



# **1<sup>st</sup> Year MBBS Study Guide**

**National University of Medical  
Sciences  
Pakistan**

**CMH Lahore Medical College & Institute of Dentistry Lahore  
Cantt, Pakistan**

## MBBS ANATOMY PROGRAMME AT NUMS

### **Vision:**

To train undergraduate students by qualified faculty and state of the art infrastructure and technology so that students can meet the community challenges of 21st century.

### **Mission:**

To impart core knowledge of anatomy in interesting, compact and practical way to undergraduate students by Hybrid/Spiral integrated system of teaching so that they can differentiate between normal and abnormal structure at gross, microscopic and embryological level.

### **Objectives:**

For this we need to impart:

Knowledge of Anatomy - On principles of pedagogy

Skills	Dissection & Prosection Simulation – Models Cyber teaching Surface Anatomy Modern Histological techniques
--------	---

Attitude:	Communication Skills - Lecture & Presentation Self-directed learning - CBL, Museum Atlas - Integrated Journal - Cyber Teaching - E-Learning Quest for Research - Journal club meeting - Library Professionalism Empathy Inter Personal Skills Extra-Curricular activities
-----------	--

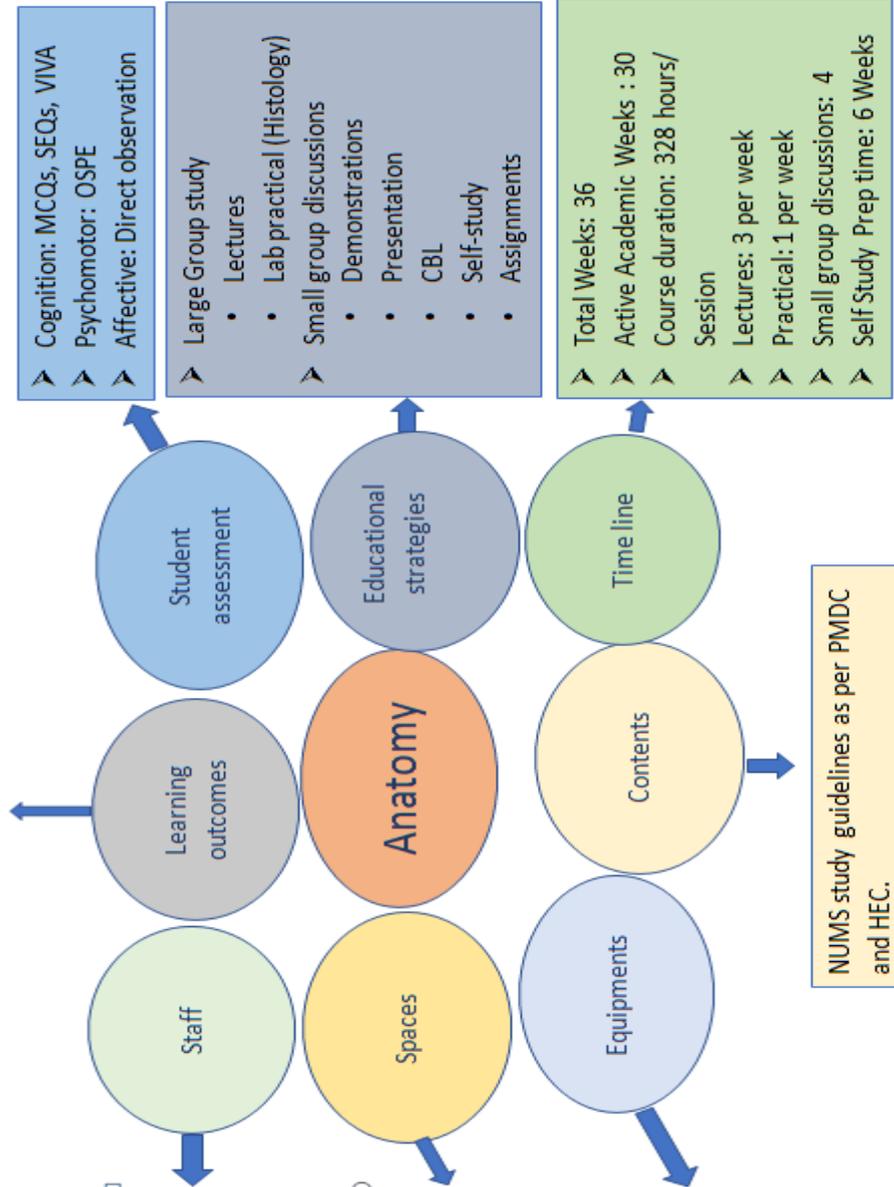
# Contents

<b>Description</b>	<b>Page No</b>
<b>Vision, Mission &amp; Objectives</b>	<b>2</b>
<b>Curriculum Map Anatomy</b>	<b>4</b>
<b>List of Faculty</b>	<b>5</b>
<b>Timetable</b>	<b>6</b>
<b>Introduction</b>	<b>7</b>
<b>Table of Specifications</b>	<b>10</b>
<b>Block -I</b>	<b>13</b>
<b>Block - II</b>	<b>57</b>
<b>Block - III</b>	<b>82</b>
<b>List of Recommended Books</b>	<b>108</b>

## Curriculum Map Anatomy Department (MBBS)

By the end of medical Academic Year, students should be able to co-relate normal anatomical structures of human body with their clinical significance macroscopically microscopically and developmentally.

- Faculty: Professors 1, Associate professor 1, assistant professors 1, and demonstrators 9 .
- Support staff: Lab assistant/Technician, Dissection Hall Attendant, Museum Keeper, Curator/Embalmer, Lecture hall attendant and Computer operator/P.A
- Lecture hall
- Histology lab (Anatomy)
- Dissection Hall
- Skill Lab
- Museum
- Microscopes
- Cadavers
- Museum models
- Audio-visual equipment
- Cyber Anatomy
- Library
- E-books



NUMS study guidelines as per PMDC and HEC.

## List of Faculty

Dr. Ansa Rabia	Professor & Head of Department
Dr. Shaista Arshad Jarral	Associate Professor
Dr. Tayyaba Mahmud	Assistant Professor
Dr. Saadia Hafeez	Assistant Professor
Dr Bahadur Baloch	Assistant Professor
Dr Rabia Latif	Assistant Professor

## Demonstrators

Dr. Amina Liaqat  
Dr. Marya Syed  
Dr. Abdullah Hamayun  
Dr. Gull Snober  
Dr. Seemi Amna

**TIME TABLE FOR THE FIRST YEAR M.B.B.S CLASS (SESSION 2023)  
C.M.H LAHORE MEDICAL COLLEGE, LAHORE-DEPARTMENT OF ANATOMY**

Day	08:00-08:55	08:55-9:50	09:50-10:45	10:45 - 11:15	11:15 - 12:10	12:10 - 13:05	13:05-14:00	14:00-15:00
<b>Mon</b>	Anatomy Lec	Week: 1-28 Surgery Week: 29-30 SDL	Dissection Hall	<b>Break</b>	Physiology Lecture	Week: 1-20 Com Med Week: 21-28 SDL	<b>Practical</b> A Biochemistry B Physiology C Anatomy	
<b>Tues</b>	Physiology Lecture	Anatomy Lec	Biochemistry Lecture		Dissection Hall	Dissection Hall	<b>Practical</b> C Biochemistry A Physiology B Anatomy	
<b>Wednes</b>	Week: 1-28 Medicine	Biochem	Physiology Lecture		Dissection Hall	Dissection Hall	<b>Practical</b> A Anatomy B Biochemistry C Physiology	
<b>Thurs</b>	Biochemistry Lecture	Physiology/Biochemistry Tutorial		Physiology Lecture	Week: 1-20 Islamiat / Pak Studies Week: 21 & 22 Medicine Week: 23-30 SDL	Dissection Hall	Dissection Hall	
	08:00 - 08:50	08:50- 09:40	09:40 - 10:30	10:30 - 11:20	11:20 - 13:00	13:00-1400	14:00-15:00	
<b>Fri</b>	Physiology Lecture	Biochemistry Lecture	Anatomy Lec	Week: 1-12, 14-22 & 24-30 SDL Week:13 & 23 Surgery	Physiology/Biochemistry Tutorial	JUMA BREAK	Week: 1-30 SDL	

## INTRODUCTION

### a. Preamble

Integration has been accepted as an important educational strategy in medical education. NUMS believes in continuous curriculum revision through regular reviews and feedback of stakeholders. This curriculum is updated as per recently revised standards of Pakistan Medical & Dental Council (PM&DC) which sets Correlation as a minimum level of integration in MBBS. This curriculum is outcome based, patient centered, community relevant, promotes health and prevents disease. It has been revised by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with NUMS Academic Directorate and NUMS department of Health Professions Education.

### b. Curricular organization and structure

- 1) NUMS MBBS curriculum will be delivered in a System Based Modular Format in the first three years and through clinical rotations/clerkships in years IV & V.
- 2) System based modules will link basic science knowledge to clinical problems. Students will be taught in an integrated manner so that subjects shall be presented as a meaningful whole. Students will have better understanding of basic sciences when they repeatedly learn in relation to clinical examples.
- 3) There will be three blocks, each will have modules, duration of which depends upon the number and complexity of the objectives to be achieved in that module.
- 4) The curriculum will be delivered by modular teams of multidisciplinary basic science faculty and relevant clinical faculty. The planning and delivery will be coordinated by year coordinators who will guide module coordinators of their respective years for efficient implementation
- 5) The syllabus will be integrated horizontally around systems of the body in which Anatomy, Physiology and Biochemistry will be taught with clinical relevance. Additional chunks of content will be added in a module that exactly does not fit in the central theme of the module.
- 6) Longitudinal themes (Behavioral Sciences and Research Methodology & EBM) are an integral part of year I & II
- 7) Islamiyat and Pakistan Studies are compulsory subjects taught throughout the year in first and second year respectively. Apart from attending daily scheduled sessions,

students should engage in self-directed learning to achieve the desired objectives

- 8) Professional Exams are discipline based. In first Prof, Anatomy, Physiology and Biochemistry and in second prof, Anatomy, Physiology, Biochemistry and Islamiat/Pakistan Studies will be assessed

**c. Curriculum perspective**

NUMS curriculum is evolved taking into consideration Constructivist and behaviorist with some element of Cognitivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

- d. Level of integration:** Correlation i.e level 7 of Harden's level of Integration. The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Though the teaching is discipline based, topics are correlated and taught with clinical context for better understanding and application of concepts.

- e. Competencies.** The focus of this curriculum is on the roles of a general physician as identified by PMC. These are skillful, knowledgeable, community health promoter, critical thinker, professional and role model, researcher and leader. Competencies focused in year I and II are: -

- 1) Medical Knowledge
- 2) Procedural skills
- 3) Problem solving
- 4) Communication skills
- 5) Professionalism
- 6) Research

**f. Outcomes**

By the end of years, I & II, students should be able to:

- 1) Correlate the developmental and anatomical knowledge of different organ systems of human body to their physiological and biochemical basis.
- 2) Comprehend the significance of behavioural sciences for medical students
- 3) Analyze multiple perspectives of Islamic studies or ethics and Pakistan studies
- 4) Discuss the basic principles of research

## g. Academic calendar Year I

Blocks	BLOCK-I 13 +1= 14 weeks					BLOCK-II 9+1= 10 weeks		BLOCK-III 9+1= 10 weeks		
Duration	02 weeks	02 weeks	06 weeks	03 Weeks	1 week	9 weeks	1 week	04 Weeks	05 Weeks	1 week
Modules	Foundation I	Cell Structure & Function	MSK - I	Haem & Immunology	EOB	Cardiovascular System	EOB	Respiratory system	MSK - II	EOB
Disciplines	Anatomy, Physiology, Biochemistry, relevant clinical disciplines									
Across the year	Behavioral Sciences, Research Methodology and Islamiyat									

## h. Proposed Contact Hours Distribution Year-I

SUBJECTS	CONTACT HOURS
Anatomy	250
Physiology	225
Biochemistry	125
*Medicine & Allied	30
*Surgery & Allied	30
Research Methodology	20
Islamiyat	15
Self-Directed Learning	100
Co-Curricular	40
<b>Total Hours</b>	<b>835</b>

## i. Educational Strategies (These are proposed, but institutes can use other evidence-based teaching methodologies that suit their context)

- 1) Interactive Lectures
- 2) Small group discussion
- 3) Lab practical
- 4) Skill lab
- 5) Problem based learning/ Case based learning
- 6) Tutorials
- 7) Integrated sessions using any of the above strategies
- 8) Self-directed learning (SDL) and directed self-learning (DSL)

## First Professional MBBS Examination (2023)

### ANATOMY

#### Theory

Marks of theory paper	= 80
Time Allowed	= 03 hrs
Internal assessment (20%)	= 20
<b>Total Marks</b> (MCQs:40%+SEQs:40%+IA:20%)	= 100
Pass Marks	= 50

**Paper-1:** (\*Marks of MCQ component shall be rationalized to 40% weightage)

60 x MCQs (1 mark each) (60 Marks) Time =60 min

#### **Paper-2:**

8x SEQs (05 Marks Each) (40 Marks) Time = 120 min

\*If a candidate obtains 50 marks in MCQs it will be rationalized as:  $(50/60 \times 40 = 33.33)$

<i>Note:</i>				Number of MCQ's (60)			Number of SEQs (08)
1. Please make sure that MCQs selection shall be done keeping in mind this specific distribution 2. 1 x SEQs each out of 07 will be from whole histology & Embryology				Total No.	Recall: 24	Application :36	X5 marks each
				<b>Histology</b>	<b>10</b>	<b>7</b>	<b>3</b>
<b>Embryology</b>	<b>14</b>	<b>4</b>	<b>10</b>	<b>1</b>			
<b>Upper limb(Gross)</b>	<b>12</b>	<b>4</b>	<b>8</b>	<b>2</b>			
<b>Lower limb (Gross)</b>	<b>12</b>	<b>4</b>	<b>8</b>	<b>2</b>			
<b>Thorax (Gross)</b>	<b>11</b>	<b>4</b>	<b>7</b>	<b>2</b>			
<b>General anatomy</b>	<b>01</b>	<b>1</b>	<b>-</b>	<b>-</b>			
Module wise distribution of MCQs							
Ser	Module	Subjects	Topics	Number of MCQ's (60)			
1.	Cell Structure & Function	Histology	Cell	1			
			Epithelium	1			
		Embryology	Gametogenesis	2			
			Chromosomal aberrations				
General Anatomy	Introduction- Planes & Terms, Bone, Joints, Muscle, Neurology	1					
2.	Musculoskeletal System - I	Histology	Connective tissue	1			
			Bones	1			
			Cartilage	1			
			Muscular Tissue	1			
		Embryology	Development 1-2 wks	2			
		Gross	Bones and joints of upper limb	2			
			Pectoral region & Scapular region	2			
			Axilla & Arm	3			

			Forearm & Hand	3
			Cutaneous innervation, Blood supply & lymphatic drainage of upper limb	2
3.	<b>Haem &amp; Immunology</b>	Histology	Lymphoid organs	2
		Embryology	Development - 3 <sup>rd</sup> wk	1
4.	<b>CVS</b>	Histology	Circulatory System	1
		Embryology	Development - 3 <sup>rd</sup> - 8 wks	1
			3 <sup>rd</sup> month to birth	1
			Development of body cavities	1
			Development of CVS	2
		Gross	Osteology of ribs, sternum & thoracic vertebrae	1
			Thoracic wall, Diaphragm, Respiratory movements	2
			Thoracic cavity, Mediastinum	2
	Pericardium & Heart		3	
5.	<b>Respiratory System</b>	Histology	Respiratory System	1
		Embryology	Development of respiratory system, vertebral column, ribs & sternum	1
		Gross	Trachea, Lungs	3
	Pleura			
6	<b>Musculoskeletal System - II</b>	Histology		
		Embryology	• Development of Limbs	1
			• Development of Muscular system	1
			• Birth defects	1
		Gross	Bones & Joints of lower limb	2
			Gluteal region	2
			Thigh	2
			Popliteal fossa & leg	2
Foot	2			
		Cutaneous innervation, Blood supply & lymphatic drainage of lower limb	2	
<b>Total</b>				<b>60 (60 Marks)</b>

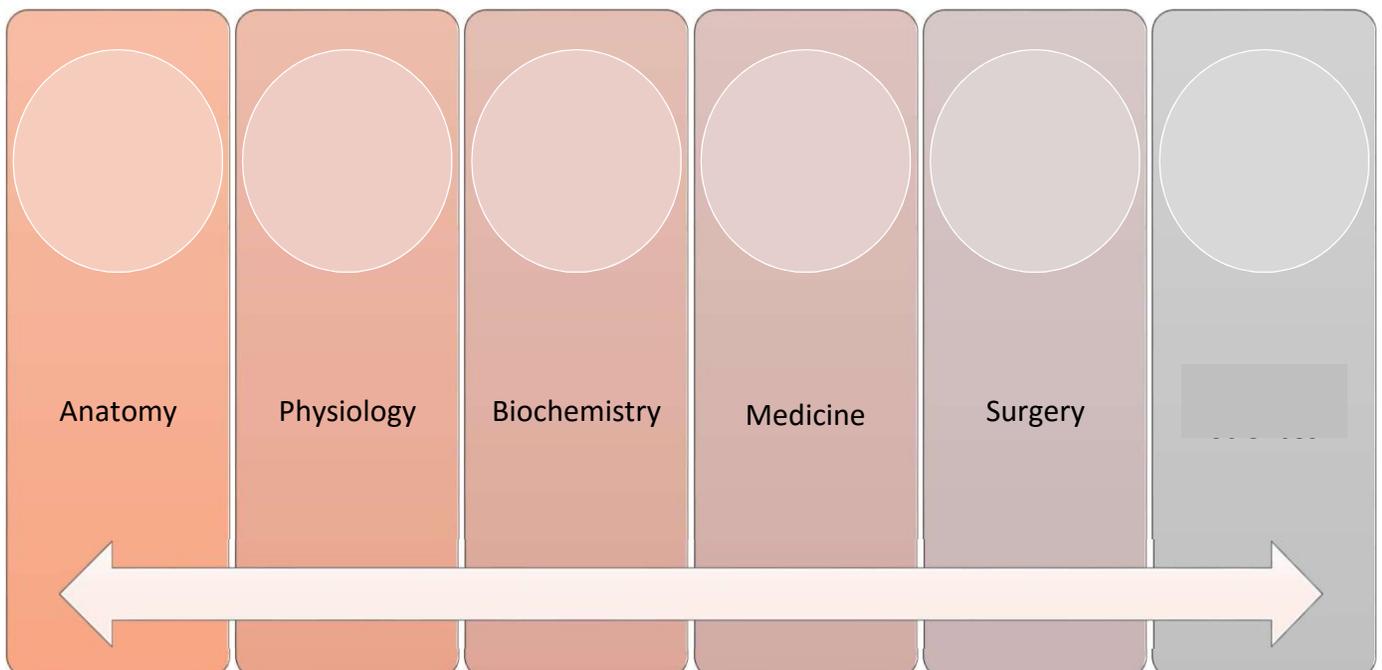
**Table of Specifications for Annual Professional Exam: Practical**

Sr #	Topics	VIVA 40 Marks	OSPE 38 Marks Gross, Embryo, Radiology, Histology		Histology Manual 02 Marks	Grand Total (Marks)
			Station (unobserved) 27 Marks	Observed Stations 11 Marks		
1	General Embryology Special embryology	10	03 (1 mark each = 03 marks)	-		13
2	General Histology Special histology	-	07 (1 mark each = 07 marks)	long slides-identification & drawing = 2 Marks) Viva Histo= 06 Marks	02 marks	17
4	Lower Limb	10	03 (2 mark each = 06 marks)	Surface Marking 01 (1 mark)		17
5	Upper Limb	10	03 (2 mark each = 06 marks)	01(1 mark)		17
6	Thorax	10	02 (2 mark each = 04 marks)	01 (1 mark)		15
7	Radiology	-	01 (01 marks)	-		01
<b>Total</b>		<b>40 Marks</b>	<b>19 (27 Marks)</b>	<b>04 (11 Marks)</b>	<b>02 Marks</b>	<b>80 Marks</b>

<b>MBBS YEAR I</b>
<b>BLOCK I</b>
<b>MODULE I</b>
<b>FOUNDATION- I</b>
<b>Duration: 02 weeks</b>



### **Integration of Disciplines in Foundation Module**



**MODULE PLANNING COMMITTEE**

<b>Module Coordinator</b>	<b>Dr. Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

This module focuses on orientation of students to different disciplines to be taught in years I & II along with their grooming through basic themes of Behavioral Sciences. It includes basic anatomical, physiological and biochemical concepts about the human body and its development. Students will also be introduced to clinical subjects. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module enables the student to recognize the role of different disciplines in studying human body and its diseases.

**Learning outcomes**

By the end of this module the students will be able to

- Grasp the basic concepts of sub-disciplines of Anatomy
- Operate a microscope correctly according to standard operating procedures
- Comprehend the basic concepts of Physiology
- Comprehend the basic concepts of biochemistry
- Outline the basics of Medicine
- Outline the basics of Surgery
- Comprehend the basic concepts of Behavioral Sciences

<b>ANATOMY</b>					
<b>S.No</b>	<b>Topic/ Theme</b>	<b>Learning outcomes</b>	<b>Learning Objectives/Contents</b>	<b>Instructional strategies</b>	<b>Assessment tool</b>
1	<b>Introduction</b>	Grasp the basic concepts of sub-disciplines of Anatomy	<ul style="list-style-type: none"> <li>Define Anatomy and its various disciplines</li> <li>Follow the plan of instruction and assessment of Anatomy as per criteria laid by NUMS</li> </ul>	Lecture	Formative-classroom assessment- Oral questioning
2	<b>Handling of microscope</b>	Operate a microscope correctly according to standard operating procedures	<ul style="list-style-type: none"> <li>Identify the parts of microscope</li> <li>Demonstrate working of microscope with focusing of slides at different magnifications</li> </ul>	Practical	Formative-classroom assessment- Oral questioning
<b>PHYSIOLOGY</b>					
1	<b>Introduction</b>	Comprehend the basic concepts of Physiology		Lecture	Formative
<b>BIOCHEMISTRY</b>					
1	<b>Introduction</b>	Comprehend the basic concepts of biochemistry		Lecture	Formative
<b>MEDICINE</b>					
1	<b>Introduction</b>	Recognize the importance of Medicine in human life	Introduction to medicine	Lecture	Formative
2		Understand the evolution of modern medicine	History of Medicine		
<b>SURGERY</b>					
1	<b>Introduction</b>	Recognize the importance of principles of surgery in general	<ul style="list-style-type: none"> <li>Recognize different specialties of surgery</li> <li>Discuss principles of management of surgical problems</li> <li>Recognize the role of Radiology and anaesthesia in surgical</li> </ul>	Lecture	Formative

			practice		
--	--	--	----------	--	--

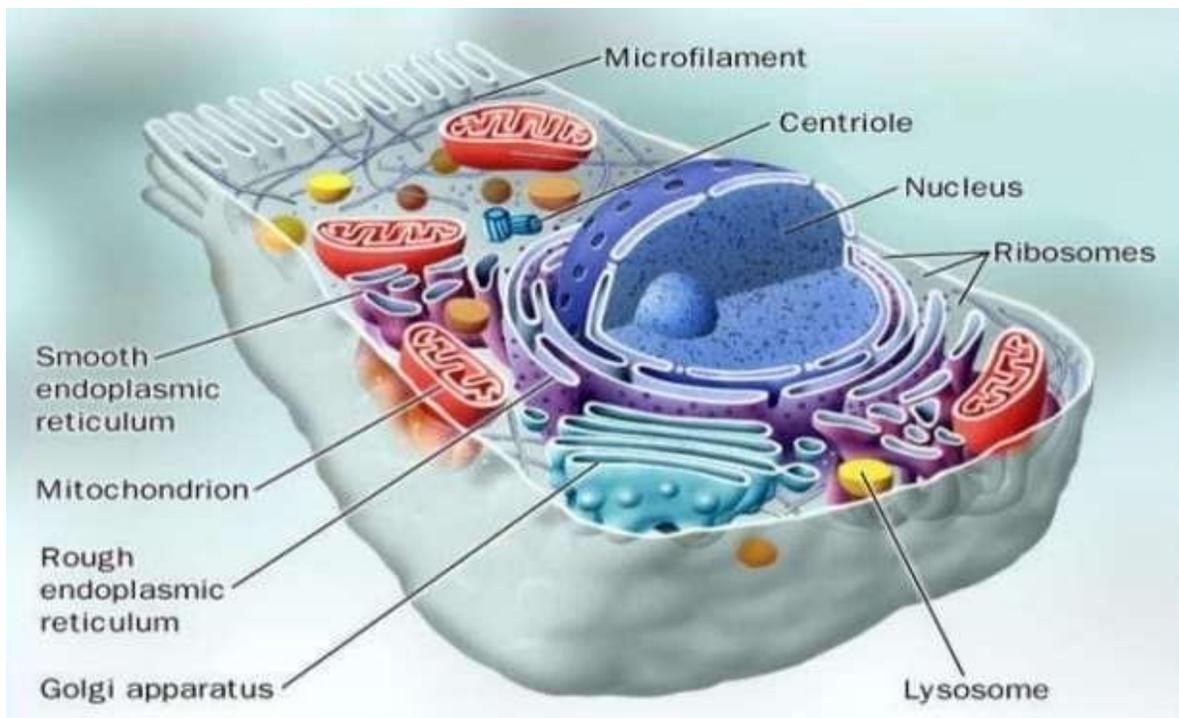
**MBBS YEAR I**

**BLOCK I**

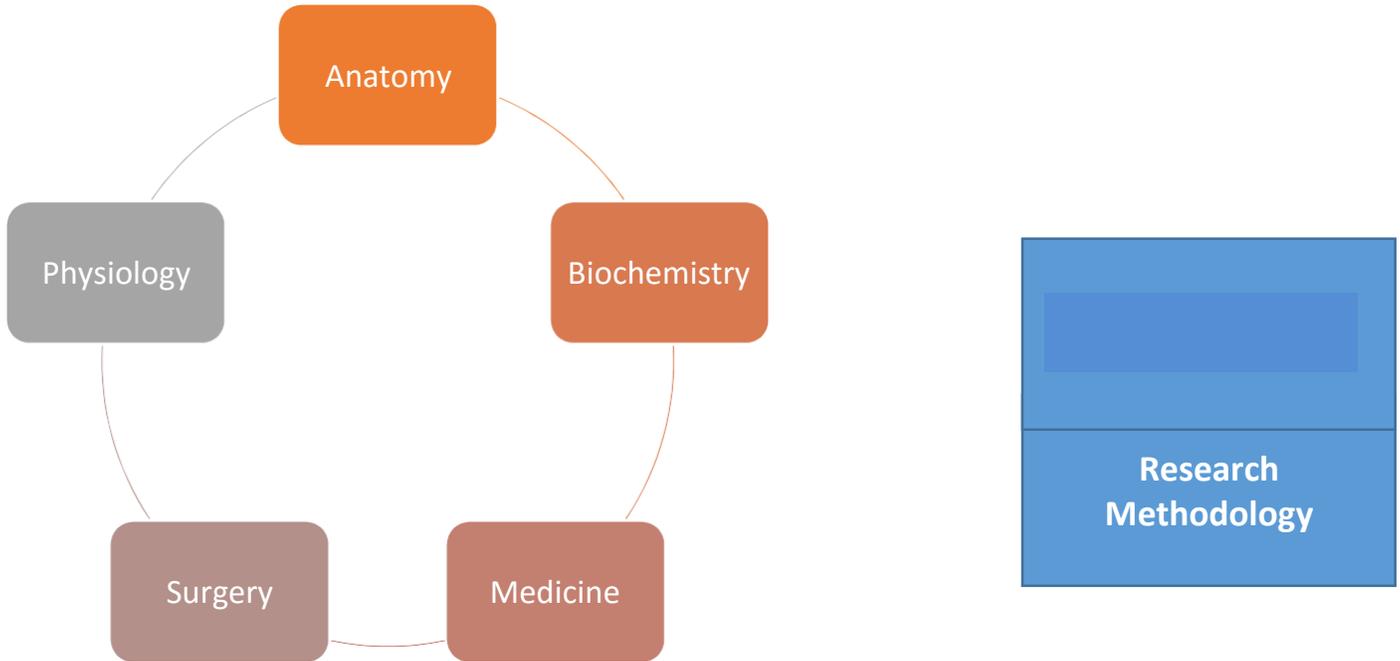
**MODULE II**

**CELL STRUCTURE & FUNCTION**

**Duration: 02 weeks**



### Integration of Disciplines in Module II



### MODULE PLANNING COMMITTEE

<b>Module Coordinator</b>	<b>Dr. Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

This module introduces the student to the basic structure and functioning of the cell and molecules and how dysfunctions in cell can lead to disease. The research methodology, Behavioral Sciences and Islamiat will be taught as a part of the longitudinal theme. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module enables students to relate the embryological, histomorphological knowledge of cell to its physiological and biochemical basis and appraise the clinical aspect related to dysfunctions in the cell

**Learning outcomes**

- **At the end of this module, student will be able to:**

1. Correlate microscopic structure of cytoskeleton with variation in cellular modifications
2. Correlate the microstructure of various types of epithelia with their functions and dysfunctions
3. Describe gametogenesis and numerical and structural chromosomal abnormalities that result from aberrations in this process.
4. Analyze the embryological basis of common numerical and structural chromosomal aberrations
5. Use the general anatomical terms in describing the structure of different parts of body
6. Appreciate the role of homeostatic feedback mechanisms in maintaining the functional organization of the Human Body and Control of the "Internal Environment"
7. Relate the structure of cell and its various components to metabolic processes and locomotion
8. Differentiate the different type of transport mechanism across the cell membrane for the movement of micro & macromolecules.
9. List various Biomolecules
10. Differentiate between Cell Organelles, their structure, biochemical functions and associated disorders
11. List various Cytology techniques for study of a cell
12. Discuss the chemical composition of a cell membrane and its significance regarding a particular cellular environment.
13. Relate the concept of chemistry and role of signal transduction in health and disease
14. Recognize various disciplines in medicine & allied
15. Recognize the clinical presentation of common chromosomal aberrations
16. Develop an Understanding about how to approach patients in clinics

**List of Proposed Themes for integrated sessions (at least one/week)****Theme**

Cell

Development of human body

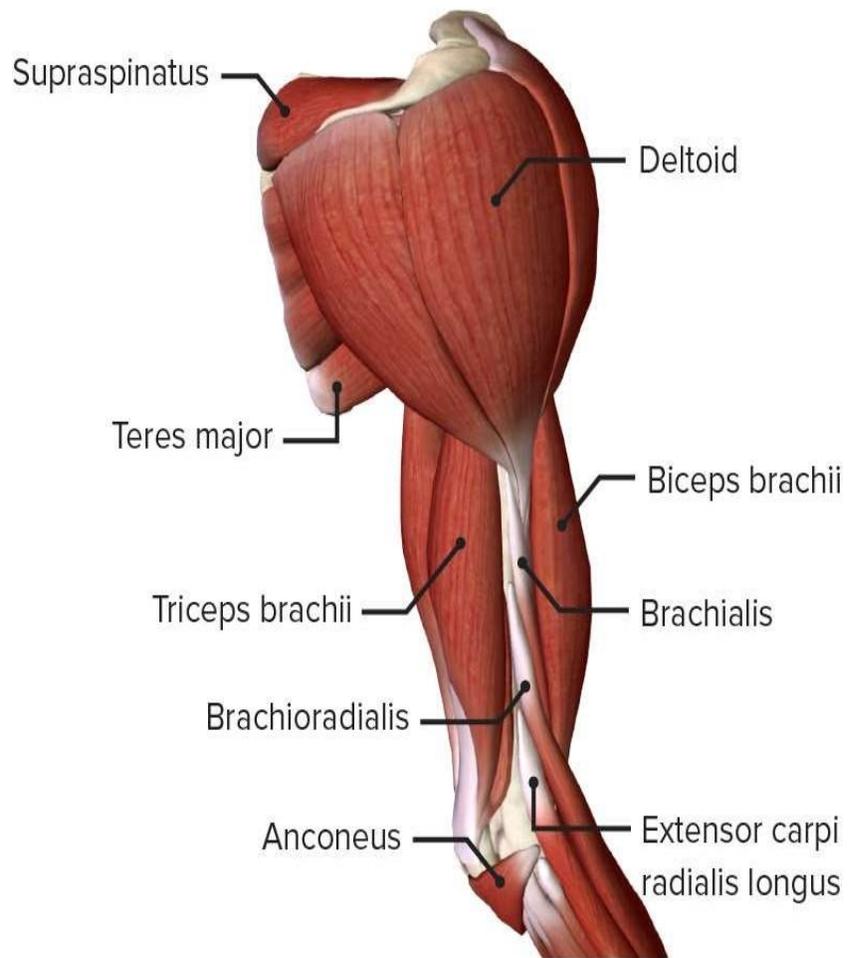
General Histology					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
		By the end of this module, students will be able to:			
1.	<b>Cell</b>	<ul style="list-style-type: none"> <li>Correlate microscopic structure of cytoskeleton with variation in cellular modifications</li> </ul>	<b>Knowledge:</b> <ul style="list-style-type: none"> <li>List various cell organelles along with their functions</li> <li>Explain the structure and functions of various components of cytoskeleton.</li> </ul>	LGIS	MCQs/SEQs/SAQs/OSPE/VIVA
2.	<b>Epithelial tissue</b>	<ul style="list-style-type: none"> <li>Correlate the microstructure of various types of epithelia with their functions and dysfunctions</li> </ul>	<b>Knowledge:</b> <ul style="list-style-type: none"> <li>Define epithelium</li> <li>Classify epithelium with examples of each type</li> <li>Classify Glands with examples.</li> <li>Define polarity</li> <li>Differentiate among various epithelial cells</li> <li>List the structural modifications of apical, lateral and basal domains of the cell.</li> <li>Classify the apical modifications according to motility</li> <li>Name the component of cytoskeleton contributing in each apical modification</li> <li>Define metaplasia and correlate it with its clinical importance.</li> <li>Classify various types of cell</li> </ul>	LGIS/ Practical	MCQs/SEQs/SAQs/OSPE/VIVA

			junctions according to functions, providing examples of each.		
--	--	--	---	--	--

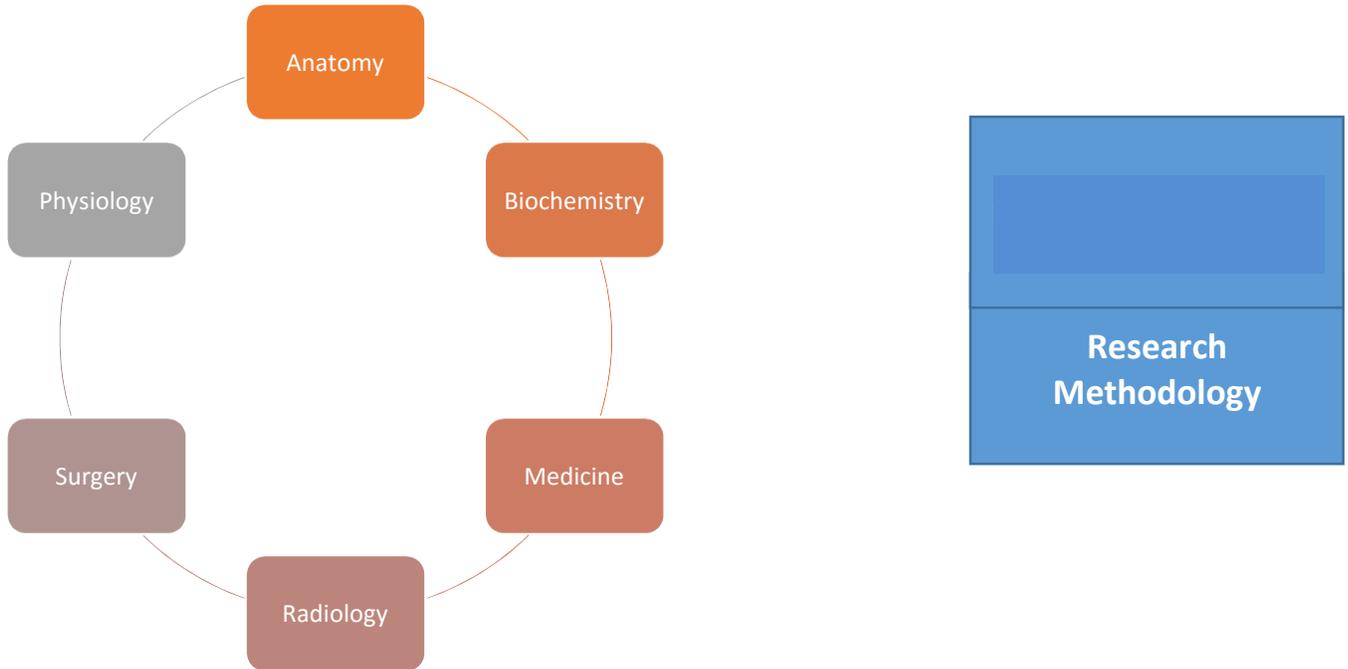
			<b>Skill:</b> <ul style="list-style-type: none"> <li>• Identify the histological features of different types of epithelia under light microscope</li> <li>• Illustrate different types of epithelia and write two points of identification of each</li> <li>• Compare the histological features of serous and mucus acini under light microscope.</li> </ul>		
<b>General Embryology</b>					
3.	<b>Gametogenesis</b>	Describe gametogenesis and numerical and structural chromosomal abnormalities that result from aberrations in this process.	<ul style="list-style-type: none"> <li>• Explain the sequence of events of mitosis and meiosis with the help of illustrations and models.</li> <li>• Elucidate the morphological changes in male and female gametes during their maturation</li> <li>• Define the following terms in relation to spermatogenesis and oogenesis: <ul style="list-style-type: none"> <li>o Haploid</li> <li>o Diploid</li> <li>o Euploid</li> <li>o Aneuploid</li> <li>o Triploid</li> <li>o Polyploid</li> <li>o Nondisjunction</li> <li>o Monosomy</li> <li>o Trisomy</li> <li>o Mosaicism</li> <li>o Translocation</li> </ul> </li> </ul>	LGIS	MCQs / SEQs/ SAQs/ OSPE/ VIVA

4.	<b>Chromosomal aberrations</b>	Analyze the embryological basis of	• List numerical and structural		
----	--------------------------------	------------------------------------	---------------------------------	--	--

		common numerical and structural chromosomal aberrations	chromosomal disorders <ul style="list-style-type: none"> <li>• Explain the embryological basis and clinical presentation of following syndromes:</li> <li>• Down's</li> <li>• Klinefelter</li> <li>• Turner</li> <li>• Angelman</li> <li>• Prader Willi</li> <li>• Cri du chat</li> </ul>		
<b>Gross Anatomy</b>					
5.	<b>Introduction</b>	Use the general anatomical terms in describing the structure of different parts of body	<ul style="list-style-type: none"> <li>• Demonstrate the anatomical position.</li> <li>• Name various planes of the body.</li> <li>• Define the terms of position, movement, and laterality.</li> </ul>	LGIS	Formative-classroom assessment -Oral questioning
<b>Practicals:</b> <ul style="list-style-type: none"> <li>• Epithelium-I</li> <li>• Epithelium-II</li> <li>• Glands</li> </ul>					

**MBBS YEAR I****BLOCK I****MODULE III****Musculoskeletal System- I (MSK  
- I)****Duration: 06 weeks**

### Integration of Disciplines in Module III



### MODULE PLANNING COMMITTEE

<b>Module Coordinator</b>	<b>Dr Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

The Musculoskeletal system is responsible for locomotion, support and protection to the human body. This system consists of osteology (the study of bones), arthrology (the study of joints), and myology (the study of muscles) of upper limb. It also includes basic structure and functioning of the nerve and muscles and how their dysfunctions can lead to disease. Along with this, biochemical aspect of mineral and trace elements is also a part of this module. The research methodology, Behavioral Sciences and Islamiat will be taught as a part of the longitudinal theme

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module will enable the student to integrate the basic and clinical knowledge for better understanding of the upper limb which will help them in the subsequent years of clinical practice

**OUTCOMES**

**By the end of this module, student should be able to:**

1. Correlate microscopic structure of various types of connective tissues with their function and dysfunction
2. Correlate microstructure of various types of muscles with their functions
3. Elucidate the embryological phenomena related to normal and abnormal processes of ovulation, fertilization, and implantation
4. Describe the sequential phases of human development during second week
5. Apply the knowledge of introduction to general principles of neurology in understanding the descriptive part in block-VI
6. Apply the knowledge of gross anatomy of upper limb in interpreting the anatomical basis of relevant clinical scenarios.
7. Recognize gross anatomical features of upper limb on the prosected specimens and models
8. Outline the course of main nerves & vessels of upper limb on the body surface of given subject exhibiting effective communication, professionalism and ethics
9. Review the physiological structure and working of neuron and synapse
10. Explain the ionic and mechanical mechanisms of generation of resting membrane potential & action potential in excitable tissue (nerves & muscle).
11. Correlate the physiological mechanism of Neuromuscular, Transmission and Excitation- Contraction Coupling with various neuromuscular diseases.
12. Discuss the morphology and physiological processes of the skeletal muscle contraction.
13. Differentiate the characteristics of skeletal and smooth muscles
14. Correlate characteristics of smooth muscle contraction with their physiological functions
15. Apply the basic knowledge of minerals for understanding their related disorders
16. Correlate the lack of transmission at NMJ with its clinical presentation (Myasthenia gravis)
17. Identify & relate clinical presentation of different fractures/dislocations of upper limb with anatomical knowledge
18. Correlate skeletal framework of upper limb with its radiological appearance

**List of Proposed Themes for integrated sessions (at least one/week)**

<b>Theme</b>
Pain/ limited movement of shoulder
Frozen Shoulder
Pain/ limited movement of elbow
Tennis Elbow
Numbness of hand
Carpal Tunnel Syndrome

ANATOMY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
		By the end of this module, students will be able to:			
<b>General Histology</b>					
1.	<b>Connective tissue</b>	Correlate microscopic structure of various types of connective tissues with their function and dysfunction	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>List the components of connective tissue.</li> <li>List various CT cells and fibers</li> <li>Classify connective tissue</li> <li>Describe the characteristic features of each type</li> <li>Explain the role of fibroblasts in wound contraction</li> <li>Elucidate the role of macrophages in defense</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>Identify different types of connective tissue under the microscope</li> <li>Illustrate the types of connective tissue with two identification points of each.</li> </ul>	LGIS Practical	MCQs SEQs/SAQs OSPE Viva Voce
2.	<b>Bone</b>		<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Describe the origin, histological</li> </ul>	LGIS Practical	MCQs SEQs/SAQs OSPE

			<p>structure, and functions of the following:</p> <ul style="list-style-type: none"><li>▪ Osteoprogenitor cells</li><li>▪ Osteoblasts</li><li>▪ Osteocytes</li><li>▪ Osteoclasts</li></ul> <ul style="list-style-type: none"><li>• Describe the characteristic histological features of osteon</li></ul>	Viva Voce
--	--	--	--	-----------

			<ul style="list-style-type: none"> <li>• Define periosteum and endosteum</li> <li>• Differentiate between primary and secondary bone.</li> <li>• Apply knowledge of histology to explain clinical conditions like osteomalacia, osteopetrosis and osteitis fibrosa cystica.</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>• Identify the structure of compact and spongy bone under the light microscope</li> <li>• Illustrate the microscopic structure of compact and spongy bone with two identification points of each.</li> </ul>		
3.	<b>Cartilage</b>		<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Differentiate in tabulated form the types of cartilage with reference to composition, arrangement of chondrocyte, interstitial matrix, and distribution.</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>• Identify different types of cartilage under the microscope</li> <li>• Illustrate the types of cartilage with two identification points of each</li> </ul>	Practical	MCQs SEQs/SAQ OSPE Viva Voce
4.	<b>Muscular tissue</b>	Correlate microstructure of various types of	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Describe the light microscopic characteristics of</li> </ul>	LGIS/ Practical	MCQs / SEQs/ SAQs/ OSPE/

					VIVA
--	--	--	--	--	------

		muscles with their functions	<p>skeletal, cardiac, and smooth muscles</p> <ul style="list-style-type: none"> <li>• Tabulate the microscopic differences between three types of muscles</li> </ul> <p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Identify the histological structure of three types of muscles under the light microscope</li> <li>• Illustrate the light microscopic structure of three types of muscles with two identification points of each.</li> </ul>		
<b>General Embryology</b>					
5.	<b>Ovulation, Fertilization, First &amp; second weeks of Development</b>	<ul style="list-style-type: none"> <li>• Elucidate the embryological phenomena related to normal and abnormal processes of ovulation, fertilization, and implantation</li> <li>• Describe the sequential phases of human development during second week</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Correlate the menstrual and ovarian cycles with each other</li> <li>• Describe the process of ovulation</li> <li>• Define corpus luteum and corpus albicans</li> <li>• Define fertilization. Describe and illustrate the steps, and outcomes of fertilization</li> <li>• Describe the basic principles behind various techniques of in vitro fertilization</li> <li>• Describe the process of implantation.</li> <li>• List the sites of abnormal implantation and describe their clinical</li> </ul>	LGIS	MCQs / SEQs/ SAQs/ OSPE/ VIVA

			<p>significance.</p> <ul style="list-style-type: none"><li>• Define cleavage, morula, blastula</li></ul>		
--	--	--	--	--	--

			<ul style="list-style-type: none"> <li>• Explain the events of second week of development in a sequence</li> <li>• Justify the statement that the second week is known as “week of two’s”</li> <li>• Identify the various phases of development on the given model.</li> </ul>		
<b>General Anatomy</b>					
6	<b>Neurology-I</b>	Apply the knowledge of introduction to general principles of neurology in understanding the descriptive part in block-VI	<ul style="list-style-type: none"> <li>• Describe the organization of nervous system.</li> <li>• Enumerate components of central and peripheral nervous system &amp; describe their general features</li> <li>• Describe the origin, course, and distribution of a typical spinal nerve with the help of a diagram.</li> <li>• <b>Define:</b> Dermatomes, Receptors, and effectors</li> </ul>	LGIS / SGD	MCQs
<b>GROSS ANATOMY</b>					

7.	<b>Bones of shoulder girdle and upper limb</b>	Correlate the bony features of long bones of upper limb (clavicle, scapula, humerus, radius and ulna) with their articulations, attachments, and anatomical basis of relevant clinical presentations in case of injury and fractures	<ul style="list-style-type: none"> <li>• Determine the side of clavicle, scapula, humerus, radius and ulna</li> <li>• Identify important bony landmarks on these bones</li> <li>• Locate attachments of major muscles and ligaments attached on these bones</li> <li>• Discuss the clinical implications in fractures of these bones at different sites</li> </ul>	SGD	<ul style="list-style-type: none"> <li>• MCQs</li> <li>• SEQ / SAQ</li> <li>• OSPE</li> <li>• Viva Voce</li> </ul>
----	--	--	--	-----	--

8.	<b>Pectoral region and breast</b>	Correlate the knowledge of gross anatomy of pectoral region with relevant clinical presentations.	<ul style="list-style-type: none"> <li>• Comprehend the structure of breast tissue</li> <li>• Justify the importance of fibrous septa in breast in relation to its carcinoma</li> <li>• Describe the blood supply and lymphatic drainage of breast</li> <li>• Justify the clinical importance of sentinel lymph node</li> <li>• Trace the possible routes of metastasis of breast cancer</li> <li>• Tabulate the attachments, nerve supply and actions of muscles attaching upper limb to thoracic wall.</li> </ul>	SGD/CBL	<ul style="list-style-type: none"> <li>• MCQs / SEQs/</li> <li>• SAQs/</li> <li>• VIVA</li> </ul>
9.	<b>Scapular region</b>	Correlate the knowledge of Anatomy of scapular region with relevant clinical presentations	<ul style="list-style-type: none"> <li>• Tabulate the attachments, nerve supply and actions of muscles attaching upper limb to vertebral column</li> <li>• Tabulate the attachments, nerve supply and actions of muscles attaching scapula to the humerus</li> <li>• Identify the boundaries and contents of quadrangular and triangular spaces</li> <li>• Trace the route and anatomical relationships of arteries and nerves present in this region</li> <li>• Describe the</li> </ul>	SGD	<ul style="list-style-type: none"> <li>• MCQs</li> <li>• SEQs/SAQs</li> <li>• Viva Voce</li> </ul>

			structureof acromioclavicular		
--	--	--	----------------------------------	--	--

			<p>and sternoclavicular joints</p> <ul style="list-style-type: none"> <li>• Appraise the stability of clavicular joints in case of direct blow</li> <li>• Describe type, ligaments, articular surfaces, blood supply and nerve supply of shoulder joint</li> <li>• Elucidate the movements at shoulder joint with reference to axis and muscles producing them</li> <li>• Justify the clinical presentation of shoulder joint dislocation on anatomical basis</li> <li>• Describe the factors providing stability to the shoulder joint in spite of wide range of movements it offers</li> <li>• Define rotators cuff and list its components</li> <li>• Justify the clinical presentation of rotator cuff injuries, frozen shoulder and calcific supraspinatus tendinitis based on the anatomical knowledge</li> <li>• Illustrate the anastomosis around shoulder joint/scapula</li> </ul>		
--	--	--	---	--	--

10.	<b>Axilla</b>	Correlate the topographic arrangement of axillary walls and its contents with anatomical basis of various relevant clinical presentations	<ul style="list-style-type: none"><li>• Appraise the shape and extent of axilla</li><li>• Enumerate different structures forming various walls of axilla and identify their inter-relationship</li></ul>	SGD	MCQs SAQ/ SEQ/ OSPE Viva Voce
-----	---------------	---	--	-----	---

			<ul style="list-style-type: none"> <li>• Enumerate different contents of axilla</li> <li>• Describe the relations and distribution of vessels of axilla</li> <li>• Describe the formation and name the branches of brachial plexus</li> <li>• Illustrate the brachial plexus</li> <li>• Elucidate the drainage area of each group of axillary lymph nodes</li> <li>• Analyze the anatomical basis of clinical presentation in case of injury to long thoracic nerve</li> </ul>		
11.	<b>Arm &amp; Forearm</b>	Correlate the knowledge of gross anatomy of arm and forearm with common	<ul style="list-style-type: none"> <li>• Tabulate the attachments, nerve supply and actions of muscles of arm</li> </ul>	SGD	MCQs/ SEQs/ SAQs/ VIVA

		clinical presentations.	and forearm		
			<ul style="list-style-type: none"><li>• Trace the route and relations of the neurovascular structures of arm and forearm</li><li>• Analyze the anatomical basis of clinical presentation in case of injury to various nerves of arm and forearm</li><li>• Describe the type, capsule and ligaments of elbow, superior and inferior radio-ulnar joints</li><li>• Explain the movements of these joints with reference to axis and muscles performing these movements</li></ul>		

			<ul style="list-style-type: none"><li>• Describe the blood supply and nerve supply of elbow joint</li><li>• Justify the anatomical basis of carrying angle</li><li>• Correlate the anatomy of these joints with clinical presentations of their dislocation</li><li>• Outline the boundaries and contents of cubital fossa in a sequential order</li><li>• Justify the clinical importance of blood vessels present in cubital fossa</li><li>• Recognize the boundaries of anatomical snuff box and bony landmarks in its floor</li><li>• Describe the attachments of, and structures passing deep to flexor and extensor retinacula in a sequential order</li><li>• Elucidate the anatomical basis of clinical presentation of compartment syndrome of forearm, Volkmann's ischemic contracture, rupture of various tendons and tennis elbow.</li><li>• Appraise the clinical significance of radial artery with reference to pulse and BP monitoring and coronary angiography</li></ul>		
--	--	--	---	--	--

12.	<b>Hand</b>	Correlate the knowledge of gross anatomy of hand with common clinical presentations.	<ul style="list-style-type: none"> <li>• Identify bones of anarticulated hand</li> <li>• Explain the clinical significance of injury to scaphoid and hamate</li> <li>• Elucidate the salient features of skin of palm and dorsum of hand and discuss its cutaneous innervation</li> <li>• Describe palmar aponeurosis</li> <li>• Enumerate the small muscles of hand with their actions and nerve supply</li> <li>• Describe the fibrous and synovial flexor sheaths of the hand</li> <li>• Explain the carpal tunnel with reference to its formation and contents</li> <li>• Analyze the anatomical basis of Dupuytren's contracture, carpal tunnel syndrome, trigger finger and tenosynovitis of synovial sheaths of flexor tendons</li> <li>• Describe boundaries &amp; contents of spaces of palm</li> <li>• Analyze the anatomical basis of palmar, Parona and pulp spaces in case of wound, resultant infections, and route of surgical drainage.</li> </ul>	SDG	MCQs SAQ/SEQ Viva Voce
-----	-------------	--	--	-----	------------------------------

- Revisit the insertion of long flexor and extensor tendons

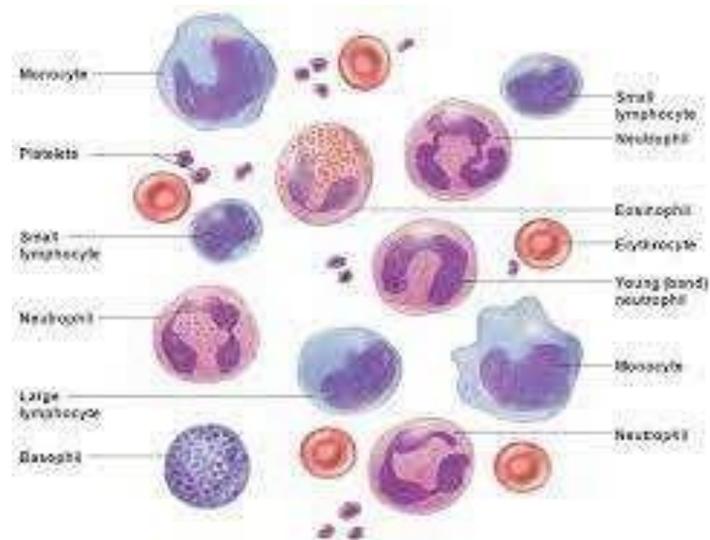
			<ul style="list-style-type: none"> <li>• Describe the blood supply of hand</li> <li>• Trace the pathway and distribution of radial, median, and ulnar nerves in hand and correlate with clinical presentation of their injuries</li> </ul>		
13.	<b>Wrist Joint</b>	Correlate the knowledge of gross anatomy of wrist joint with common clinical presentations.	<ul style="list-style-type: none"> <li>• Describe the type, capsule, and ligaments of wrist joint</li> <li>• Explain the movements of wrist joint with reference to axis and muscles responsible</li> <li>• Describe the blood supply and nerve supply of wrist joint</li> <li>• Correlate the anatomical knowledge with clinical presentation of wrist joint dislocation</li> <li>• Enumerate the structures endangered in case of fall on outstretched hand</li> </ul>	SDG	MCQs SAQ/SEQ Q Viva Voce
14.	<b>Cutaneous innervation of upper limb</b>	Predict the area of sensory loss in case of injuries of different nerves of upper limb based on anatomical knowledge of cutaneous innervation.	<ul style="list-style-type: none"> <li>• Correlate the dermatomes with the cutaneous innervation of specific nerves in Arm &amp; forearm</li> <li>• Illustrate cutaneous innervation and dermatomes of upper limb</li> <li>• Identify the area of anesthesia in case of injury to different</li> </ul>	SGD	MCQs SAQs/SEQ sViva Voce

			nerves		
15.	<b>Injuries to brachial plexus and its branches</b>	Analyze the areas of motor and sensory loss in case of injuries to	<ul style="list-style-type: none"> <li>Revisit the formation and branches of brachial plexus</li> </ul>	SGD	MCQs SAQs/SEQ sViva Voce

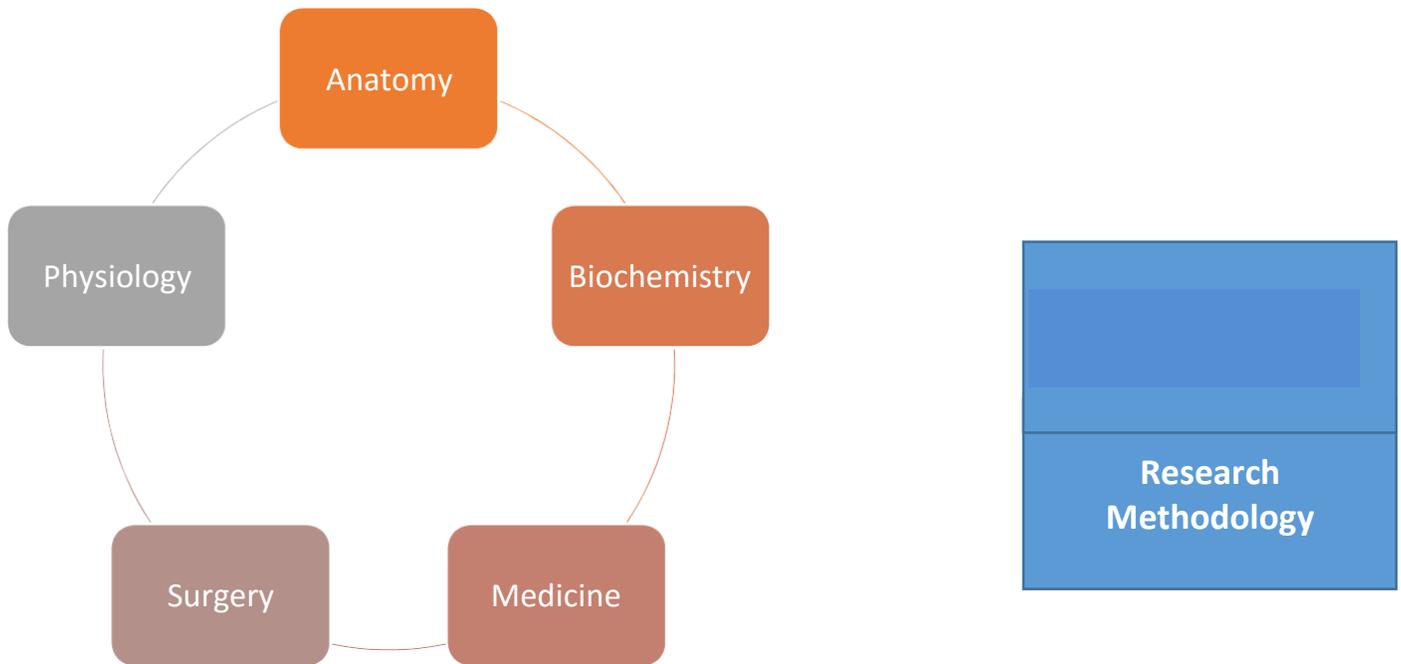
		various branches of brachial plexus at various anatomical sites	<ul style="list-style-type: none"> <li>• Identify the points of injury and justify peculiar positions of upper limb in cases of Klumpke paralysis &amp; Erb-Duchenne palsy with anatomical reasoning</li> <li>• Identify the anatomical sites where different branches of brachial plexus are vulnerable to injury / compression</li> <li>• Correlate the lesion of following nerves with respective areas of sensory and motor loss and peculiar positions of different parts of upper limb: <ul style="list-style-type: none"> <li>▪ Axillary</li> <li>▪ Long thoracic</li> <li>▪ Musculocutaneous</li> <li>▪ Ulnar</li> <li>▪ Median</li> <li>▪ Radial</li> </ul> </li> </ul>		
16.	<b>Venous and lymphatic drainage of upper limb</b>	Summarize the lymphatic and venous drainage of upper limb in totality	<ul style="list-style-type: none"> <li>☒ Recap the veins in various parts to describe the venous drainage of upper limb as a whole</li> <li>☒ Identify the veins commonly used for cannulation</li> <li>☒ Discuss the lymphatic drainage of upper limb in detail</li> </ul>	SGD	MCQs SAQs/SEQ sViva Voce

17.	<b>Surface Marking</b>	Recognize the muscular, tendinous, and bony landmarks of upper limb to Utilize the knowledge of topography of important	<ul style="list-style-type: none"><li>• Mark the following structures on surface of a subject or mannequin correctly:<ul style="list-style-type: none"><li>▪ Axillary nerve</li><li>▪ Brachial nerve</li><li>▪ Ulnar artery</li><li>▪ Radial artery</li></ul></li></ul>	SGD	MCQs SAQs/SEQ SOSPE Viva Voce
-----	------------------------	---	---	-----	--

		neurovascular structures of upper limb in plotting the same on body surface and inferring relevant clinical presentations.	<ul style="list-style-type: none"> <li>▪ Superficial palmar arch</li> <li>▪ Deep palmar arch</li> <li>▪ Cephalic vein</li> <li>▪ Basilic vein</li> <li>▪ Median cubital vein</li> <li>▪ Axillary nerve</li> <li>▪ Musculocutaneous nerve</li> <li>▪ Median nerve</li> <li>▪ Radial nerve</li> <li>▪ Ulnar nerve</li> </ul>		
18.	<b>Skills</b>	Correlate various parts of upper limb with topographic arrangement	<ul style="list-style-type: none"> <li>• Identify various muscular, neurovascular, and ligamentous structures of upper limb on models and prosected specimens</li> </ul>	SGD	OSPE
21.	<b>Practicals</b>	Identify and illustrate microscopic structure	<p>Microscopic structure of the following:</p> <ul style="list-style-type: none"> <li>• Connective tissue</li> <li>• Bone</li> <li>• Cartilage</li> <li>• Muscular tissue</li> </ul>	Practical	OSPE

**MBBS YEAR I****BLOCK I****MODULE IV****HEMATOLOGY AND  
IMMUNOLOGY****Duration: 03 weeks**

### Integration of Disciplines in Module III



### MODULE PLANNING COMMITTEE

<b>Module Coordinator</b>	<b>Dr. Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

This module introduces the student to different lymphoid organs along with physiological imbalances occurring due to deficiencies in contents, functions & features of blood and different lymphoid organs. Biochemical importance of plasma proteins and haemoglobin for understanding its related disorders is also taught in this module. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim:**

This module enables the student to relate the anatomy of different lymphoid organs with their function and to comprehend the outcomes that result from altered structure.

***OUTCOMES*****By the end of this module, student should be able to:**

1. Describe the light microscopic structure of different lymphoid organs (lymph node, thymus, spleen, and palatine tonsils)
2. Elucidate the embryological phenomenon of gastrulation occurring during third week of development
3. Describe the Morphology and Genesis of blood cells
4. Discuss the composition and functions of blood
5. Classify different types of immunity on the basis of cell types involved and their role in defense mechanism.
6. Differentiate the different types of blood groups
7. Compare and contrast various bleeding disorders.
8. Correlate the physiological mechanism for hemostasis & role of pro-coagulants and anti-coagulants in it.
9. Correlate the biochemical basis of Porphyrin and Hemoglobin with clinical conditions
10. Relate the basic knowledge of Plasma proteins to its clinical significance
11. Identify the causes of decrease in hemoglobin level
12. Correlate decrease in hemoglobin level with clinical presentation
13. Interpret the significance of altered level of leucocytes
14. Correlate decreases in platelet count/ functional defects of platelets and bleeding diathesis (ITP)
15. Correlate deficiencies of clotting factors VIII & IX with its varied clinical manifestations (Hemophilia)
16. Relate the de novo synthesis of hemoglobin and its manifestations in the patients of thalassemia and sickle cell anemia.
17. Identify the need of cross matching to avoid blood group incompatibility
18. Develop an understanding about general management of wounds
19. Describe the principles of first-aid in management of patients with external bleeding
20. Demonstrate appropriate methods of managing external bleeding/vascular lesions and hemorrhage

**List of Proposed Themes for INTEGRATED SESSION sessions (at least one/week)**

<b>Theme</b>
Pallor
Enlarged lymph nodes
Splenomegaly
Transfusion reactions

<b>GENERAL HISTOLOGY</b>				
<b>Topic/ Theme</b>	<b>Learning outcomes</b>	<b>Learning Objectives/Contents</b>	<b>Instructional strategies</b>	<b>Assessment tool</b>
	<b>By the end of this module, students will be able to:</b>			
<b>Lymphoid organs</b>	Describe the light microscopic structure of different lymphoid organs (lymph node, thymus, spleen, and palatine tonsils)	Describe light microscopic features of lymph node, thymus, spleen, palatine tonsil on slides	LGIS	MCQs / SEQs/ SAQs VIVA VOCE
		Identify and illustrate light microscopic features of lymph node, thymus, spleen, palatine tonsil on slides	Practical	OSPE/ Viva voce
<b>EMBRYOLOGY</b>				
<b>Third Week of development</b>	Elucidate the embryological phenomenon of gastrulation occurring during third week of development	<p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>Enumerate the sequential phases of human development during third week</li> <li>Define Gastrulation</li> <li>Describe the formation of notochord and the establishment of body axes.</li> <li>Recognize the embryological basis of sacroccygeal teratoma, Holoprosencephaly, caudal dysgenesis, Situs inversus</li> </ul> <p><b>Skill:</b></p> <p>Identify the various phenomenon during third week of development on the given model and diagrams</p>	LGIS	MCQs SEQs/SAQs OSPE Viva Voce

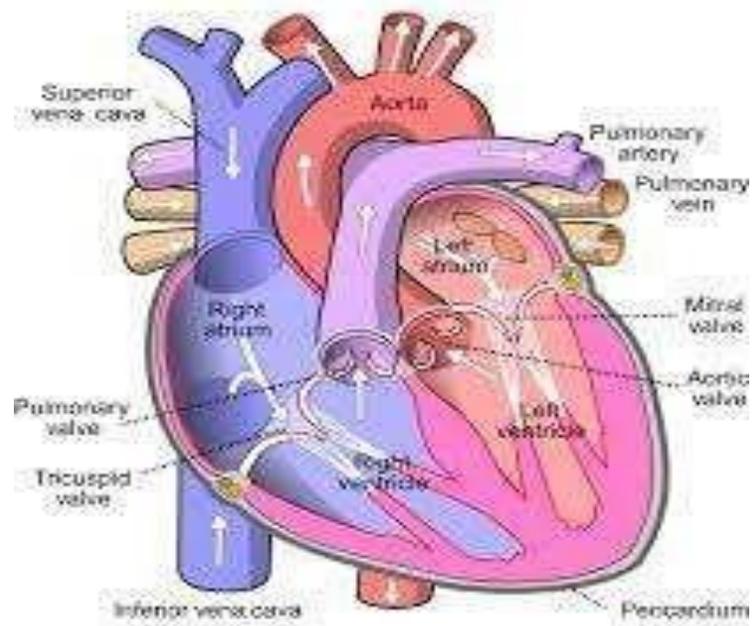
**MBBS YEAR I**

**BLOCK II**

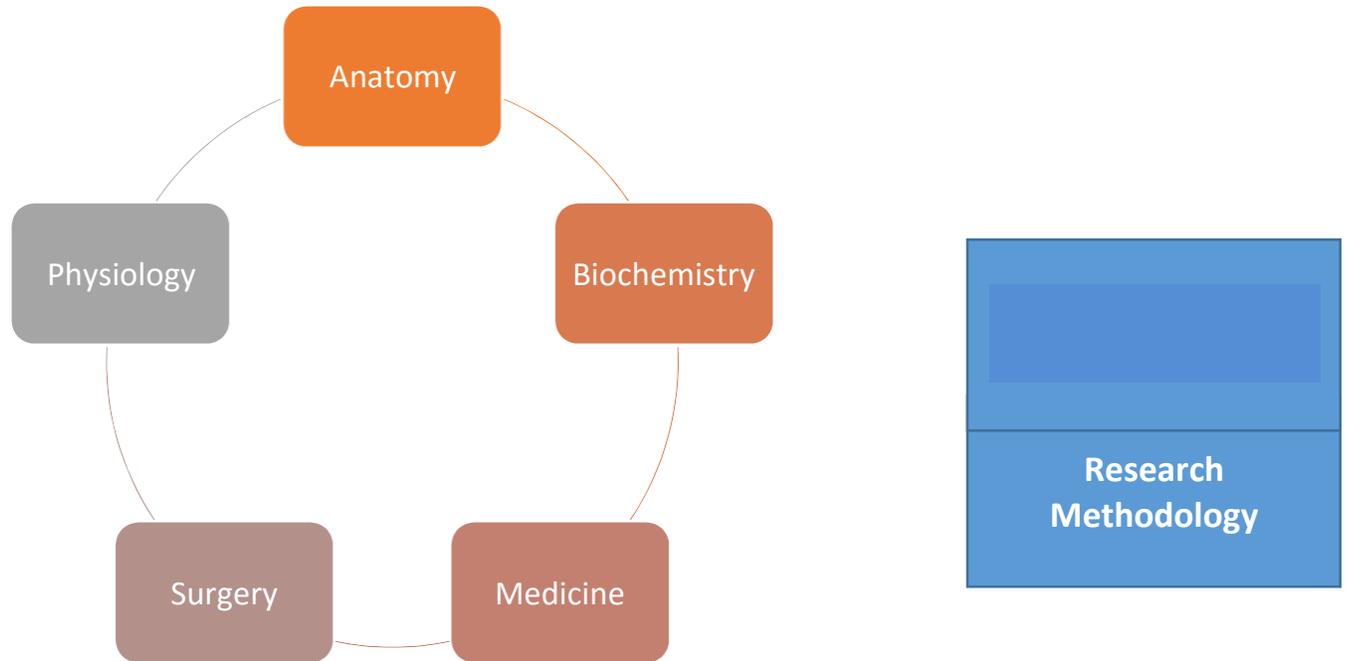
**MODULE V**

**Cardiovascular System**

**Duration: 09 weeks**



### Integration of Disciplines in Module



### MODULE PLANNING COMMITTEE

<b>Module Coordinator</b>	<b>Dr. Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

This block focuses on cardiovascular system with basic understanding of structure of thorax. At the very outset medical student should understand that cardiovascular system has fundamental importance in all the fields of Medicine. Coronary artery diseases alone are one of the leading causes of morbidity and mortality worldwide. The course of this block is designed for first year MBBS students in an integrated manner.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module will enable students to relate their theoretical learning about cardiovascular system through case-based learning, interactive Lectures, integrated sessions and apply this knowledge in relevant clinical scenarios encountered in subsequent years of training and practice.

**Learning Outcomes:****At the end of this module, student will be able to:**

1. Correlate the light microscopic structure of different components of cardiovascular System (elastic and muscular arteries, small and large veins, capillaries, heart) with their function and dysfunction.
2. Correlate the developmental events of embryonic period, fetal period including placenta, fetal membranes, multiple pregnancies with relevant congenital anomalies
3. Relate the development of body cavities, heart & vascular system with their congenital anomalies
4. Apply the knowledge of fetal circulation for interpreting cardiovascular congenital anomalies
5. Correlate the gross anatomical features of mediastinum, thoracic cage and cardiovascular system with relevant clinical conditions
6. Recognize the topographic anatomy of thoracic wall and cavity on the dissected specimens and models
7. Outline the main vessels and viscera of thorax on the body surface of given subject exhibiting effective communication, professionalism and ethics.
8. Appreciate the functional characteristics & electrical properties of cardiac muscle
9. Compare and contrast the pressure and volume changes in different
10. components of circulatory system during cardiac cycle
11. Interpret normal and abnormal ECG changes in health and disease
12. Explain the hemodynamics of systemic circulation
13. Identify the dynamics of local and peripheral Blood flow
14. Elucidate edema types, clinical significance and factors responsible for causing edema
15. Analyze the factors regulating venous return and cardiac output at rest and during exercise
16. Summarize regulatory mechanisms of blood pressure & cardiac output control in health and disease
17. Explain pathophysiology of cardiac failure
18. Differentiate among normal and abnormal heart sounds
19. Compare various types of shock and their pathophysiology
20. Explain the special blood circulations in the body
21. Analyze cardiovascular and pulmonary changes (including oxygen consumption) during different grades of exercise
22. Elaborate the biochemical importance of enzymes, coenzymes, co-factors, and isoenzymes as well as their role in various clinical conditions
23. Relate the significance of different lipids in medicine
24. Apply the knowledge of lipid metabolism for understanding relevant metabolic disorder
25. Analyze the results of given experiment

26. Differentiate between types of lipids
27. Correlate the increase in peripheral vascular resistance being manifested in the form of high blood pressure
28. Relate the common presentation of IHD with its causes
29. Explain the abnormalities in systole & diastole (cardiac cycle) in the patients of CCF
30. Correlate cardiac cycle with ECG
31. Correlate the common abnormalities in the heart rhythm on ECG.
32. Explain surgical aspect of various Cardiovascular diseases
33. Describe principles of Coronary angioplasty and CABG
34. Describes clinical presentations of acute and chronic limb ischemia
35. Explain incidence of various aneurysms
36. Describe presentations of varicose veins

**List of Proposed Themes for integrated sessions (at least one/week)**

Theme
Chest pain
Dyspnoea
Changes in ECG
High blood pressure
Dyslipidaemia
Palpitations
Decreased heart rate

<b>CARDIOVASCULAR SYSTEM</b>				
<b>HISTOLOGY</b>				
<b>Topic/ Theme</b>	<b>Learning outcomes</b>	<b>Learning Objectives/Contents</b>	<b>Instructional strategies</b>	<b>Assessment tool</b>
<b>Histology of Circulatory System</b>	Correlate the light microscopic structure of different components of cardiovascular System (elastic and muscular arteries, small and large veins, capillaries, heart) with their function and dysfunction.	<ul style="list-style-type: none"> <li>Define capillaries &amp; classify them based on their structure and describe each class by giving examples</li> <li>Classify arteries and veins depending on their size and describe structure and relative thickness of each component by giving examples.</li> <li>Describe histological changes in intima in atherosclerosis or arteriosclerosis.</li> </ul>	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
		<ul style="list-style-type: none"> <li>Identify various vessels under light microscope and enlist at least two identification points for each.</li> <li>Illustrate elastic and muscular arteries, small and large veins, capillaries, emphasizing the differences amongst them with the help of eosin and hematoxylin pencils.</li> </ul>	Practical	OSPE/ Viva voce
<b>EMBRYOLOGY</b>				
<b>The Embryonic Period (Third to Eight Weeks)</b>	Correlate the developmental events during the embryonic period with relevant congenital anomalies	<ul style="list-style-type: none"> <li>Define neurulation and describe process of formation of neural plate, neural tube and neural crest cells.</li> </ul>	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
		<ul style="list-style-type: none"> <li>Enlist derivatives of:</li> <li>Surface ectoderm</li> <li>Neuroectoderm</li> <li>Neural crest</li> <li>Intraembryonic mesoderm (paraxial, intermediate, lateral</li> </ul>		

		plate) • Endoderm • Explain somitogenesis and differentiation of somites		
		• Explain the development of Intraembryonic coelom.		

		<ul style="list-style-type: none"> <li>Correlate the folding of the embryo in the horizontal and longitudinal planes with its consequences.</li> </ul>		
		<ul style="list-style-type: none"> <li>Explain the processes of formation of blood vessels</li> <li>Define hemangioma and explain its embryological basis.</li> </ul>		
<b>Fetal Period</b>	<ul style="list-style-type: none"> <li>Correlate the developmental events of fetal period including placenta, fetal membranes, multiple pregnancies with relevant congenital anomalies</li> </ul>	<ul style="list-style-type: none"> <li>Define fetal period</li> <li>List the external body landmarks from third month till birth.</li> <li>Enumerate various methods to estimate fetal age</li> <li>List factors affecting fetal growth.</li> <li>Define intrauterine growth retardation.</li> </ul>	LGIS	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

<b>Placenta and Fetal Membranes</b>	<ul style="list-style-type: none"> <li>Distinguish various types of multiple pregnancies based on fertilization, fetal membranes, and placental circulation</li> </ul>	<ul style="list-style-type: none"> <li>Enlist fetal membranes. Describe their important functions &amp; fate in humans</li> <li>Enlist types of chorion and give fate of each.</li> <li>Define decidua. Enlist its types and give fate of each.</li> <li>Differentiate between stem, anchoring and terminal villi</li> <li>Describe the structure of placenta and enumerate its functions</li> <li>Correlate the following anomalies with development of placenta <ul style="list-style-type: none"> <li>Placenta Previa</li> <li>Placenta Accreta</li> <li>Placenta Percreta</li> <li>Placenta Succenturiata</li> <li>Placenta Battledore</li> <li>Placenta Velamentosa</li> </ul> </li> <li>Differentiate between features of maternal and fetal surfaces of placenta.</li> <li>Enumerate the layers forming placental barrier</li> </ul>	LGIS	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
-------------------------------------	--	---	------	--

		<ul style="list-style-type: none"> <li>• Describe placental circulation(maternal and fetal)</li> <li>• Describe development ofumbilical cord</li> <li>• Describe production, circulation, and significance ofamniotic fluid</li> <li>• Identify causes, complications and diagnostic features of poly&amp; oligohydramnios.</li> <li>• Describe embryological basis of amniotic bands and umbilicalcord defects</li> </ul>		
<b>Multiple pregnancies</b>	Correlate the development of bodycavities with commoncongenital anomalies	<ul style="list-style-type: none"> <li>• Elucidate the mechanism behind the occurrence of various types of multiple pregnancies.</li> <li>• Explain the arrangement of fetal membranes in various types of multiple pregnancies</li> <li>• Explain the embryological basisof fetus papyraceus, twin transfusion syndrome and conjoined twins.</li> </ul>	LGIS	MCQs/SEQs/SAQs/VIVA VOCE
<b>Screening forfetal well being</b>	Appraise Invasive and noninvasive approaches for antenatal screening for fetal well being	<ul style="list-style-type: none"> <li>• Appraise Invasive and noninvasive approaches for antenatal screening for fetalwell being</li> </ul>	LGIS	MCQs/SAQs/SEQs/Vivavoce/OSPE

<b>Development of body cavities</b>	Correlate the development of body cavities with their congenital anomalies	<ul style="list-style-type: none"> <li>• Describe the formation of intraembryonic coelom and its divisions</li> <li>• Correlate the effects of folding with relocation of different parts of intraembryonic coelom</li> <li>• Elucidate the processes involved in partitioning of intraembryonic coelom into definitive body cavities</li> <li>• Explain the contribution of different developmental sources of Diaphragm</li> </ul>	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
-------------------------------------	--	--	------	---------------------------------

		<ul style="list-style-type: none"> <li>• Correlate the nerve supply of diaphragm with its developmental sources</li> <li>• Correlate the anomalies of ventral body wall and diaphragm with normal development</li> </ul>		
<b>Development of Heart</b>	Correlate the development of heart with its congenital anomalies	<ul style="list-style-type: none"> <li>• Explain the formation, division of heart tube with special reference to primary &amp; secondary heart fields</li> <li>• Elucidate the mechanism of cardiac looping, and justify dextrocardia on basis of that knowledge</li> <li>• Explain methods of septal formation in atria and ventricles</li> <li>• Describe division of atrioventricular canal.</li> <li>• Describe the formation of left atrium and pulmonary veins</li> <li>• Explain the division of conotruncus</li> <li>• Appraise the embryological basis of the following heart defects.</li> <li>• Atrial septal defects</li> <li>• Ventricular septal defects</li> <li>• Fallot's tetralogy</li> <li>• Transposition of great vessels</li> <li>• Persistent truncus arteriosus</li> <li>• Ectopia cordis</li> </ul>	LGIS	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
<b>Development of vascular system</b>	Correlate the development of vascular system with its congenital anomalies	<ul style="list-style-type: none"> <li>• Explain the development and fate of aortic arches</li> <li>• Enumerate the developmental sources of aorta</li> <li>• Explain the congenital anomalies of arterial system which include:</li> <li>• Patent Ductus Arteriosus</li> <li>• Coarctation of aorta</li> <li>• Double aortic arch</li> </ul>	LGIS	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"><li>• Right aortic arch</li></ul>		
--	--	---	--	--

		<ul style="list-style-type: none"> <li>• Abnormal origin of the Right Subclavian Artery</li> <li>• An interrupted aortic arch</li> <li>• Explain the fate of vitelline, umbilical and cardinal veins.</li> <li>• Describe the development of superior &amp; inferior vena cava.</li> <li>• Apply the knowledge of developmental anatomy to explain following anomalies: <ul style="list-style-type: none"> <li>• Double Inferior Vena Cava</li> <li>• Absence of Inferior Vena Cava</li> <li>• Left Superior Vena Cava</li> <li>• Double Superior Vena Cava</li> </ul> </li> </ul>		
<b>Fetal circulation</b>	Use the knowledge of fetal circulation for interpreting cardiovascular congenital anomalies	<ul style="list-style-type: none"> <li>• Identify the sites of mixing of oxygenated and deoxygenated blood in a fetus</li> <li>• Justify the needs of these sites in a fetus</li> <li>• List the changes occurring in human circulation after birth</li> <li>• Explicate the embryological basis of various congenital anomalies of CVS based on the knowledge of fetal circulation and changes after birth.</li> </ul>	LGIS	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
<b>Skills</b>	Recognize the developmental events of fetal period and cardiovascular system on the given models	<ul style="list-style-type: none"> <li>• Identify the developmental events of embryonic and fetal period on the given models and diagrams</li> <li>• Identify the developmental events of cardiovascular system on the given models and diagrams</li> </ul>	SGD	OSPE Viva

<b>GROSS ANATOMY</b>				
<b>Osteology of ribs, sternum and thoracic vertebrae</b>	Appraise bony features of thoracic vertebrae, ribs, sternum	<ul style="list-style-type: none"> <li>Identify basic features of thoracic vertebrae, ribs, sternum</li> <li>Recognize the site and importance of sternal angle in relation to great vessels and rib counting.</li> </ul>	LGIS/SGD	MCQs/SEQs/SAQs/OSPE/VIVA VOCE
<b>General organization of circulatory system</b>	Appraise the general concept of anatomical organization of cardiovascular system	<ul style="list-style-type: none"> <li>Describe general plan of systemic, pulmonary, and portal circulatory system.</li> <li>Classify blood vessels on anatomical and functional basis with the help of examples.</li> <li>Differentiate between anatomical end arteries and functional end arteries by giving examples.</li> <li>Explain the anatomical basis and clinical significance of collateral/potential circulation</li> <li>Describe general plan of the lymphatic system of the body.</li> </ul>	LGIS/SGD	Formative--MCQs/SEQs/SAQs/
<b>Thoracic wall</b>	Appraise thoracic inlet and outlet, sternum, sternal angle, thoracic vertebrae,	<ul style="list-style-type: none"> <li>Identify structures forming the thoracic inlet and outlet/costal margin</li> <li>Mark sternal angle and discuss its importance in clinical practice</li> <li>Identify basic features of thoracic vertebrae, ribs, sternum</li> </ul>	LGIS/SGD	MCQs/SEQs/SAQs/OSPE/VIVA VOCE

Correlate the gross anatomy of thoracic wall, lungs, pleura and diaphragm with relevant clinical conditions	<ul style="list-style-type: none"><li>• Revisit basic features of thoracic vertebrae, ribs, sternum</li><li>• Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its function</li></ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
---	--	----------	--

		<ul style="list-style-type: none"> <li>• Identify structures forming the thoracic inlet and outlet/costal margin</li> <li>• Mark sternal angle and discuss its importance in clinical practice</li> <li>• Describe the joints of thorax with reference to their types and movements</li> <li>• Discuss and differentiate between the pump handle and bucket handle movements and their effect on diameters of chest cavity</li> <li>• Discuss the role of the respiratory muscles during inspiration and expiration</li> <li>• Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons.</li> <li>• Discuss the arterial supply, lymphatic and venous drainage of the thoracic wall.</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>• Calculate ribs, cardiothoracic ratio on chest x ray PA view</li> <li>• Identify cardiophrenic angle, cardiothoracic angle, hilar shadow and aortic knuckle on chest x ray PA view.</li> <li>• Identify Lung consolidation on X ray chest PA view.</li> </ul>		
<b>Anterior Mediastinum</b>	Recognize the boundaries and contents of anterior mediastinum	<ul style="list-style-type: none"> <li>• Outline the boundaries of anterior mediastinum</li> <li>• Enumerate the contents of anterior mediastinum</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

	h	wit		
--	---	-----	--	--

	special emphasis on thymus	<ul style="list-style-type: none"> <li>Describe the shape, relations, and blood supply of thymus</li> </ul>		
<b>Superior Mediastinum</b>	Discuss superior mediastinum in detail	<ul style="list-style-type: none"> <li>Outline the boundaries of superior mediastinum and describe its general topography</li> <li>Enumerate the contents of superior mediastinum</li> <li>Identify carina at the site of bifurcation of trachea into main principal bronchi</li> <li>Describe immediate relations, blood, and nerve supply of thoracic part of trachea</li> <li>Justify the right bronchus being the most probable site of foreign body impaction in respiratory tract</li> <li>Describe the origin, course, relations, and distribution of both phrenic nerves</li> <li>Analyze the clinical scenarios related to compression of trachea and damage/irritation to phrenic nerve based upon your knowledge of Anatomy</li> </ul>	LGIS/SGD	MCQs/SEQs/SAQs/OSPE/VIVA VOCE

<b>Middle mediastinu mand Heart</b>	Correlate the anatomical knowledge of the middle mediastinum with relevant clinical conditions	<ul style="list-style-type: none"> <li>• Recognize anatomical position, borders, surfaces, apex and base, chambers of heart as seen from exterior</li> <li>• Describe internal features of various chambers of heart</li> <li>• Describe the arterial supply, venous drainage and nerve supply of heart</li> <li>• Correlate the anatomical basis of opening and closing of AV, aortic and pulmonary valves, with the heart sounds produced by them.</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
---	--	---	----------	--

		<ul style="list-style-type: none"> <li>• Locate the sites for auscultation of various heart sounds on the chest wall</li> <li>• Describe the anatomical basis of valvular heart diseases</li> <li>• Differentiate between anatomical end arteries and functional end arteries</li> <li>• Define angina pectoris and myocardial infarction. and explain their anatomical basis in case of coronary artery disease</li> <li>• Explain the anatomical basis of cardiac referred pain in case of ischemic heart disease</li> <li>• List various diagnostic procedures for coronary artery disease</li> <li>• Differentiate between coronary angiography and angioplasty</li> <li>• Name the blood vessels preferably used for coronary catheterization</li> </ul>		
<b>Posterior mediastinum</b>	Discuss posterior mediastinum in detail	<ul style="list-style-type: none"> <li>• Outline the boundaries of posterior mediastinum and describe its general topography</li> <li>• Enumerate the contents of posterior mediastinum</li> <li>• Describe the relations and branches of descending aorta</li> <li>• Describe the thoracic duct with reference to its formation, course, tributaries, termination, and area of drainage</li> <li>• Analyze the clinical scenarios related to chylothorax with the help of your knowledge of Anatomy</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> <li>• Describe the course, relations, and distribution of both vagii in thorax</li> <li>• Discuss the azygos system of veins with reference to formation, course, relations, tributaries, and area of drainage of both azygos and hemiazygos veins</li> <li>• Discuss the role of azygos vein in case of caval obstruction</li> <li>• Identify the lymph nodes in the posterior mediastinum</li> <li>• Define splanchnic nerves and identify the location of thoracicsympathetic chain</li> </ul>		
<b>Pericardium</b>	Correlate the anatomical features ofpericardium with its clinical abnormalities	<ul style="list-style-type: none"> <li>• Describe the layers, innervation, blood supply andfunctions of pericardium</li> <li>• Correlate the reflections of parietal and visceral pericardium resulting in formation of oblique sinus, and transverse sinus with its surgicalsignificance</li> <li>• Define pericarditis and identify the layers of pericardiuminvolved</li> <li>• Explain the anatomical basis of cardiac tamponade and pericardial rub</li> <li>• Name the layers between which the serous accumulation may occur, resulting in pericardial effusion.</li> <li>• Identify the ideal site for pericardiocentesis, and list the structures pierced during the</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

		procedure in an order.		
--	--	------------------------	--	--

<b>Lungs</b>	Correlate the development of lungs with its structure and function	<ul style="list-style-type: none"> <li>• Identify the side of lung correctly by recognizing its borders, surfaces, and hilar apertures</li> <li>• Discuss the blood supply, nerve supply, and relations of various surfaces of both lungs</li> <li>• Correlate bronchopulmonary segments with their position and significance.</li> <li>• Discuss with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
<b>Pleura</b>	Correlate the development of pleura with its anatomy, functions, and diseases	<ul style="list-style-type: none"> <li>• Identify various parts of pleura</li> <li>• Recognize the pleural reflections and recesses</li> <li>• Relate the innervation of the visceral and parietal layers of the pleura in different clinical presentations of pleurisy</li> <li>• Discuss the clinical significance of reflections and recesses of pleura and pleural cavity</li> <li>• Recognize signs, symptoms and radiological findings of pleural effusion, pneumothorax, empyema and hemothorax.</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE
<b>Diaphragm</b>	Correlate the development of diaphragm with its structure and function	<ul style="list-style-type: none"> <li>• Identify parts of diaphragm and their embryological origin</li> <li>• List the apertures in diaphragm with their levels and structures passing through each</li> <li>• Discuss the role of diaphragm and scalene muscles in increasing the vertical diameter</li> </ul>	LGIS/SGD	MCQs/ SEQs/SAQs/ OSPE/ VIVA VOCE

		of thoracic cavity		
--	--	--------------------	--	--

		<ul style="list-style-type: none"> <li>Analyze the clinical scenario related to diaphragmatic hernia and phrenic nerve lesions with anatomical reasoning</li> <li>Justify anatomical basis of referred shoulder tip pain</li> </ul>		
<b>Thorax</b>	<p>Correlate the gross anatomy of thoracic wall with its movements, relevant clinical conditions, and requisite surgical interventions</p> <p>Surface Marking</p>	<ul style="list-style-type: none"> <li>Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its functions</li> <li>Explain the mechanics of respiration</li> <li>Recognize signs, symptoms and radiological findings of pleural effusion, pneumothorax, empyema and hemothorax.</li> <li>Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons.</li> <li>Discuss with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma</li> <li>Correlate bronchopulmonary segments with their position and clinical significance</li> </ul>	SGD	MCQs/SAQs /SEQs/Viva voce/ OSPE

**MBBS YEAR I**

**BLOCK III**

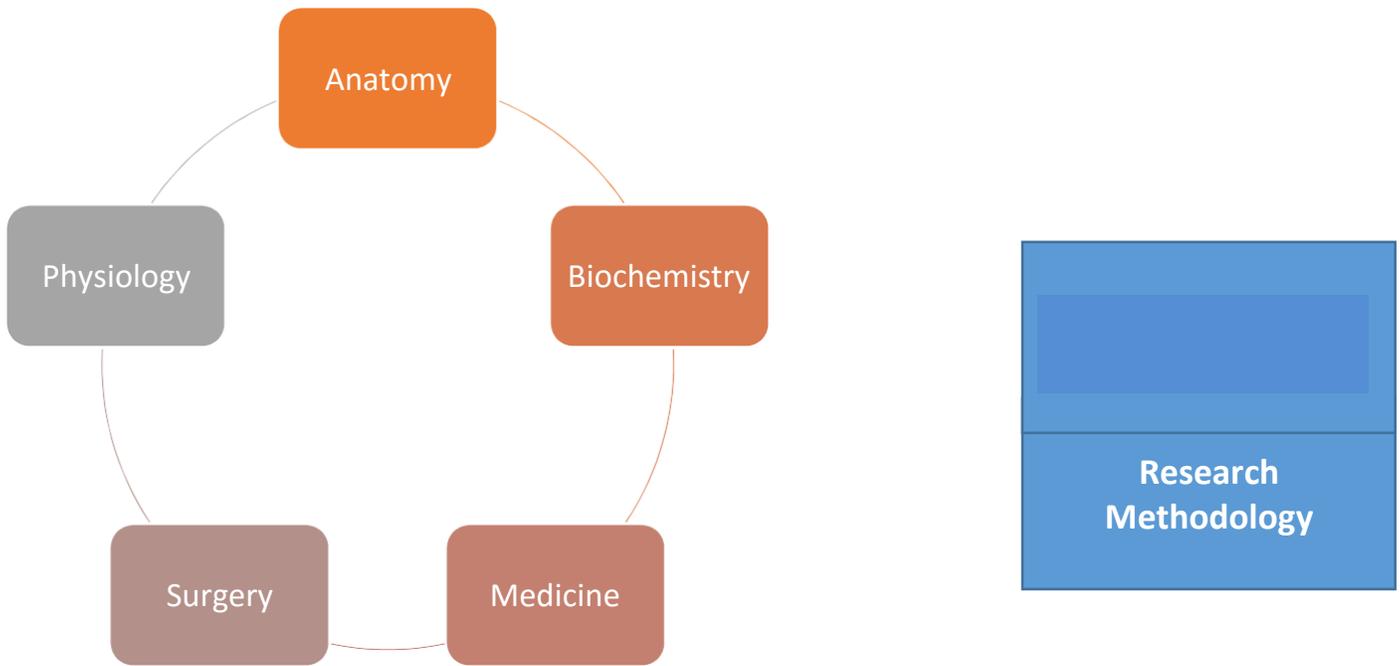
**MODULE VI**

**Respiratory system**

**Duration: 04 weeks**



### Integration of Disciplines in Module VI



### MODULE PLANNING COMMITTEE

<b>Module Coordinator</b>	Dr. Rabia Latif
<b>Members</b>	Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun

**Preamble**

One of the unfortunate gifts of industrialization is varied respiratory illnesses. However, high prevalence of chronic respiratory diseases, mortality and morbidity associated with it is a burden that is not limited to affluent countries. According to a lancet report, nearly 545 million of world population (7.4% of world's population) suffers from chronic respiratory condition. However, disability remains highest in our part of the world (South Asia), where premature mortality from chronic respiratory diseases is highest! Risk factors for men include air pollution, cigarette and sheesha smoking causing rise in COPD cases. Amongst women, exceptions exist, as household air pollution from solid fuels and ambient particulate matter are the were the leading cause. Genetics also play a part in diseases like asthma, sarcoidosis, interstitial lung diseases. However, certain lifestyle and behavioral modifications can overcome genetic and environmental factors improving the morbidity. Therefore, a firm understanding of the respiratory system is very important for undergraduate students so that they can manage these diseases in clinical settings reducing disease burden in society.

This module focuses on respiratory system along with knowledge of Bioenergetics and Biological Oxidation and Vita,min. Content of 'Gross Anatomy of thorax, development of body cavities and diaphragm" will be taught in block-

II. However, revisit of thorax (lungs pleura and respiratory movements) is included in this block for integration with physiology

The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module will enable the students to integrate the basic knowledge of respiratory system and relate it with its

clinical aspects which helps them to practice clinically in the subsequent years

**Learning Outcomes:**

**At the end of this module, student will be able to:**

1. Recognize the light microscopic features of different parts of respiratory system.
2. Correlate the microscopic structure of respiratory system with its function and dysfunction.
3. Correlate the development of respiratory system with its congenital anomalies.
4. Correlate the development of vertebral column, ribs and sternum with their related congenital anomalies
5. Revisit the gross anatomy of thorax (lungs,pleura and respiratory movements) for integration with physiologyand relevant clinical conditions
6. Explain the involvement of surrounding structures in spread of infections and malignancies of variousrespiratory organs with anatomical reasoning
7. Correlate the anatomy of respiratory tract with its functions
8. Appreciate the role of conductive and gas exchange zones of lungs
9. Analyze the mechanics of respiration
10. Analyze lung volume and pressure changes during quiet and forceful breathing
11. Explain factors determining pulmonary compliance, lung volumes, lung capacities and pulmonary capillarydynamics
12. Explain factors determining dead space and alveolar ventilation
13. Compare the chemical and neural regulation of respiration during rest and exercise

14. Correlate ventilation with perfusion in different lung zones
15. Compare the different modes of gas transport in blood
16. Distinguish between various respiratory abnormalities
17. Justify the role of ATP and energy metabolism in health and disease
18. Classify vitamins.
19. Relate the knowledge of water soluble and fat-soluble vitamins for understanding of its deficiency and excess manifestations
20. Identify clinical presentation of asthma
21. Correlate Obstructive Airway Disease with Clinical Manifestations
22. Correlate Restrictive Lung Disease with Clinical manifestation (dyspnea)
23. Apply knowledge of anatomy to understand clinical findings in patients presenting with thoracic trauma and other thoracic surgical problems
24. Describe principles of chest intubation in treatment of thoracic injuries

**List of Proposed Themes for integrated sessions (at least one/week)**

<b>Theme</b>
Cough
Dyspnoea
Hemoptysis
Fever with cough

ANATOMY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
<b>HISTOLOGY</b>				
<b>Histology of Respiratory system</b>	<ul style="list-style-type: none"> <li>Recognize the light microscopic features of different parts of respiratory system.</li> <li>Correlate the microscopic structure of respiratory system with its function and dysfunction.</li> </ul>	<ul style="list-style-type: none"> <li>Enumerate cells comprising respiratory epithelium.</li> <li>Differentiate between the light microscopic structure of conducting and gas exchange portion of respiratory system.</li> <li>Relate progressive modifications of wall of respiratory tract (from trachea down to alveoli) with its function</li> <li>Describe the components of respiratory membrane, the role of type-II alveolar cells in surfactant production and respiratory distress syndrome.</li> <li>Appraise the histological basis of immotile cilia syndrome.</li> <li>Identify the role of interalveolar septa in preventing alveolar collapse.</li> <li>Describe histological basis of hemoptysis in cardiac failure.</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>Illustrate histological structure of different parts of respiratory system</li> <li>Give two points of identification of each part on slide.</li> </ul>	LGIS, Practical	MCQs, SAQs, SEQs OSPE, Vivavoce

<b>EMBRYOLOGY</b>				
<b>Development of Respiratory system</b>	Correlate the development of respiratory system	<ul style="list-style-type: none"><li>Describe the development of trachea.</li></ul>	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE

	with its congenital anomalies.	<ul style="list-style-type: none"> <li>• Appraise the embryological basis of various types of tracheoesophageal fistulae &amp; justify their relationship with polyhydramnios.</li> <li>• Explain different stages of lung maturation.</li> <li>• Enumerate factors important for normal lung development</li> <li>• Analyze embryological basis and prevention of respiratory distress syndrome in a premature infant.</li> </ul>		
<b>Development of vertebral column, ribs, and sternum</b>	Correlate the development of vertebral column, ribs and sternum with their related congenital anomalies	<ul style="list-style-type: none"> <li>• Describe the development of vertebral column, ribs, and sternum.</li> <li>• Explain the embryological basis of Vertebral defects (Klippel-Feil Syndrome, Spina bifida, Chordoma, variations in number of vertebrae, Hemivertebrae, Rachischisis), Rib defects (Accessory ribs, Fused ribs, Cervical rib) and Defects of sternum</li> </ul>	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
<b>Gross Anatomy</b>				
Recap of gross anatomy of lungs, pleura and respiratory movements				
<b>List of Practicals</b>				
<ol style="list-style-type: none"> <li>1. Trachea</li> <li>2. Lungs</li> </ol>				

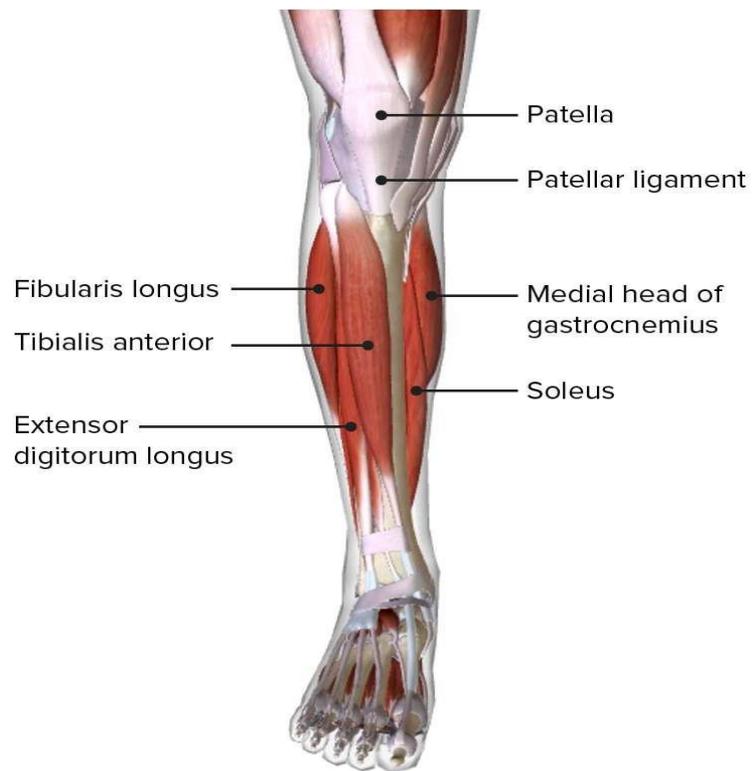
**MBBS YEAR I**

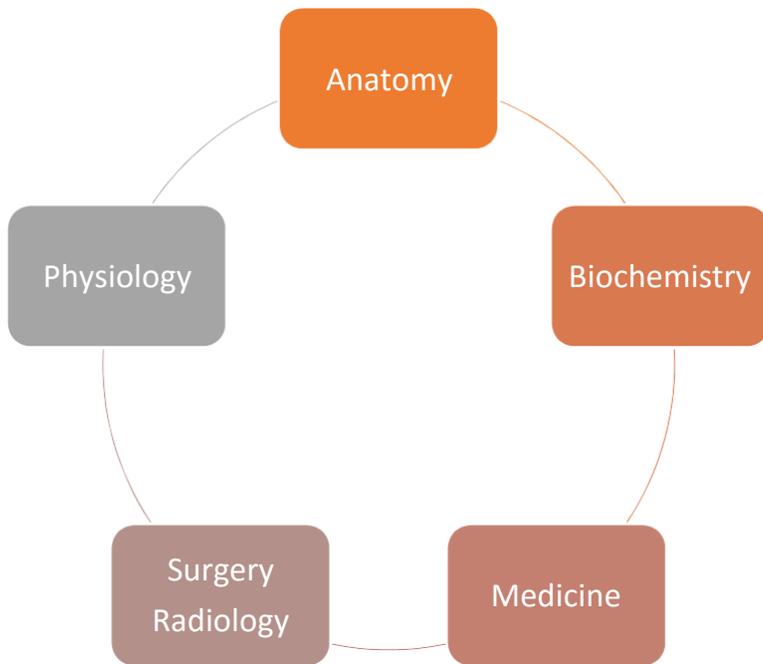
**BLOCK III**

**MODULE VII**

**MUSCULOSKELETAL SYSTEM -  
II**

**Duration: 05 weeks**



**Integration of Disciplines in Module VII****MODULE PLANNING COMMITTEE**

<b>Module Coordinator</b>	<b>Dr. Rabia Latif</b>
<b>Members</b>	<b>Dr. Amina Liaqat, Dr. Marya Syed, Dr. Abdullah Humayun</b>

**Preamble**

The locomotor system is responsible for locomotion, support and protection to the human body. This system consists of osteology (the study of bones), arthrology (the study of joints), and myology (the study of muscles) of lower limb

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

**Aim**

This module will enable the students to apply the knowledge of gross and developmental anatomy of bones, joints, muscles and neurovascular bundle of lower limb in interpreting the basis of common relevant clinical conditions

**Learning Outcomes**

**By the end of this module, student should be able to:**

1. Correlate the development of limbs with the related congenital anomalies
2. Correlate the development of muscles with its anomalies
3. Identify the congenital malformations associated with various common teratogens
4. Apply the knowledge of gross anatomy of bones, joints, muscles and neurovascular bundle of lower limb in interpreting the basis of common relevant clinical conditions
5. Recognize gross anatomical features of Lower limb on the prosected specimens and models
6. Outline the course of main nerves & vessels of lower limb on the body surface of given subject exhibiting effective communication, professionalism and ethics.
7. Summarize the respiratory and cardiovascular adjustments in body during exercise
8. Discern the respiratory adjustment at high altitude, in deep sea and space and analyze various maladjustments in unusual environment
9. Relate the significance of different proteins in medicine
10. Apply the knowledge of protein metabolism for understanding relevant metabolic disorders
11. Identify clinical presentation of Caisson's disease
12. Comprehend the significance of O<sub>2</sub> therapy in respiratory failure
13. Recognize Poliomyelitis & Gullain Barrie syndrome
14. Recognize Duchenne muscular dystrophy/ Becker's muscular dystrophy
15. Identify clinical presentation of Gout Identify & relate clinical presentation of different fractures/dislocations of lower limb with anatomical knowledge
16. Correlate skeletal framework of lower limb with its radiological appearance

**List of Proposed Themes for integrated sessions (at least one/week)**

<b>Theme</b>
Waddling Gait
Swollen knee joint
Foot drop
Numbness in leg

<b>Embryology</b>				
<b>TOPIC/THEME</b>	<b>LEARNING OUTCOMES</b>	<b>COURSE CONTENT/LEARNING OBJECTIVES</b>	<b>MIT</b>	<b>ASSESSMENT TOOLS</b>
<b>Development of limbs</b>	Correlate the development of limbs with the related congenital anomalies	<ul style="list-style-type: none"> <li>• Describe the events in the development of limbs</li> <li>• Identify teratogens causing limb defects</li> <li>• Explain the embryological basis of following Limb Defects:               <ul style="list-style-type: none"> <li>○ Amelia,</li> <li>○ Meromelia,</li> <li>○ Phocomelia</li> <li>○ Micromelia</li> <li>○ Micromelia</li> <li>○ Syndactyly,</li> <li>○ Brachydactyly,</li> <li>○ Polydactyly,</li> <li>○ Ectrodactyly</li> <li>○ Cleft hand &amp; foot</li> <li>○ Osteogenesis imperfecta</li> <li>○ Marfan syndrome</li> <li>○ Congenital absence of radius,</li> <li>○ Amniotic bands</li> <li>○ Transverse limb deficiencies</li> <li>○ Congenital hip dislocation</li> <li>○ Club foot</li> <li>○ Clinical significance of ossification centers in determining the bone age</li> </ul> </li> </ul>	LGIS	MCQ/SEQ/OSPE /VIVA VOCE

<b>Development of muscles</b>	<ul style="list-style-type: none"> <li>Correlate the development of muscles with its anomalies</li> </ul>	<ul style="list-style-type: none"> <li>Explain the development of skeletal, cardiac, and smooth muscles</li> <li>Describe the patterning of muscles</li> <li>Recognize the embryological basis of various types of congenital anomalies (Poland sequence, Prune belly syndrome, muscular dystrophy)</li> </ul>	LGIS	MCQ/SEQ/OSPE /VIVA VOCE
<b>Birth defects</b>	<ul style="list-style-type: none"> <li>Identify the congenital malformations associated with various common teratogens</li> </ul>	<ul style="list-style-type: none"> <li>Identify the congenital malformations associated with the following teratogens:             <ul style="list-style-type: none"> <li>Infectious agents (Rubella virus, cytomegalovirus, herpes simplex virus, varicella virus)</li> <li>Physical agents (X-Rays, hyperthermia)</li> <li>Chemical agents (Thalidomide, phenytoin, opioids, warfarin, ACE inhibitors, Alcohol, Vitamin A)</li> <li>Hormones (Androgenic Agents, DES, Maternal diabetes, Maternal obesity)</li> </ul> </li> </ul>	LGIS	MCQ/SEQ/OSPE /VIVA VOCE

<b>Hip bone, femur Tibia, fibula Patella</b>	Appraise the topographic orientation of major bones of lower limb, their attachments and their articulations.	<ul style="list-style-type: none"> <li>• Demonstrate the anatomical position of hip bone, femur, tibia fibula &amp; patella.</li> <li>• Determine side of bone.</li> <li>• Identify important bony landmarks and attachments of hip bone, Femur, tibia and fibula on gross inspection and radiographs.</li> <li>• Appraise the importance of blood supply of head of femur in relation to age related complications of fractures of femoral neck.</li> </ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE
<b>Hip joint</b>	Apply anatomical knowledge of hip joint in various clinical scenarios.	<ul style="list-style-type: none"> <li>• Describe the articular surfaces, types, capsule, ligaments, synovial membrane, nerve supply, blood supply and important relations of hip joint</li> <li>• Analyze movements of hip joint (muscles responsible for these movements, axis of movements, limiting factors)</li> </ul>	SGD/CBL	
<b>Fascia of lower limb</b>	Correlate the attachments, and modifications superficial & deep fascia of lower limb with their clinical significance	<ul style="list-style-type: none"> <li>• Trace the lining of fascia lata on the skeleton highlighting muscles enclosed and saphenous opening.</li> <li>• Describe the formation, extent &amp; importance of iliotibial tract.</li> </ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE

<b>Gluteal region</b>	Correlate the topographic anatomy of muscles and neurovascular structures of Gluteal region with	<ul style="list-style-type: none"><li>• Demonstrate the major functions of muscles of gluteal region.</li><li>• Describe formation of greater and lesser sciatic foramina and enumerate</li></ul>	SGD/CBL	MCQ/SEQ/OSPE /VIVA VOCE
-----------------------	--	---	---------	-------------------------

	their clinical conditions.	<p>structures passing through them.</p> <ul style="list-style-type: none"> <li>• Enumerate the nerves entering gluteal region and comprehend the origin, important relations &amp; muscles innervated by each.</li> <li>• Recognize the effects of injury to superior, inferior gluteal and sciatic nerves with emphasis on various gaits</li> <li>• Enumerate structures deep to gluteus Maximus.</li> <li>• Locate appropriate site of intragluteal injection with anatomical reasoning</li> </ul>		
<b>Thigh</b>	Correlate the muscular and neurovascular contents of all compartments of thigh with relevant clinical scenarios.	<ul style="list-style-type: none"> <li>• Explain the contents of all fascial compartment of thigh (muscles, neurovascular bundle, lymph nodes)</li> <li>• Describe the extent, boundaries, &amp; contents of adductor canal.</li> <li>• Distinguish different swellings in front of thigh (inflamed lymph nodes, femoral hernia, inguinal hernia)</li> <li>• Appraise the precautionary measures in development of femoral hernia.</li> <li>• Describe the functions of muscles of thigh to understand the displacement of</li> </ul>	SGD/CBL	

		fragments of fractured femoral neck		
--	--	--	--	--

<b>Femor al triangl e</b>	Correlate the gross anatomy of femoral triangle and femoral sheath with its clinical significance	<ul style="list-style-type: none"> <li>• Recognize the topography and contents of femoral triangle in a sequential order</li> <li>• Describe division of femoral sheath into different compartments while naming their contents</li> <li>• Relate anatomical knowledge of Femoral canal and femoral ring with femoral hernia.</li> <li>• Justify anatomical basis of presence of femoral nerve outside the femoral sheath.</li> <li>• Describe the area of drainage of different groups of inguinal lymph nodes.</li> </ul>		
<b>Poplite alfossa</b>	Explain the location, boundaries & contents of popliteal fossa	<ul style="list-style-type: none"> <li>• List the structures forming various boundaries of popliteal fossa.</li> <li>• Identify the contents of popliteal fossa in a sequential order</li> <li>• Illustrate the genicular anastomosis</li> </ul>	SGD/CBL	MCQ/SEQ/OSPE /VIVA VOCE

<b>Knee joint</b>	Relate the gross anatomical knowledge of kneejoint to relevant injuries	<ul style="list-style-type: none"> <li>• Describe the type, articular surfaces, capsule, ligaments(intra- &amp; extra-articular), synovial membrane, nerve supply, blood supply, important relations of kneejoint.</li> <li>• Demonstrate various movements of knee joint (axes, limiting factors and muscles involved).</li> <li>• Analyze mechanism of locking and unlocking of</li> </ul>	SGD/CBL	MCQ/SEQ/OSPE /VIVA VOCE
-------------------	---	--	---------	-------------------------

		<p>knee joint while foot is off on the ground.</p> <ul style="list-style-type: none"> <li>• Correlate various types of bursae (communicating and non-communicating bursae) to their clinical significance.</li> <li>• Identify the role of vastus medialis in stability of patella.</li> <li>• Analyze various meniscal injuries</li> <li>• Explain the structure and mechanism of knee joint movements</li> </ul>		
<b>Leg</b>	Apply the knowledge of gross anatomy of leg in analyzing relevant clinical scenarios	<ul style="list-style-type: none"> <li>• Explain the contents of three fascial compartments of leg (muscles, neurovascular bundle, lymph nodes)</li> <li>• Justify the role of soleus as a peripheral heart with anatomical reasoning</li> <li>• Justify various clinical presentations in injury to lateral side of knee joint (e.g. fracture of neck of fibula)</li> </ul>	SGD/CBL	MCQ/SEQ/OSPE /VIVA VOCE
<b>Ankle joint</b>	Correlate the anatomical knowledge of ankle joint with relevant ankle injuries	<ul style="list-style-type: none"> <li>• Describe the articular surfaces, type, capsule, ligaments, synovial membrane, nerve supply, blood supply of ankle joint</li> <li>• Elucidate the various movements of the joint (axes, limiting factors and muscles involved).</li> <li>• Explain important relations of ankle joint with emphasis on</li> </ul>	SGD/CBL	MCQ/SEQ/OSPE /VIVA VOCE

		structures related to various retinacula.		
--	--	---	--	--

		<ul style="list-style-type: none"> <li>• Justify the sensory /motor loss associated with tibial nerve entrapment in tarsal tunnel syndrome.</li> <li>• Describe the anatomical basis of ankle sprain.</li> <li>• Identify the arrangement of tendons, arteries, and nerves in the region of ankle joint (in relation to retinacula of ankle) in the given model/ prosected specimen.</li> </ul>		
<b>Foot</b>	Correlate the anatomical knowledge of foot with its clinical significance	<ul style="list-style-type: none"> <li>• Explain the topographic anatomy of dorsum of foot.</li> <li>• Explain various layers of sole of foot in a sequence</li> <li>• Describe the arches of foot</li> <li>• Describe the mechanism of inversion and eversion of foot.</li> </ul>		
<b>Cutaneous innervation of lower limb</b>	Correlate the knowledge of dermatomes of lower limb to sensory loss.	<ul style="list-style-type: none"> <li>• Describe the cutaneous nerves of lower limb.</li> <li>• Illustrate the cutaneous nerves/dermatomes of lower limb</li> <li>• Justify the sensory loss in various nerve injuries of lower limb with focus on cutaneous innervation.</li> </ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE

<b>Nerves &amp; plexuses of lower limb</b>	Correlate the distribution of lower limb nerves with effects of relevant nerve injuries.	<ul style="list-style-type: none"><li>• Outline the location and formation of lumbar and sacral plexus.</li><li>• List branches of plexuses innervating lower limb</li><li>• Illustrate lumbar &amp; sacral plexus.</li></ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE
--	--	---	-----	-------------------------

		<ul style="list-style-type: none"> <li>Analyze the clinical presentation of various nerve injuries (sciatic, femoral, obturator, commonperoneal, superior gluteal, inferior gluteal)</li> <li>Correlate the lower limb nerve injuries to common fractures.</li> </ul>		
<b>Arterial supply of lower limb</b>	Correlate the blood supply of lower limb with effects of occlusion or damage.	<ul style="list-style-type: none"> <li>Describe the origin, relations, and main branches of arteries (Femoral, gluteal, and Obturator) with their area of distribution.</li> <li>List the vessels participating in trochanteric and cruciate anastomosis with clinical significance of these anastomoses.</li> </ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE
<b>Venous drainage of lower limb</b>	Correlate the anatomical knowledge of superficial & deep veins of lower limb with their surgical significance.	<ul style="list-style-type: none"> <li>Describe the venous drainage of lower limb (superficial and deep veins)</li> <li>Describe the formation, course, tributaries, and termination of great and small saphenous veins.</li> <li>Analyze a case of varicose veins with emphasis on predisposing factors, causes, clinical presentations, role of valves and perforators)</li> <li>Appraise the importance of great saphenous vein in CABG.</li> </ul>	SGD	MCQ/SEQ/OSPE /VIVA VOCE

<b>Lymphatic drainage of lower limb</b>	Appreciate the clinical importance of lymphatics in lower limb	<ul style="list-style-type: none"><li>Apply the knowledge of lymphatic drainage of lower limb to locate the site of infection or malignancy.</li></ul>	SGD	MCQ/SEQ/VIVA
---	--	--	-----	--------------

<b>Prosected Specimens / Models</b>	Demonstrate grossanatomical features of lower limb on the models & prosected specimens	<b>Skill:</b> <ul style="list-style-type: none"> <li>Identify muscles &amp; neurovascular structures of lower limb on the given models &amp; prosected specimen.</li> </ul>	SGD	OSPE
<b>Surface marking</b>	Locate the site of deeply placed structures of lower limb on skin.	<b>Attitude:</b> <ul style="list-style-type: none"> <li>Mark the nerves and vessels of lower limb on the surface of given subject with the help of important bony landmarks exhibiting effective communication skills, professionalism &amp; ethics.</li> </ul>	SGD	OSPE

<b>GROSS ANATOMY</b>	
<b>Text Books</b>	<b>Reference Books</b>
Clinically oriented Anatomy By Keith L Moore (8 <sup>th</sup> Edition)	LAST's Anatomy Regional & Applied (12 <sup>th</sup> Edition)
Clinical Anatomy for medical students By Richard S. Snell (10 <sup>th</sup> Edition)	Gray's Anatomy By Henry Gray's (41 <sup>st</sup> Edition)
Cunningham's manual of practical anatomy 15 <sup>th</sup> Edition  <b>Vol-1</b> (Upper limb & Lower limb) <b>Vol-2</b> (Abdomen & Thorax) <b>Vol-3</b> (Head & Neck, Brain) (Only For BDS)  <b>Photocopy</b> of "General Introduction" from Cunningham's manual Vol-I (Page 1-19) (Only For BDS)	Atlas of Anatomy By Netter (7 <sup>th</sup> Edition)/ Atlas of Anatomy By Grant's
Sketch book Gross	
Clinical Neuroanatomy By Richard S. Snell (8 <sup>th</sup> Edition) only for BDS	Atlas of Anatomy By Netter (6 <sup>th</sup> Edition)/ Atlas of Anatomy By Grant's Museum Atlas
<b>HISTOLOGY</b>	
<b>Text Books</b>	<b>Reference Books</b>
Basic Histology By Luiz carlos Junqueira (14 <sup>th</sup> Edition)	Medical Histology by Prof. Laiq Hussain (6 <sup>th</sup> edition)
Di-fiore's Atlas of Histology (13 <sup>th</sup> Edition)	
Manual of Histology Vol - I Manual of Histology Vol - II (for BDS only) By Prof Dr Tassaduq Hussain Shaikh/ Contextual Journal of Histology	
<b>GENERAL ANATOMY</b>	
<b>Text Books</b>	<b>Reference Books</b>
General Anatomy by Prof Laiq Hussain (5 <sup>th</sup> edition)	General Anatomy By Dr Tassaduq Hussain Shaikh(16 <sup>th</sup> Edition) General Anatomy By Prof Dr Ghulam Ahmed (7 <sup>th</sup> Edition)
<b>EMBRYOLOGY</b>	
<b>Text Books</b>	<b>Reference Books</b>
Langman's Medical Embryology(14 <sup>th</sup> Edition)	Netter's Embryology Atlas
The Developing Human By Keith L-Moore (11 <sup>th</sup> Edition)	