions of muscles of back 	MSK-S1-Ana-G-3 Scapular region (scapula bone, muscles & neurovascular Bundle of back)	Demonstration	SBQs, OSPE & OSVE
5	<ul style="list-style-type: none"> Identify the bony components, type & variety & movements of sternoclavicular, acromioclavicular joints 	MSK-S1-Ana-G-4 Sternoclavicular acromioclavicular Joints		
6	<ul style="list-style-type: none"> Define the extent and quadrants of the breast Describe the blood supply and lymphatic drainage of breast in the female with its clinical significance. 	MSK-Ana-G-5 Anatomy of the breast	Interactive Lecture	SBQs & OSVE
7	<ul style="list-style-type: none"> Identify histology of mammary gland in non-lactating, lactating & during pregnancy under microscope. Identify and describe histological features of nipple and areola. 	MSK-S1-Ana-H-1 Histology of breast	Practical	OSPE & OSVE
Physiology				
8	<ul style="list-style-type: none"> Describe the Physiology of Mammary gland. Describe the Hormone responsible for milk production & ejection. Describe the let-down reflex (milk ejection reflex) 	MSK-S1-Phy-1 Physiology of breast and lactation	Interactive Lecture	SBQs & OSVE
9	<ul style="list-style-type: none"> Discuss the basic relationship between vitamin D, PTH, calcium and Phosphate in relation to bone formation Describe the various cells of the bones and their function in Homeostasis 	MSK-S1-Phy-2 Hormones regulating calcium homeostasis		

10	<ul style="list-style-type: none">Identify and name various parts of power labIllustrate functions of various parts of the power lab	MSK-S1-Phy-P1 Introduction to Power Lab	Practical	OSPE & OSVE
Biochemistry				
11	<ul style="list-style-type: none">Enlist classification, functions and Biochemical significance of Hetero polysaccharides in formation of Extracellular Matrix.	MSK-S1-Bio-01 Role of Hetero polysaccharides (Glycosaminoglycans)	Interactive Lecture	SBQs & OSVE
12	<ul style="list-style-type: none">Explain Muco-polysacharridoses:Classification, Deficient Enzymes Clinical Manifestation	MSK-S1-Bio-02 Muco-polysaccharidoses		
13	<ul style="list-style-type: none">Discuss general introduction and classification of Minerals.	MSK-S1-Bio-03 Classification of Minerals		
Clinical Lecture				
14	<ul style="list-style-type: none">Define bone density and factors which are responsible to maintain bone densityDefine Pathogenesis and clinical course of change in bone density and conditions associated with lactation.Discuss its complications and management.	MSK-S1-Gyn & Obs-1 Changes in bone density with lactation	Interactive Lecture	SBQs & OSVE
15	<ul style="list-style-type: none">Describe the Patho-Physiology of mammary gland disordersDescribe the lactation reflexDescribe weaningDescribe the hormonal effectStudent guide for complete protocol of lactation and weaning	MSK-S1-Paeds-1 Breast feeding guide for medical profession		

Theme 2: Back, Axilla and Shoulder joint

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
16	<ul style="list-style-type: none"> Describe the attachments, nerve supply and the actions of the muscles of the back. Define the effects of paralysis of these muscles 	MSK-S1-Ana-G-6 Muscles of back	Demonstration	SBQs, OSPE & OSVE
17	<ul style="list-style-type: none"> Discuss the arterial anastomosis around the scapula. Explain the neurovascular bundle of scapula. 	MSK-S1-Ana-G-7 Anastomosis around scapula & Neurovascular bundle of scapula		
18	<ul style="list-style-type: none"> Enumerate bony components, type & variety, attachment of 	MSK-S1-Ana-G-8 The Shoulder Joint	Interactive Lecture	SBQs & OSVE

	capsule and ligaments of this joint. <ul style="list-style-type: none"> • Demonstrate various muscles & movements at the joint. • Identify the factors stabilizing or weakening the shoulder joint. 			
19	<ul style="list-style-type: none"> • Discuss the developmental stages of skull and its clinicals 	MSK-S1-Ana-E-2 Development of skull		
20	<ul style="list-style-type: none"> • Define the shape, location, boundaries and contents of Axilla. • Discuss the formation, course and relations of axillary vessels • Describe arrangement of axillary lymph nodes and their area of drainage. 	MSK-S1-Ana-G-9 Axilla: Boundaries & Contents	Demonstration	SBQs, OSPE & OSVE
21	<ul style="list-style-type: none"> • Describe and draw formation of the brachial plexus. • Mention different parts of brachial plexus and their location. • Identify different nerves with their root values. • Discuss the effects of injury to different sites of brachial plexus. 	MSK-S1-Ana-G-10 Brachial Plexus	Interactive Lecture	SBQs & OSVE
22	<ul style="list-style-type: none"> • Identify the skeletal muscle under light microscope • Describe the structural basis of muscle striations. • Recognize the structural elements that produces muscle contraction and brings the movement of a body part. 	MSK-S1-Ana-H-2 Histology of skeletal muscle	Practical	OSPE & OSVE
Physiology				
23	<ul style="list-style-type: none"> • Describe the distribution of calcium in the bones. • Describe the mechanism by which Ca is released in blood from Bone 	MSK-S1-Phy-3 Role of Calcium in bones	Interactive Lecture	SBQs & OSVE
24	<ul style="list-style-type: none"> • Describe and classify properties of various types of muscle. • Describe the structure, functions and arrangements of Myosin, Actin, Troponin & Tropomyosin filaments 	MSK-S1-PHY-4 Properties of muscles & structure of skeletal muscles.		
Biochemistry				

25	<ul style="list-style-type: none">Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	MSK-S1-Bio-4 Calcium metabolism.	Interactive Lecture	SBQs & OSVE
26	<ul style="list-style-type: none">Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	MSK-S1-Bio-5 Magnesium & Phosphorus Metabolism		
27	<ul style="list-style-type: none">Describe sources, RDA, Absorption, transport, Functions, Clinical Aspects	MSK-S1-Bio-6 Vitamin D metabolism.		
28	<ul style="list-style-type: none">Describe miscellaneous minerals: Iodine, Fluoride , Selenium, Cobalt, Zinc, Copper	MSK-S1-Bio-7 Miscellaneous Minerals		
29	<ul style="list-style-type: none">Discuss role of Parathyroid, Calcitonin & Vitamin D	MSK-S1-Bio-8 Regulation of Calcium & PO ₄ Metabolism		
30	<ul style="list-style-type: none">Discuss chemical composition of bone, remodeling and normal composition of synovial fluid.	MSK-S1-Bio-9 Chemical composition of bone		
31	<ul style="list-style-type: none">Demonstrate importance of calcium as macro-mineral. RDA, Absorption, factors influencing absorption.clinical manifestation of excess and deficiency states.	MSK-S1-Bio-10 Estimation of serum calcium	Practical	OSPE & OSVE
Pathology				
32	<ul style="list-style-type: none">Define Vitamin DExplain significance of vitamin D in the bodyDescribe the different deficiency states related with vitamin DDiscuss the prevention of Vitamin D Deficiency	MSK-S1-Path-1 Vitamin D deficiency	Interactive Lecture	SBQs & OSVE
Pharmacology				
33	<ul style="list-style-type: none">	MSK-S1-Pharm-1 Introduction to Cholinergics	Interactive Lecture	SBQs & OSVE

Theme 3: Brachial Plexus and Arm

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
34	<ul style="list-style-type: none"> Explain the arrangement of different functional groups of muscles in the ant compartment of arm & their attachment Demonstrate the actions of above muscles Describe the neurovascular structures and their important relations 	MSK-S1-Ana-G-11 Humerus bone Anterior compartment of arm	Demonstration	SBQs, OSPE & OSVE
35	<ul style="list-style-type: none"> Define cubital fossa. Discuss its boundaries Clinical correlates 	MSK-S1-Ana-G-12 Cubital fossa	Interactive Lecture	SBQs & OSVE
36	<ul style="list-style-type: none"> Explain arrangement of different functional groups of muscles in the post compartment arm & their attachment Demonstrate actions of muscles Describe neurovascular structures and their important relations 	MSK-S1-Ana-G-13 Posterior compartment of arm & Elbow joint	Demonstration	SBQs, OSPE & OSVE
37	<ul style="list-style-type: none"> Identify general features of the radius & ulna. Discuss attachments of various muscles on the radius & ulna. Discuss the radioulnar joints. 	MSK-S1-Ana-G-14 Radius & Ulna (radioulnar joints)	Demonstration	SBQs, OSPE & OSVE
38	<ul style="list-style-type: none"> Explain arrangement of different functional groups of muscles in anterior compartment of fore-arm & their attachment. Describe neurovascular structures and their important relations 	MSK-S1-Ana-G-15 Anterior compartment of forearm		
39	<ul style="list-style-type: none"> Explain arrangement of different functional groups of muscles in the posterior compartment of forearm & their attachment. Describe neurovascular structures and their important relations 	MSK-S1-ANA-G-16 Posterior compartment of forearm		
40	<ul style="list-style-type: none"> Describe ossification of vertebra ribs & sternum and its 	MSK-S1-Ana-E-3 Development of	Interactive Lecture	SBQs & OSVE

	clinicals	vertebra, ribs, & sternum .		
41	<ul style="list-style-type: none"> Identify smooth and cardiac muscles under light microscope Describe structural basis of muscle striations & differentiate the two muscles. Recognize function and organization of the connective tissue in muscle. 	MSK-S1-Ana-H-3 Histology of smooth and cardiac muscles	Practical	OSPE & OSVE
Physiology				
42	<ul style="list-style-type: none"> Describe general mechanism of skeletal muscle contraction. Describe molecular mechanism (sliding filament theory) of skeletal muscle contraction. Describe walk along theory-power stroke. Define motor unit, isotonic & isometric contraction 	MSK-S1-Phy-5 Mechanism & different theories of muscle contraction Types of muscle contraction	Interactive Lecture	SBQs & OSVE
43	<ul style="list-style-type: none"> Define neuromuscular junction (NMJ) & list the components of NMJ Explain sequence of events of neuromuscular transmission 	MSK-S1-Phy-6 Neuromuscular Junction & transmission		
44	<ul style="list-style-type: none"> Define end plate potential Describe excitation contraction coupling Explain myasthenia gravis 	MSK-S1-Phy-7 Excitation contraction coupling		
45	<ul style="list-style-type: none"> Demonstrate Nerve conduction velocity Explain how electrical events are converted to mechanical events 	MSK-S1-Phy-P2 Action potential	Practical	OSPE & OSVE
Biochemistry				
46	<ul style="list-style-type: none"> Demonstrate sources, daily requirements, intestinal absorption, transport and Biochemical role and regulation of Vit-D3 	MSK-S1-Bio-11 Estimation of Serum Vit.D3	Practical	OSPE & OSVE
Clinical Lecture				
48	<ul style="list-style-type: none"> Enlist disorders of skeletal muscle disorders and factors which are responsible to it Define Pathogenesis and clinical course of conditions associated with skeletal muscle disorders Discuss it's complications and management 	MSK-S1-Ortho-1 Disorders of voluntary muscles	Interactive Lecture	SBQs & OSVE

Theme 4: Forearm, Hand and Carpal Tunnel Syndrome

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
53	<ul style="list-style-type: none"> Describe the location, destination, course & relations of arteries & their branches in upper limb. Identify and discuss the deep veins of upper limb. Describe the location, destination, course & relations of nerves & their branches in upper limb. 	MSK-S1-Ana-G-17 Neuromuscular bundle of the upper limb	Demonstration	SBQs, OSPE & OSVE
54	<ul style="list-style-type: none"> Describe the type, variety, attachment of capsule and ligaments of this joint. demonstrate various movements at this joint. Describe the structural organization of the Flexor & Extensor Retinaculum. Discuss carpal tunnel syndrome. 	MSK-S1-Ana-G-18 Wrist joint	Interactive Lecture	SBQs & OSVE
55	<ul style="list-style-type: none"> Describe the bony arrangement of the hand. Describe the joints of the hand. 	MSK-S1-Ana-G-19 Osteology of the hand and the joints of the hand.	Demonstration	SBQs, OSPE & OSVE
56	<ul style="list-style-type: none"> Discuss the cutaneous supply, arteries & veins of palm of hand. define fibrous flexor sheath. Define the palmer aponeurosis, facial spaces. Describe small muscles of hand. 	MSK-S1-Ana-G-20 Palm of the hand		
57	<ul style="list-style-type: none"> Discuss the dorsal venous arch. Describe insertion of the long extensors tendons. 	MSK-S1-Ana-G-21 Dorsum of the hand		
58	<ul style="list-style-type: none"> Describe different regions of lower limb. Identify the various bones forming skeleton of lower limb. Describe general arrangement of superficial & deep fasciae of lower limb Demonstrate the bones of pelvic girdle. Identify different landmarks in different regions of lower limb 	MSK-S1-Ana-G-22 Introduction to lower limb / Organization of skeleton of lower limb	Interactive Lecture	SBQs & OSVE
59	<ul style="list-style-type: none"> Identify the superficial arteries of 	MSK-S1-Ana-G-23	Demonstration	SBQs, OSPE &

	lower limb <ul style="list-style-type: none">Name and discuss superficial veins of lower limbHighlight the course of great and small saphenous veinDescribe the superficial lymphatic vessels & lymph nodes of lower limbDiscuss clinical correlates.	Superficial veins, arteries , lymph nodes & cutaneous supply of the lower limbs		OSVE
60	<ul style="list-style-type: none">Describe the development of skeletal muscle.Discuss the development of MyotomesList derivatives of Ebaxial and Primaxial divisions of myotomes	MSK-S1-ANA-E-4 Development of skeletal muscles	Interactive Lecture	SBQs & OSVE
61	<ul style="list-style-type: none">Classify bone on developmental and structural basis.Differentiate between woven bone and lamellar bone under microscope.Differentiate between compact bone and spongy bone under microscope.	MSK-S1-Ana-H-4 Histology of bones	Practical	OSPE & OSVE
Physiology				
62	<ul style="list-style-type: none">Demonstrate SMT on power labWhat are the different periods of SMT & their duration?Demonstrate the phenomenon of fatigue & Tetanus	MSK-S1-Phy-P3 Muscular twitch response	Practical	OSPE & OSVE
63	<ul style="list-style-type: none">Describe types of muscle fibers (type I and II)Determine effect of exercise on muscle blood flowState effect of training, stamina and resistance on muscle fibersState Hypoxia, muscle Fatigue during exercise and, its Biochemical reasons.	MSK-S1-Phy-8 Muscle adaptation to exercise	Interactive Lecture	SBQs & OSVE
64	<ul style="list-style-type: none">Explain aerobic and anaerobic exercise and effect of exercise on muscles.	MSK-S1-Phy-9 Role of muscle in exercise		
Biochemistry				
65	<ul style="list-style-type: none">Describe the Collagen Structure and synthesis, Types, Role of vitamin C in synthesis of Collagen	MSK-S1-Bio-12 Collagen Structure and synthesis	Interactive Lecture	SBQs & OSVE
66	<ul style="list-style-type: none">Brief overview of inherited Collagen Disorders and their clinical manifestation	MSK-S1-Bio-13 Overview of inherited Collagen		

		disorders		
67	<ul style="list-style-type: none"> Estimation, RDA, Effects, regulation and clinical manifestation of excess and deficiencies. 	MSK-S1-Bio-14 Estimation of serum phosphorus	Practical	OSPE & OSVE
69	<ul style="list-style-type: none"> Classify different muscle relaxants. Discuss mechanism of their action Explain clinical uses and their adverse effects 	MSK-S1-Pharm-2 Drugs used as Skeletal muscle relaxant		
Clinical Lecture				
70	<ul style="list-style-type: none"> Define of osteoporosis Describe generalized and localized osteoporosis Enlist primary & secondary causes of generalized osteoporosis Define Pathogenesis and clinical course Discuss it's complications and management 	MSK-S1-Ortho-2 Clinical manifestation of Osteoporosis	Interactive Lecture	SBQs & OSVE

Theme 5: Anterior thigh and femoral hernia

Theme 6: Gluteal region, hip joint and Sciatic nerve

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
71	<ul style="list-style-type: none"> Identify parts of the hip bone. Determine side of the bone. Describe general features of each part of hip bone. Identify the bone. Determine the side of the bone. Describe the anatomical position of the bone. 	MSK-S1-Ana-G-24 Hip bone + Femur	Demonstration	SBQs, OSPE & OSVE
72	<ul style="list-style-type: none"> Discuss division of the thigh into compartments Enumerate muscles of the anterior compartment of thigh and their respective actions. Describe the innervation and blood supply of muscles of anterior compartment. 	MSK-S1-Ana-G-25 Anterior compartment of thigh		
73	<ul style="list-style-type: none"> Describe the Femoral triangle, its boundaries and contents. Discuss femoral sheath and its contents and the clinical conditions associated. 	MSK-S1-Ana-G-26 Femoral triangle	Interactive Lecture	SBQs & OSVE

74	<ul style="list-style-type: none"> Describe development of smooth and cardiac muscle. Discuss development of Myotomes Enlist derivatives of epaxial and hypaxial divisions of myotomes 	MSK-S1-Ana-E-5 Development of smooth & cardiac muscles		
75	<ul style="list-style-type: none"> Discuss muscles of medial compartment of the thigh. Discuss blood & nerve supply of these muscles. Describe actions of the muscles of medial compartment of thigh. 	MSK-S1-Ana-G-27 Medial compartment of thigh	Demonstration	SBQs, OSPE & OSVE
76	<ul style="list-style-type: none"> Describe location of gluteal region. Discuss about bones and ligaments of gluteal region. Discuss muscles of the gluteal region & their respective actions. Discuss nerves and blood vessels of the gluteal region. 	MSK-S1-Ana-G-28 The Gluteal region	Demonstration	SBQs, OSPE & OSVE
77	<ul style="list-style-type: none"> Describe articular surfaces of the hip joint along with capsular attachment Enumerate ligaments of the hip joint & describe their attachments. Discuss clinical correlates 	MSK-S1-Ana-G-29 Hip joint	Interactive Lecture	SBQs & OSVE
78	<ul style="list-style-type: none"> Identify different types of cartilage under light Microscope. Define distinctive microscopic features of each type. 	MSK-S1-Ana-H-5 Histology of Hyaline Cartilage	Practical	OSPE & OSVE
Physiology				
79	<ul style="list-style-type: none"> Describe role of skin in homeostasis Describe the function of skin Describe medico-legal importance of the skin 	MSK-S1-Phy-12 Physiology of Skin	Interactive Lecture	SBQs & OSVE
Biochemistry				
80	<ul style="list-style-type: none"> Describe metabolic pathway for synthesis of purines and pyrimidines 	MSK-S1-Bio-15 Metabolic pathway for synthesis of purines and pyrimidines	Interactive Lecture	SBQs & OSVE
81	<ul style="list-style-type: none"> Discuss in detail metabolic pathways for nucleic acids degradation. Inherited associated disorders. Uric acid metabolic disorders. 	MSK-S1-Bio-16 Metabolic pathways for nucleic acids degradation and related disorders.		
82	<ul style="list-style-type: none"> Demonstrate the methods to estimate the serum uric acid. 	MSK-S1-Bio-17 Estimation of serum uric acid	Practical	OSPE & OSVE
Pathology				

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

Theme 7: Anterior Compartment of Leg and Compartment Syndrome

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
86	<ul style="list-style-type: none"> Describe muscles of posterior compartment of thigh. Describe arterial supply of posterior compartment of thigh. Discuss trochanteric and cruciate anastomosis at back of thigh. Describe venous drainage of this region. 	MSK-S1-Ana-G-30 Post: compartment of thigh + popliteal fossa	Demonstration	SBQs, OSPE & OSVE
87	<ul style="list-style-type: none"> Describe anatomical position of the bone. Identify the bone and its side determination. Mark attachment of muscles and ligaments. Describe the nerve injuries related to it. 	MSK-S1-Ana-G-31 Tibia & fibula		
88	<ul style="list-style-type: none"> Discuss site and time of appearance of upper and lower limb buds. Define source of mesoderm forming the limb muscles 	MSK-S1-Ana-E-6 Development of Limbs & its clinical 1	Interactive Lecture	SBQs & OSVE
89	<ul style="list-style-type: none"> Discuss formation of different compartments of leg. Explain arrangement of the muscles in anterior compartments of leg and their actions. Describe neurovasculature of these compartments of leg. Identify bones forming the architecture of foot. Discuss joints formed by these bones. 	MSK-S1-Ana-G-32 Anterior compartment of leg & dorsum of foot	Demonstration	SBQs, OSPE & OSVE
90	<ul style="list-style-type: none"> Explain arrangement of the muscles in lateral compartments 	MSK-S1-Ana-G-33 Lateral		

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

Theme 8: Posterior compartment of leg and foot

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

	<ul style="list-style-type: none"> Describe the muscles involved in and process of rotation of limb Explain the congenital anomalies of the limbs 			
99	<ul style="list-style-type: none"> Describe the Ankle Joint. Describe Superior and Inferior Tibiofibular Joints. 	MSK-S1-Ana-G-37 Ankle ,subtalar & small joints of foot	Demonstration	SBQs, OSPE & OSVE
100	<ul style="list-style-type: none"> Identify the bones forming architecture of sole of foot. Discuss the joints formed by these bones. Describe clinical correlates like flat foot and club foot. 	MSK-S1-Ana-G-38 Sole of foot		
101	<ul style="list-style-type: none"> Explain different nerve of lower limb and their root value. Discuss causes of injuries. Enumerate common sites of these nerve injuries Discuss symptoms caused by these nerve injuries. 	MSK-S1-Ana-G-39 Neurovascular bundle of lower limb		
102	<ul style="list-style-type: none"> Discuss the blood supply and nerve supply of sole of foot. Describe vascular and nervous supply of dorsum of foot. 	MSK-S1-Ana-G-40 Neurovascular bundle of foot		
103	<ul style="list-style-type: none"> Describe development of musculoskeletal system. Discuss development of Myotomes List derivatives of epaxial and hypaxial divisions of myotomes Describe the development of bones, joints & cartilage 	MSK-S1-Ana-E-8 Overview of Embryological development of musculoskeletal system	Interactive Lecture	SBQs & OSVE
104	<ul style="list-style-type: none"> Describe layers of the skin. Discuss layers of the Epidermis. Describe appendages of skin. Discuss the functions of the skin. 	MSK-S1-Ana-H-7 Microscopic anatomy of the Skin		
105	<ul style="list-style-type: none"> Identify three layers of skin under light microscope Describe structural basis & elements of skin. Recognize function and organization of connective tissue in skin 	MSK-S1-Ana-H-8 Histology of skin	Practical	OSPE & OSVE

106	<ul style="list-style-type: none"> Identify three layers of skin under light microscope Describe structural basis & elements of skin. Recognize the function and organization of connective tissue in skin 	MSK-S1-Ana-H-9 Histology of skin appendages		
Clinical Interactive Lecture				
109	<ul style="list-style-type: none"> Define terms related to fracture: Stress Fracture, Incomplete fracture, Closed (simple fracture), Open (complicated) fracture, multi-fragmented fractures, complex fracture, Pathologic fractures Describe mechanism of bone healing Enlist complications of fracture Describe etiology & Pathogenesis of Pathologic fractures. 	MSK-S1-Ortho-4 Fractures/Dislocations	Interactive Lecture	SBQs & OSVE
Pathology				
110	<ul style="list-style-type: none"> Classify different types of osteomyelitis List factors leading to their etiology Explain its pathogenesis 	MSK-S1-Path-3 Osteomyelitis	Interactive Lecture	SBQs & OSVE

CARDIOVASCULAR MODULE-1

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

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

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

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

Duration 5 weeks

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

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

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

Clinical/ Practical skills

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

Placing electrodes and obtaining an electrocardiogram and interpretation of the basic ECG findings.

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

Attitude:

Follow the basic laboratory protocols.

Participate in class and practical work professionally.

Communicate effectively in a team with 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
Anatomy				
1	<ul style="list-style-type: none"> Define the middle mediastinum. Explain location and contents of the middle mediastinum. Discuss fibrous and serous parts of the pericardium. Define pericardial sinuses and nerve supply of the pericardium. Discuss related clinical conditions. 	CVS-S1-Ana-G-1 Middle Mediastinum and The Pericardium	Interactive Lecture	SBQs & OSVE
2	<ul style="list-style-type: none"> Define Anatomical position of the heart. Identify and name structures constituting the borders and surfaces of the heart. Define the external features of the Chambers of the heart. 	CVS-S1-Ana-G-2 Anatomy of the Heart-1	Demonstration	SBQs, OSPE & OSVE
3	<ul style="list-style-type: none"> Describe Internal features of each chamber of heart. Discuss the related clinical conditions. 	CVS-S1-Ana-G-3 Anatomy of the Heart-2		
4	<ul style="list-style-type: none"> Describe composition of the walls and the skeleton of the heart. Describe conducting system of the heart. Discuss related clinical conditions. 	CVS-S1-Ana-G-4 Structure of the heart and The Conducting system of the Heart		
5	Identify the histological features of heart; endocardium, myocardium, epicardium on light microscope.	CVS-S1-Ana-H-1 Histology of the Heart	Practical	OSPE & OSVE
Physiology				

6	<ul style="list-style-type: none">Describe components/parts of CVS and their functionsDefine systemic and pulmonary circulationMention distribution of blood (in percentage of total blood) in different parts of the circulatory systemMention pressures in various portions of the circulatory system	CVS-S1-Phy-1 Overview of CVS	Interactive Lecture	SBQs & OSVE
7	<ul style="list-style-type: none">Mention three major types of muscleDescribe properties of cardiac muscle (Functional syncytium, Automaticity, Rhythmicity, Conductivity, Long refractory period)Describe cardiac muscle action potentialDiscuss mechanism of excitation contraction coupling in cardiac muscle	CVS-S1-Phy-2 Properties of cardiac muscle	Interactive Lecture	SBQs & OSVE
08	<ul style="list-style-type: none">Describe various parts/components of conducting system of the heart and their functionsExplain action potential and rhythmicity of sinus nodal fibersDescribe origin and spread of cardiac impulseMention AV nodal delay and its significanceDescribe the effect of ANS on the functioning of conducting system of the heart	CVS-S1-Phy-3 Excitatory and Conducting system of the heart	Interactive Lecture	SBQs & OSVE
09	<ul style="list-style-type: none">Define electrocardiogram and electrocardiographyDescribe the waves, intervals and segments of a normal electrocardiogram (ECG)Mention the uses/indications of ECG	CVS-S1-Phy-4 Electrocardiogram (ECG)		
Biochemistry				
10	<ul style="list-style-type: none">Mention introduction of isoenzymesDiscuss diagnostic significance of isoenzymes	CVS-S1-Bio-1 Diagnostic significance of Isoenzymes in cardiovascular disorders	Interactive Lecture	SBQs & OSVE
Pathology				
11	<ul style="list-style-type: none">Define ischemic heart diseases?Classify different types of ischemic heart diseases.Discuss causes and clinical manifestation of ischemic heart diseases.	CVS-S1-Path-1 Ischemic heart disease	Interactive Lecture	SBQs & OSVE
Medicine (Cardiology)				
12	<ul style="list-style-type: none">Define ArrhythmiasRecognize the common abnormalities in rate and rhythm of the heart (tachycardia, bradycardia, flutter, fibrillations, heart blocks and extra systole) failure.	CVS-S1-Cardio-1 Arrhythmias	Interactive Lecture	SBQs & OSVE

	<ul style="list-style-type: none"> Describe the hemodynamic, neuroendocrine and cellular changes that occur in heart failure. Describe the Physiological basis of the treatment principles in heart failure. 			
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Theme 2: **Congenital Anomalies of Cardiovascular System**

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

	<ul style="list-style-type: none"> Define EDV, ESV and Stroke volume Define ejection fraction and mention its clinical importance Define preload and afterload 			
20	<ul style="list-style-type: none"> Describe functions of heart valves Mention normal heart sounds and explain their production Define heart murmur Mention the timing of the murmur produced by valvular defects and congenital heart diseases Explain the hemodynamic changes in various valvular heart diseases 	CVS-S1-Phy-7 Heart valves, heart sounds and murmurs		
21	<ul style="list-style-type: none"> Define Ohm's law of circulation Describe main factors that determine vascular resistance Define total peripheral vascular resistance and total pulmonary vascular resistance Mention Poiseuille's law 	CVS-S1-Phy-8 Interrelationship among blood flow, pressure and resistance		

Biochemistry

22	<ul style="list-style-type: none"> Describe different aspects related to fatty acids and their clinical significance in the CVS diseases.. 	CVS-S1-Bio-2 Fatty acids	Interactive Lecture	SBQs & OSVE
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Pathology

23	<ul style="list-style-type: none"> Define aneurysm Classification of aneurysm What are the true and false aneurysms with their examples Pathogenesis of aneurysm 	CVS-S1-Path-2 Congenital anomalies of blood vessels	Interactive Lecture	SBQs & OSVE
24	<ul style="list-style-type: none"> Define congenital heart disease. Describe etiopathogenesis. Discuss clinical features 	CVS-S1-Path-3 Congenital heart disease.		

Paediatrics

25	<ul style="list-style-type: none"> Describe the Hemodynamic changes in various congenital heart diseases including; Mitral Stenosis Mitral regurgitation Stenosis Aortic regurgitation 	CVS-S1-Paeds-I Congenital heart diseases	Interactive Lecture	SBQs & OSVE
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Theme 3: Hypertension

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
26	<ul style="list-style-type: none"> Describe the arterial supply and venous drainage of heart. Describe the branches of major arteries and their distribution. Define the nerve supply of the heart. Describe the cardiac plexus. 	CVS-S1-Ana-G-5 Blood and nerve supply of the Heart	Interactive Lecture	SBQs & OSVE
27	<ul style="list-style-type: none"> Discuss development of arterial system; aortic arches, umbilical, vitelline and coronary arteries Name the common congenital anomalies of arteries? 	CVS-S1-Ana-E-5 Development of arterial system of heart		

28	<ul style="list-style-type: none">Discuss development of venous system; cardinal veins, umbilical and vitelline.Name the common congenital anomalies of venous system?	CVS-S1-Ana-E-6 Development of venous system of heart		
29	Describe the microscopic structure of the veins	CVS-S1-Ana-H-3 Histology of veins	Practical	OSPE & OSVE
Physiology				
30	<ul style="list-style-type: none">Mention the specific needs of the tissues for blood flowDefine local blood flowDescribe acute/short-term control of local blood flowDescribe long-term control of local blood flowExplain the auto-regulation of blood flow	CVS-S1-Phy-9 Control of local blood flow	Practical	OSPE & OSVE
31	<ul style="list-style-type: none">Describe structure of microcirculation and capillary wallExplain flow of blood in capillariesDefine vasomotionDefine Starling forces and give their approximate valuesDescribe role of Starling forces in fluid exchange across the capillary wallList the functions of lymphaticsDefine edema and explain the patho Physiological basis for edema (i.e. increased capillary hydrostatic pressure, hypoalbuminemia, increased capillary permeability and lymphatic obstruction)	CVS-S1-Phy-10 Capillary fluid exchange		
32	<ul style="list-style-type: none">Describe vasomotor center, its important areas and functionsDefine vasomotor toneDescribe role of sympathetic nervous system in regulation of circulationDescribe role of parasympathetic nervous system in regulation of circulation	CVS-S1-Phy-11 Nervous regulation of circulation		
33	<ul style="list-style-type: none">Define systolic blood pressure, diastolic blood pressure, pulse pressure and mean arterial pressureMention important factors on which blood pressure dependsList various mechanisms that regulate/control blood pressureDescribe role of baroreceptor reflex in regulation of blood pressure	CVS-S1-Phy-12 Blood pressure and its Regulation-I (Baroreceptor reflex mechanism)		
Biochemistry				
34	Explain the metabolism and function of	CVS-S1-Bio-3 Cholesterol	Interactive Lecture	SBQs & OSVE

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

Theme 4: Heart Attack

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
39	Identify different chambers/structures of the heart.	CVS-S1-Ana-G-6 Model study of heart	Demonstration	SBQs & OSPE & OSVE
40	Identify different chambers/structures of the heart.	CVS-S1-Ana-G-7 Model study of heart		
41	<ul style="list-style-type: none"> Describe circulatory changes before and after birth. Name the adult derivatives of embryonic structures? 	CVS-S1-Ana-E-7 Circulation before and after birth	Interactive Lecture	SBQs & OSVE
42	Identify the capillaries with the help of light microscope.	CVS-S1-Ana-H-4 Histology of capillaries	Practical	OSPE & OSVE
Physiology				
43	<ul style="list-style-type: none"> Explain renal-body fluid system and its role in arterial pressure control Describe Renin-Angiotensin system and its role in arterial pressure control 	CVS-S1-Phy-13 Blood pressure and its regulation-II (Role of kidneys in long-term control of blood pressure)	Interactive Lecture	SBQs & OSVE
44	<ul style="list-style-type: none"> Define cardiac output and mention its relationship to stroke volume & heart rate Describe factors regulating cardiac output Describe Frank-Starling mechanism of heart 	CVS-S1-Phy-14 Cardiac output and venous return		
45	<ul style="list-style-type: none"> Mention some pathological conditions that cause high cardiac output Mention some pathological conditions that cause low cardiac output Mention methods of measurement of cardiac output 	CVS-S1-Phy-15 Cardiac output and venous return		

	<ul style="list-style-type: none"> Define venous return and mention factors that affect/regulate venous return Describe central venous pressure 			
46	<ul style="list-style-type: none"> Define circulatory shock Describe causes and major types of shock Mention stages of shock Describe Physiology of non-progressive and progressive hemorrhagic shock 	CVS-S1-Phy-16 Circulatory shock		
47	<ul style="list-style-type: none"> Mention compensatory mechanisms that attempt to return cardiac output and arterial pressure back to normal in a hemorrhagic shock (hypovolemic shock) Mention factors that lead to progression of shock (i.e. factors worsening the shock) Describe the Physiological basis of treatment of circulatory shock 	CVS-S1-Phy-17 Circulatory shock		
48	<ul style="list-style-type: none"> To record pulse rate manually & on power lab To record blood pressure manually & on power lab To record ECG on ECG machine & power lab To auscultate heart sounds 	CVS-S1-Phy-18 Pulse rate, blood pressure, ECG recording on power lab. and ECG machine	Practical	OSPE & OSVE
Biochemistry				
49	Discuss lipoproteins' metabolism and their clinical significance in CVS diseases	CVS-S1-Bio-5 Lipoproteins	Interactive Lecture	SBQs & OSVE
50	Interpret lipid profile and its significance	CVS-S1-Bio-P2 Lipid Profile	Practical	OSPE & OSVE
Pathology				
51	<ul style="list-style-type: none"> Define shock Enlist types of shock Describe causes, patho-physiology, signs and symptoms of shock 	CVS-S1-Path-4 Shock	Interactive Lecture	SBQs & OSVE
Medicine (Cardiology)				
52	<ul style="list-style-type: none"> Define heart failure. Explain the Physiological basis of common clinical manifestations of heart failure. Describe different types of the heart failure. Describe hemodynamic, neuroendocrine and cellular changes that occur in heart failure. Describe Physiological basis of treatment principles in heart failure. 	CVS-S1-Cardio-3 Heart failure	Interactive Lecture	SBQs & OSVE

5 RESPIRATORY MODULE 1

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

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

Duration 5 weeks

Learning Outcomes

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

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

Skills

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

Attitude

- Follow the basic laboratory protocols

- Participate in class and practical work professionally
- Communicate effectively in a team with 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
Anatomy				
1	<ul style="list-style-type: none"> • Define anatomical classification of the respiratory system. • Define structure of the thoracic cage & wall. • Define thoracic inlet & thoracic outlet. • Discuss thoracic outlet syndrome. 	RESP-S1-Ana-G-1 General introduction of the Respiratory system and Anatomy of the thorax	Interactive Lecture	SBQs & OSVE
2	<ul style="list-style-type: none"> • Define general features of the sternum. • Define general features of the ribs. • Differentiate typical and atypical ribs. • Define costal cartilages. • Discuss attachment of various muscles. 	RESP-S1-Ana-G-2 Osteology of the Ribs and the Sternum	Demonstration	SBQs, OSPE & OSVE
3	<ul style="list-style-type: none"> • Define general features of the thoracic vertebra. • Differentiate typical and atypical thoracic vertebrae. • Discuss joints of the thoracic walls. 	RESP-S1-Ana-G-3 Osteology of the thoracic vertebrae		
4	<ul style="list-style-type: none"> • Define three morphological layers of the muscles of the thoracic wall. • Define intercostal spaces. • Define endothoracic fascia. • Discuss supra pleural membrane. 	RESP-S1-Ana-G-4 Muscles of the thoracic wall and intercostal spaces		
5	<ul style="list-style-type: none"> • Define intraembryonic mesoderm and its parts. • Discuss divisions of lateral plate mesoderm into visceral and parietal layers. • Define extent of intraembryonic coelom and its divisions. • Discuss formation of the pleuro-pericardial and pleuro-peritoneal membranes. 	RESP-S1-Ana-E-1 Formation of the intraembryonic cavity, Serosus membranes and thoracic cavity	Interactive Lecture	SBQs & OSVE
6	<ul style="list-style-type: none"> • Discuss steps of development of diaphragm from its composite 	RESP-S1-Ana-E-2 Development of the		

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

		humans		
14	<ul style="list-style-type: none"> Describe the acid base balance. Explain the respiratory and metabolic acidosis & alkalosis with causes and compensatory mechanisms. 	RESP-S1-Bio-2 Acid Base Balance/ Metabolic & Respiratory Acidosis & Alkalosis		
15	<ul style="list-style-type: none"> Description & Biomedical significance of Compound Lipids 	RESP-S1-Bio-3 Biomedical significance of Compound Lipids		
16	<ul style="list-style-type: none"> Describe the Synthesis & Functions of Phospholipids. Discuss role of lecithin in respiration 	RESP-S1-Bio-4 Synthesis of Phospholipids & Role of Lecithin in Respiration		
17	Demonstrate the pH Meter, Significance, interpretation	RESP-S1-Bio-5 Introduction to pH Meter, Significance, interpretation	Practical	OSPE & OSVE
Pathology				
18	<ul style="list-style-type: none"> Identify congenital anomalies of lungs. Define acute lung injury Describe causes ARDS. Discuss characteristic features, morphology and pathogenesis of ARDS. Describe its consequences and clinical course. 	RESP-S1-Patho-1 Congenital anomalies, acute lung injury and ARDS	Practical	OSPE & OSVE
CLINICAL CLASSES				
20	<ul style="list-style-type: none"> Define Chyne-stokes breathing and effects on body. Define COPD and RLD. Differentiate between RLD & COLD & effects on body (obstructive & restrictive lung disease). Is COVID-19 RLD or COLD type of disease Define emphysema, chronic bronchitis. Define Bronchiectasis. Define interstitial lung diseases 	RESP-S1-MED-1 Obstructive and Restrictive Lung Diseases	Interactive Lecture	SBQs & OSVE

Theme 2: Airways and Their Conditions or Diseases

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

	<ul style="list-style-type: none"> Define structures passing through these openings. Define functions of the diaphragm. 			
22	<ul style="list-style-type: none"> Describe mediastinum Describe boundaries and divisions of mediastinum Enumerate structures present in it 	RESP-S1-Ana-G-6 Mediastinum	Interactive Lecture	SBQs & OSVE
23	<ul style="list-style-type: none"> Define anatomy of the trachea. Discuss clinical conditions related with trachea. 	RESP-S1-Ana-G-7 Anatomy of the trachea		
24	<ul style="list-style-type: none"> Define anatomy of the principal bronchi. Discuss clinical conditions related with bronchi. 	RESP-S1-Ana-G-8 Anatomy of the bronchi	Demonstration	SBQs, OSPE & OSVE
25	<ul style="list-style-type: none"> Describe development of the larynx, trachea and bronchi. Discuss anomalies related with development of these structures. 	RESP-S1-Ana-E-3 Formation of the Larynx, Trachea and Bronchi	Interactive Lecture	SBQs & OSVE
26	<ul style="list-style-type: none"> Describe microscopic features of the bronchi. Differentiate primary bronchioles from the tertiary bronchioles. Identify general histological features of bronchi and bronchioles with help of light microscope. 	RESP-S1-Ana-H-2 The Histology of the Bronchi: Primary and Tertiary Bronchioles	Practical	OSPE & OSVE

Physiology

27	<ul style="list-style-type: none"> Describe structure & functions of Respiratory membrane Gasses exchange across the respiratory membrane Factors affecting exchange through membrane 	RESP-S1-Phy-6 Diffusion of Gasses	Interactive Lecture	SBQs & OSVE
28	<ul style="list-style-type: none"> Describe transport of oxygen in the blood & discuss the oxygen Hb dissociation curve & factors affecting it 	RESP-S1-Phy-7 Transport of oxygen		
29	<ul style="list-style-type: none"> Describe transport of CO₂ in the blood & gasses exchange between blood & body cells (chloride shift) 	RESP-S1-Phy-8 Transport of CO ₂		
30	<ul style="list-style-type: none"> Enlist respiratory centers Describe mechanisms of nervous regulation of respiration Describe reflexes involve in nervous regulation 	RESP-S1-Phy-9 Nervous regulation of respiration		
31	<ul style="list-style-type: none"> Record effect of exercise on respiration in healthy adult on power lab & plot a graph Interpret Pulmonary Function Tests 	RESP-S1-Phy-10 Record the lung volumes and capacities on power lab & plot a graph	Practical	OSPE & OSVE

Biochemistry				
32	Describe the Glycolysis in detail.	RESP-S1-Bio-6 Glycolysis	Interactive Lecture	SBQs & OSVE
33	Describe role of TCA Cycle in cellular respiration	RESP-S1-Bio-7 Role of TCA Cycle in cellular respiration		
34	<ul style="list-style-type: none"> • Demonstrate the Arterial blood gases significance • Describe the ABG's interpretation with various respiratory disorders 	RESP-S1-Bio-8 Arterial blood gases (ABGs) interpretation	Practical	OSPE & OSVE
Pathology				
35	<ul style="list-style-type: none"> • Define chronic obstructive lung disease (COPD) • Classify the types of COPD • Describe its pathogenesis & clinical features. 	RESP-S1-Path-2 Chronic obstructive lung diseases (COPD)	Interactive Lecture	SBQs & OSVE
Pharmacology				
36	<ul style="list-style-type: none"> • Classify drugs used to treat dry and productive cough according to their mechanism of action. • Describe adverse effects, contraindications and drug interactions of the drugs used to treat various types of cough. 	RESP-S1-Pharm-1 The Anti-Tussives Drugs	Interactive Lecture	SBQs & OSVE
Clinical Classes				
37	<ul style="list-style-type: none"> • Define hypoxia and its types. • Explain effects of the hypoxia. • Explain psychogenic dyspnea & causes of psychogenic dyspnea • Define cyanosis. • Explain prevention strategies of cyanosis. • Enlist three principal reasons of cyanosis. • Define CO₂ poisoning. • Explain the effects of CO₂ poisoning and preventing measures of CO₂. 	RESP-S1-MED-2 Hypoxia Cyanosis CO ₂ poisoning	Interactive Lecture	SBQs & OSVE

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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
38	Define structure and nerve supply of pleura	RESP-S1-Ana-G-9 Anatomy of the pleurae	Demonstration	SBQs, OSPE & OSVE
39	<ul style="list-style-type: none"> • Describe gross anatomy of the lungs. • Discuss the phases of the respiration 	RESP-S1-Ana-G-10 Anatomy of the lungs Mechanism of the		

		respiration-1		
40	<ul style="list-style-type: none"> Define bronchopulmonary segments. Define types of the respiration. Discuss clinical conditions related with lungs. 	RESP-S1-Ana-G-11 Anatomy of the lungs Mechanism of the respiration-2 (bronchopulmonary segment)		
41	<ul style="list-style-type: none"> Define blood and nerve supply of the lungs. Discuss clinical conditions related with lungs. 	RESP-S1-Ana-G-12 Anatomy of the lungs-3 (Blood supply)		
42	<ul style="list-style-type: none"> Define clinical significance of chest X-ray in respiratory diseases. 	RESP-S1-Ana-G-13 Radiology: Basics of chest X-ray		
43	<ul style="list-style-type: none"> Discuss formation of laryngo-tracheal groove & respiratory diverticulum or lung buds. Define anomalies related with development of the lung buds. Discuss stages of development / maturation of the lungs. Discuss anomalies related with the lung maturation 	RESP-S1-Ana-E-4 Formation of the lung buds The maturation of the Lungs	Interactive Lecture	SBQs & OSVE
44	<ul style="list-style-type: none"> Identify structure of the alveoli and inter-alveolar septum under microscope and correlate functions of different types of cells, forming the alveolar wall. Identify structure and function of the blood air barrier 	RESP-S1-Ana-H-3 The Histology of the Lungs: Alveoli	Practical	OSPE & OSVE
Physiology				
45	<ul style="list-style-type: none"> Describe chemical control of respiration Explain chemoreceptor involved in chemical respiration. Describe regulation of respiration during exercise. Explain Periodic breathing 	RESP-S1-Phy-9 Chemical regulation of respiration Regulation during exercise		
46	<ul style="list-style-type: none"> Describe pulmonary circulation & blood flow through various zones of lung (1, 2, 3). Explain pulmonary capillary dynamics. Explain mechanism of development of pulmonary edema, pleural effusion Ventilation perfusion ratio (V/Q ratio) 	RESP-S1-Phy-10 Pulmonary Circulation & V/Q relationships	Interactive Lecture	SBQs & OSVE
47	<ul style="list-style-type: none"> Define respiratory changes associated with High altitude Discuss hypoxia and its types. 	RESP-S1-Phy-11 High altitude & Hypoxia		

48	<ul style="list-style-type: none"> Explain deep sea diving Physiology Describe caisson's disease 	RESP-S1-Phy-12 Deep sea Diving Physiology		
Biochemistry				
49	Describe organization of the Electron Transport Chain	RESP-S1-Bio-9 Organization of Electron Transport Chain	Interactive Lecture	SBQs & OSVE
50	Describe Oxidative phosphorylation & ATP Synthesis	RESP-S1-Bio-10 Oxidative phosphorylation & ATP Synthesis		
51	Demonstrate role of emulsification in respiration and digestion.	RESP-S1-Bio-11 Role of Emulsification in respiration and digestion	Practical	OSPE & OSVE
Pathology				
52	<ul style="list-style-type: none"> Define pneumonia. Discuss etiological classification of pneumonia. Discuss its clinical presentation. Describe diagnostic tools for pneumonia. 	RESP-S1-Path-3 Pneumonia	Interactive Lecture	SBQs & OSVE
Clinical				
53	<ul style="list-style-type: none"> Define RDS. Describe sign and symptoms of the respiratory distress syndrome. Enlist the causes of the respiratory distress syndrome Discuss the management 	RESP-S1-Med-3 Respiratory distress syndrome	Interactive Lecture	SBQs & OSVE

BEHAVIOURAL SCIENCES

Introduction

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

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

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

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

Rationale

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

Learning Outcomes of Behavioral Sciences Among MBBS Students:

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

KNOWLEDGE:

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

SKILLS

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

ATTITUDE

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

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

LEARNING METHODOLOGIES

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

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

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

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Comprehend the significance of behavioral sciences in medical practice. Understand the bio psycho-social model in clinical practice, along with the impact of culture on medical practice. gain a comprehensive understanding of psychology, sociology, anthropology, and the biological determinants of health and disease in clinical practice, and be able to identify normal and abnormal behaviors	PAR-S-1-BS-1 Introduction to Behavioral Sciences and its importance in health. <ul style="list-style-type: none">• The importance of behavioral sciences in healthcare• The Bio-psycho-social model of health and illness• The connection between health and behavioral sciences (psychology, sociology, anthropology).• The correlation between body, brain, mind and behavioral sciences• Normality vs. abnormality	LECTURE

THEME 2: Understanding Behavior

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Analyze human behavior by examining factors such as sensation, sensory organs, perception, attention, concentration, memory, thinking, and communication. Evaluate how these elements influence the development of psychological and behavioral disorders, applying clinical reasoning and fostering personal growth in learning and practice.	PAR-S-1-BS-2 Understanding Behavior: Sensation, Perception, Attention, Memory, Thinking, and Communication. <ul style="list-style-type: none">• Explore sensation and the functions of sensory organs.• Define perception, its influencing factors, and abnormalities, including extrasensory perception (ESP).• Examine attention and concentration, focusing on factors that affect their efficacy.• Discuss memory, including its stages, types, and strategies for enhancement.• Analyze thinking, its types, and related theories, along with levels of cognition, problem-solving techniques, and decision-making strategies.• Define communication, highlighting its types, modes, influencing factors, non-verbal cues, and the characteristics of effective communication.	LECTURE

THEME 3: THEME 3: Individual Differences

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Analyze the types of human personality and the stages of personality development, emphasizing their influence on behavior and growth. Assess the role of intelligence in shaping personal and professional success.	PAR-S-1-BS-3 Understanding Individual Differences: Personality, Intelligence. <ul style="list-style-type: none"> Explore the stages and key characteristics of psychological human growth and development. Define personality and examine cognitive and psychodynamic theories, factors influencing personality development, and methods of assessment. Analyze how personality impacts responses to health, disease, hospitalization, and stress. Define intelligence and its various types, including IQ and EQ, and their relevance in a doctor's life. Discuss strategies to enhance EQ and effectively utilize IQ. Examine factors influencing intelligence and methods of assessment. 	LECTURE
2.	Explain the complex relationship between brain function and behavior, focusing on emotions, motivation, and learning, as well as strategies to manage and enhance these processes effectively.	PAR-S-1-BS-4 Interplay of Brain and Behavior: Emotions, Motivation/need/drive and Learning <ul style="list-style-type: none"> Define emotions, their types, and the concept of Emotional Quotient (EQ), emphasizing emotional literacy and its practical utility. Define motivation, its types, and the application of motivational theories to improve learning and treatment adherence. Define learning and explore its principles, modern methods, learning styles, and types of learners. Discuss cognitive theories of learning and strategies to enhance learning skills effectively 	LECTURE

THEME 4: Doctor-Patient Relationship and Medical Ethics

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Critically evaluate complex clinical scenarios to identify and resolve ethical and practical challenges while upholding ethical boundaries within the doctor patient relationship. Demonstrate professionalism and strive for excellence in fostering trust and maintaining a healthy, effective doctor-patient dynamic.	PAR-S-1-BS-5 Doctor-Patient Relationship and Medical Ethics. <ul style="list-style-type: none"> Professional boundaries and psychological aspects (e.g., transference, counter-transference). Ethical principles: Hippocratic Oath, medical/dental ethics, and patient-doctor rights (international law, Pakistan's Constitution, PM&DC, Islam). Ethical dilemmas in interactions with families, colleagues, and the pharmaceutical industry. Emerging issues: e-consultation, telemedicine, euthanasia, and physician-assisted suicide 	LECTURE

THEME 5: Communication skills and Non-Pharmacological Interventions

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Demonstrate effective communication skills in clinical practice, including the use of non-pharmacological interventions such as counseling, providing informational care, and sensitively breaking bad news, in conjunction with appropriate medication management. Effectively handle patient information across diverse clinical scenarios while maintaining confidentiality and professionalism. Develop the ability to navigate and manage uncertain situations with confidence and empathy in clinical practice	PAR-S-1-BS-6 Communication skills and Non-Pharmacological Interventions (NPIs) in Clinical Practice. <ul style="list-style-type: none">• Principles of effective communication: active listening, the art of questioning, and the art of listening. Characteristics of good and bad listeners.• Counseling: Scope, indications, contraindications, steps, do's and don'ts. Managing real-life crisis and conflict situations in health settings.• Informational Care: Communicating with patients about disease, medications, prognosis, etc.• Breaking bad news: Introduction, model, and approach to patient and caregivers	LECTURE

COMMUNITY MEDICINE

LEARNING OUTCOMES:

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

RATIONALE:

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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
01	<ul style="list-style-type: none"> • To define different definition of public health / Community Medicine • To learn evolution of public health, its importance in today's world • To discuss the basic functions of Public health / community Medicine • To define the difference between clinical and community medicine 	PAR-S-1-CM-1 Introduction to Community Medicine & public Health (introduction to course/ department/ faculty)	LECTURE
02	<ul style="list-style-type: none"> • To understand the concept of disease and health • To discuss the Spectrum of health and Iceberg phenomenon of disease • To understand the Health Dimensions 	PAR-S-1-CM-2 Concept of Health and Disease	LECTURE
03	<ul style="list-style-type: none"> • To understand determinants of health with special focus on social determinants of health (SDH) • To define responsibility for Health • To define health indicator • To describe the Types of indicators 	PAR-S-1-CM-3 Determinants of health and Health Indicator	LECTURE
04	<ul style="list-style-type: none"> • To define Health • To discuss the "health for All", background, concepts and progress. • To define Primary health care • To discuss the Alma Ata Declaration • To discuss the Universal health coverage • To learn about health delivery system of Pakistan 	PAR-S-1-CM-4 Primary Health Care": Concepts and progress, and Health Delivery system of Pakistan	LECTURE

<p>05</p>	<ul style="list-style-type: none"> • To discuss the important global health issues • To understand the important public health issues of Pakistan • To define the health inequalities <ul style="list-style-type: none"> ○ Developing vs developed, ○ urban vs, rural, ○ rich vs poor, ○ male vs female • To discuss the Health and its relationship with development • To learn global development goals <ul style="list-style-type: none"> I. Millennium Development goals (MDGs) II. Sustainable Development Goals (SDGs) 	<p>PAR-S-1-CM-5 Global and Local health issues & Global Health Agendas</p>	<p>LECTURE</p>
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INFORMATION TECHNOLOGY

Introduction/ Rationale

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

Learning Outcomes

After completing this IT module, students will be able:

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

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

Recommendation:

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

BIOMEDICAL ETHICS

Introduction/ Rationale

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S #	LEARNING OUTCOMES	TOPIC	TEACHING STRATEGY
01	<ul style="list-style-type: none">• Students should be able to understand the principles of bioethics and what is ethical practice and what is an ethical dilemma• Students should be able to understand harms and benefits in health care settings• Students should be able to understand the concepts of autonomy and individual responsibility and to understand their significance for the health care provider patient relationship• Students should be able to understand concept of non-maleficence and Hippocratic oath• Students should be able to understand concept of justice in health care setting and equity in resource allocation	PAR-S-1-ETH-1 Introduction to Biomedical Ethics	Lecture SGD

RESEARCH

Introduction

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

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

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

Rationale

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

Learning Objectives:

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

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

EXAMINATION ASSESSEMENT

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

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

7 LEARNING RESOURCES

Anatomy:

❖ GROSS ANATOMY

- Clinical Anatomy by Richard S. Snell
- K.L. Moore, Clinically Oriented Anatomy
- Neuro Anatomy by Richard Snell

❖ HISTOLOGY

- B. Young J. W. Health Wheather's Functional Histology

❖ EMBRYOLOGY

- Keith L. Moore. The Developing Human
- Langman's Medical Embryology

Biochemistry:

❖ TEXTBOOKS

- Harper's Illustrated Biochemistry
- Lehninger Principle of Biochemistry

- Biochemistry by Devlin

Community Medicine:

❖ TEXT BOOKS

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

Pathology / MicroBiology:

❖ TEXT BOOKS

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

Pharmacology:

❖ TEXT BOOKS

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

Physiology:

❖ TEXTBOOKS

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

❖ REFERENCE BOOKS

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

• Behavioral Sciences:

- Hand book of Behavioral Sciences by Brig (Rtd) Mowadat H Rana (3rd Edition)
- Introduction To Psychology By Atkinson & Hilgard (15th Edition)
- Shorter Oxford Textbook of Psychiatry (7th Edition)

• Biomedical Ethics:

- Beauchamp TL, Childress JF. Principles of biomedical ethics. Oxford University Press, USA; 2001

• Research:

- Basic Biostatistics for Clinical Researchers" by Prof. Dr. Binafsha Manzoor Syed, PhD et al.

Weblink: <https://www.lumhs.edu.pk/publishers/documents/basicbio.pdf>

- Research Methodology in Medicine" by John K. Last

Weblink: <https://kth.diva-portal.org/smash/get/diva2:1547062/FULLTEXT01.pdf>

Journals:

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

Online Databases:

- PubMed

Assessment

Indus Medical College Tando Muhammad Khan is affiliated with Liaquat University of Medical and Health Sciences Jamshoro for assessment. College ensures facilitating students to appear in the examination at University and holding of the components of examination at its campus. Transparency, decorum and fairness is ensured at each aspect of assessment. Periodical review is done of the results of each session to find out the strength and weaknesses of learning, teaching and curricular issues to be addressed.

Assessment Areas

A separate examination department in liason with concerned officials of the University Controller of Examination has been established. A policy defining clear process of transparent assessment has been devised in liason with University. Policy ensures that assessment method is compatible with instruction methods and helpful in achieving the outcomes as outlined earlier. It ensures that all domains of competencies in the area of Knowledge, Skills, Attitude, Professionalism and Communication are part of the assessment.

Assessment Review

All evidence based assessment methods like SBQs, SEQs, OSPE and OSCE are applied in the assessment process. A Quality Assurance Cell in collaboration with university ensures transparent and evidence based procedures before, during and after the assessment. External examiners are part of paper setting and practical examinations. Appeal system for students is as per university rules. Assessment standards are reviewed and set for items used in examinations.

SCHEME OF STUDIES
PROFESSIONAL MBBS EXAMINATIONS

1. First Year MBBS Examination:

To be held at the end of the 1st year in the following subjects in course work completed in the first year:

(a) Anatomy and Histology	
One Paper:	90 Marks
Internal Evaluation	10 Marks
Oral & Practical	90 Marks
Internal Evaluation	10 Marks
Total	200 Marks

(b) Physiology	
One Paper:	90 Marks
Internal Evaluation	10 Marks
Practical & Oral Exam:	90 Marks
Internal Evaluation	10 Marks
Total	200Marks

(c) Biochemistry	
One Paper:	45 Marks
Internal Evaluation	05 Marks
Oral & Practical	45 Marks
Internal Evaluation	05 Marks
Total	100 Marks

Standard 13: Students



Indus Medical College Tando Muhammad Khan is engaging their students in management, delivery as well as evaluation of their services by involving them as member in different academic committees of the Institute. Their suggestions and ideas are always respected and welcomed by the institutional management and leadership. They are always involved in curricular as well as extra -curricular activities. They are always being motivated by arranging different seminars and workshops from national facilitators.

Admission Policy

The Medical College offers a five-year Bachelor of Medicine, Bachelor of Surgery (MBBS) programme. The programme is open to all academically qualified candidates without consideration to gender, religion, race, creed, colour or domicile. Students from anywhere in Pakistan and overseas may apply as per National and Provincial government policies approved by PM&DC. Indus Medical College believes in fair and merit-based admissions for the candidates from around the world. There are no quotas, reserved seats or admissions

against donations. Admission policy strictly follows the guidelines of PM&DC. Merit list as issued by official national admission test conducting body/ university and endorsed by PM&DC is implemented.

Student Support Program

Student Support Program has been devised to help students in loan schemes, debt schemes and financial needs of students.

There is student counseling office to deal and fulfill students' psychological, academic and career requirements. For career counseling time to time certain seminars are arranged at institutional level. The teachers are available always in their corresponding departments to deal with their daily academic requirements even after the lectures to discuss and sit with them.

Students' academic records are always kept confidential in their corresponding departments, the examination branch and student record office of the Institute

Students' medical records are also confidentially kept in the student record office. A dedicated person has been appointed for record keeping in student record office. Only authorized persons have access to the records if genuinely required and allowed by the registrar office in the benefit of student.

Students are invited to attend curricular committee meetings from time to time and their suggestions given due weightage. Their perceptions, suggestions and problems regarding curriculum are being notified and discussed with the senior members of the curricular committee and medical education department in different meetings. Students from each batch are voluntarily invited to be the part of sports committee and other extra-curricular activities. They also play role as volunteer in different seminars, lectures, academic programs, Pakistan day, culture day and top ten ceremonies to guide the participants and to help the management.

They actively participate in trilingual declamation contest at different universities. On many occasions, they have presented research papers in different symposia. Students can contact "student affairs" office at in case of any discrepancies.

Funds and finances are allocated for students support as per PM&DC policy.

This Institute has clear policy to systemically seek, analyze and respond to student feedback about the processes and products of educational programmes through students presentation in different committees i.e., curricular committee, sports committee, extracurricular committee. They have been provided free access to preventive and therapeutic health services available

at Indus Medical College Hospital. Institutional policy for health care policy for students and faculty have been approved.

Students Code of Conduct:

Policy Name: Student Code of Conduct and Disciplinary Procedures Devised By: Department of Medical Education

Approved by: Academic Council

Date of Approval: January 5, 2014

Date of Revision: March 11, 2019

Contact Office: Office of the Registrar / Administrative Officer

- As a part of your learning, you will have privileged access to people, and to their health information.
- The Student Code of Conduct and Disciplinary Procedures has been planned with the primary objective of safeguarding exemplary behavior and conduct of students which they can achieve by exhibiting the highest degree of moral and ethical values.
- The trust that people place in doctors carries considerable responsibility, hopes and expectations regarding your behavior.
- It is imperative that you are aware of these responsibilities and expectations from the beginning of your medical training.
- Any breach of these expectations could result in serious repercussions for you, your continuing medical education and your later career.
- Indus medical college is committed to support you to uphold this Code and to assist you throughout your studies, and encourages you to know where and how to access available support services. You should think of yourself as a doctor-in-training, rather than as a student in theoretical studies.
- Though the degree of your involvement with patients, families and the wider community may initially be small, from now on you will be meeting people as part of your education as a doctor.
- As you progress through your training you will be increasingly part of the health care team.
- You represent the Medical Institute, and the medical profession, whenever you meet people in this way.
- Your behavior as part of health care system, should rationalize the trust the public places

in the medical profession.

- All students will diligently apply themselves to their studies.
- Students shall attend lectures, tutorials, seminars, practical sessions, clinics and ward assignments, examinations and other scheduled courses and activities, in accordance with the 85 % attendance requirements of the affiliated University PM&DC.
- Each student shall be solely responsible for completing his / her scheduled examinations and attending other academic activities, as per his / her programme requirements.
- Students will respect the confidentiality of information pertaining to all clients of the IMC and IMCH including patients and their records, and will use it in no other circumstances than for authorized academic and professional purposes.
- The above mentioned principles therefore apply right from the start. We ask that you read through these principles and sign this document acknowledging your agreement to obey with them.

Disciplinary Committee

- A disciplinary committee and students grievances committee ensures disciplinary action or provides remedies in case of student's status being affected due to any reason.
- The disciplinary committee will be formed and empowered by the head of the institute / Indus Medical College
- They have been informed about code of conduct at Indus Medical College as medical professional student on very first day on orientation day. Code of conduct is available for dissemination for students to be informed beforehand.
- Transfer policy is as per PM&DC guidelines.
- Student's disciplinary committee ensures that students are not participating in any political activity.
- Ramps and lifts on hospital gate way are available for handicapped students. Scholarship program and support program is available for meritorious and deserving students. Student's exchange, national and international rotation, electives & internship program have been devised.

Disciplinary Offences:

Any form of intimidation, insult, abusive language, assault, molestation or harassment of students, staff, faculty, patients or other clients, within or outside the University.

Any form of unauthorized picketing, rallies, demonstrations or organized obstructions of any student / University / University Hospital function in any manner whatsoever.

Any attempt to conceive, design or affect any plan of whatever nature whose object or consequence is to disrupt academic programmes of the University or its operations.

Malicious acts, theft, willful damage or misuse of University's or any third party's property.

Students residing or availing the hostel and its facilities shall comply with all the hostel rules and will conduct themselves in a manner that respects the rights of other resident students, faculty and staff of the University.

Unauthorized housing of persons in the hostel or other buildings at the college.

Raising funds, accepting donations or engaging in similar activities for and on behalf of the college without a prior written approval of the Institute

Smoking is prohibited in settings of the college.

Procurement, possession, use, sale or display of any weapon, including firearms or any other contraband item on campus or at any University-related event.

Procurement, possession, use, sale and consumption of banned drugs, alcohol or other contraband items on campus or at University related events.

Attendance on campus or at University-related events in an intoxicated state or under the influence of banned substances.

Any act of violence causing injury or damage to any person or property at the University.

Providing wrong information, giving false and / or fabricated evidence, deliberately concealing material facts or information to the University in any proceedings and inquiries carried out at any forum by the University.

Committing or involvement in any act of deceit, fraud, forgery with the University, students, staff or faculty.

Abuse, unauthorized or fraudulent use of University computers, network systems or computer files.

Failure to comply with or any act in violation of, contravention of or disregard for published University policies, regulations or failure to comply with the direction of University officials acting in performance of their duties.

Any form of intimidation, insult, abusive language, assault, molestation or harassment of students, staff, faculty, patients or other clients, within or outside the University.

Anti-Harassment Policy

Government of Pakistan anti-harassment policy document has been adapted by the academic council of IMC. It encompasses all provision for protection of women at workplace.

Medical Student Dress Code

All students should adhere to dress standards which satisfy the requirements of:

- Workplace Health and Safety
- Patient Safety
- Infection Control
- Creating a professional and positive public image
- Identification of students to patients / staff
- Comfort and security

The dress standard must be adhered to whenever a student is working in a Professional capacity.

Standards

- Dress standards should be appropriate to the work being performed.
- Hair must be neat at all times. Long hair should be tied back when working in clinical areas.
- Jewelry and body piercing should be discreet and appropriate to patient care.
- It should not create an occupational hazard.
- Nails should be short, clean and neatly trimmed, particularly for patient safety and comfort.
- In areas where there is an infection control risk students should not wear nail polish or acrylic nails.
- Tattoos must be covered.

Footwear

- Footwear should be professional and fully enclosed.
- In Operating Room Suite students must wear footwear that is easily cleaned and non-slip.

- Professionalism is one of the core values of Indus Medical College, Tando Muhammad Khan
- The dress of medical students should reflect this, while in the premises of the college and hospital.

The End