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LIAQUAT UNIVERSITY
OF MEDICAL & HEALTH SCIENCES,
JAMSHORO, SINDH

STUDY GUIDE

SECOND PROFESSIONAL
MBBS

BATCH 2020-21

ACADEMIC SESSION 2024-25

ACADEMIC CALENDAR
Academic Session 2024-2025

Activity	Class Year	Dates
Classes starts	All Batches of MBBS	January 27, 2025
Eid-ul-Fitr	Holiday	March 31 to April 06, 2025
Classes Resumes	All Batches of MBBS	April 07, 2025
Summer Vacation/ Internship/Elective	1st to 4th Year MBBS	June 07 to July 06, 2025
Summer Vacation/ Tour	Final Year MBBS	June 07 to July 06, 2025
Classes Resumes	All Batches of MBBS	July 07, 2025
Classes Ends	1st to 4th Year MBBS	November 07, 2025
	Final Year MBBS	December 05, 2025
Exam Preparation	1st to 4th Year MBBS	November 08 to November 30, 2025
	Final Year MBBS	December 06 to January 04, 2026
Annual Examination	1st to 4th Year MBBS	December 01 to December 31, 2025
	Final Year MBBS	January 05 to January 31, 2026
Winter Vacation	1st to 4th Year MBBS	January 01, 2026 to January 04, 2026

PREFACE

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

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

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

LEARNING STRATEGIES

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

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

INTERACTIVE LECTURES

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

SMALL GROUP TEACHING (SGT):

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

probing questioning, summarization, or rephrasing techniques to enhance the understanding of concepts.

CASE- BASED LEARNING:

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

PRACTICAL:

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

SKILLS LAB SESSION:

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

SELF DIRECTED LEARNING:

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

DEMONSTRATIONS:

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

FIELD VISITS:

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

Prof. Dr. Samreen Memon
Module Coordinator
Director Academics
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

STUDY GUIDE

A study guide is a strategic and effective approach to

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

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

A B B R E V I A T I O N S

FOUNDATION	Fnd
GASTROINTESTINAL TRACT & LIVER	GIL
NEUROSCIENCE	NS
MUSCULOSKELETAL	MSK
ENDOCRINOLOGY	End
RENAL & EXCRETORY	EXC
REPRODUCTIVE	Rep
PATHOLOGY	Path
PHARMACOLOGY	Pharm
MEDICINE	Med
SURGERY	Surg
PAEDIATRICS	Paeds
GYNAECOLOGY & OBSTETRICS	Obs & Gynae
COMMUNITY MEDICINE	CM
SPIRAL	S

CONTRIBUTIONS

Prof. Dr. Ikram din Ujjan
Vice-Chancellor
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Prof. Dr. Munawar Alam Ansari
Dean
Faculty of Basic Medical Sciences
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Prof. Dr. Moin Ahmed Ansari
Dean
Faculty of Medicine & Allied Sciences
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Prof. Dr. Ashok Kumar Narsani
Dean
Faculty of Surgery & Allied Sciences
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Prof. Dr. Samreen Memon
Module Coordinator
Director Academics
Chairperson, Department of Anatomy
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Dr. Hudebia Allah Buksh
Incharge, Department of Medical Education
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Dr. Nazia
Assistant Professor, Department of Pathology
Bilawal Medical College for Boys
Directorate of Academics
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Dr. Faheem Ahmed Memon
Lecturer, Department of Pathology
Directorate of Academics
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Prof. Dr. Rano Mal
Department of Medical Education, Bilawal Medical College for Boys
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Administrative Staff

Mr. Mohal Lal
Sr. Data Processing Officer
Vice-Chancellor's Secretariat
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Mr. Syed Zohaib Ali
Assistant Network Administrator
Vice-Chancellor's Secretariat
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Mr. Mazhar Ali
Directorate of Academics
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

Mr. Rizwan Ali
Directorate of Academics
Liaquat University of Medical & Health Sciences,
Jamshoro, Pakistan

TEACHING FACULTY

DEPARTMENT OF ANATOMY	
PROFESSORS	
01	Prof. Dr. Samreen Memon { **CHAIRPERSON**}
02	Prof. Dr. Pushpa Goswami
ASSOCIATE PROFESSORS	
03	Dr. Muhammad Yaqoob Shahani
04	Dr. Pashmina Shaikh
05	Dr. Farhana Rajpar
ASSISTANT PROFESSORS	
06	Dr. Umbreen Bano
07	Dr. Sadia Effendi
LECTURERS	
08	Dr. Abdul Rauf Memon
09	Dr. Fahmeeda Gul Saher
10	Dr. Khalida Parveen
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12	Dr. Sana Shabbir

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02	Dr. Mubeena Laghari { **CHAIRPERSON**}
03	Dr. Ali Raza Memon
ASSISTANT PROFESSOR :	
04	Dr. Beenish Ghaffar
05	Dr. Abdul Sattar Khan
06	Dr. Sofia Chandio
LECTURERS	
07	Dr. Ali Karim Soomro
08	Dr. Nosheen Zehra Mangi
09	Dr. Maria Asif

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01	Prof. Dr. Khalida Shaikh { **CHAIRPERSON**}
02	Prof. Dr. Salma Farrukh Memon
ASSOCIATE PROFESSOR	
03	Dr. Rubina Ahmdani
04	Dr. Keenjhar Rani
05	Dr. Tazeen Shah
ASSISTANT PROFESSORS	
06	Dr. Arsalan Uqaili
07	Dr. Saima Naz Shaikh
08	Dr. Urooj Bhatti
09	Dr. Kavita Bai
10	Dr. Jawed Iqbal

LECTURERS	
11	Dr. Fayaz Ahmed Memon
12	Dr. Aqsa Naeem Memon
13	Dr. Moomal Tagar
14	Dr. Sarwat Batool Memon
15	Dr. Rubina Zareen
16	Dr. Javeria Hameed Sheikh
17	Dr. Shahzado Tariq

DEPARTMENT OF PATHOLOGY	
VICE CHANCELLOR / PROFESSOR	
01	Prof. Ikram Din Ujjan
PROFESSOR AND CHAIRMAN	
02	Dr. Abid Hussain Chang
ASSOCIATE PROFESSOR	
03	Dr. Abdul Aziz Shaikh
04	Dr. Kiran Amir
05	Dr. Muhammad Rahil Khan
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06	Dr. Naila Shaikh
07	Dr. Zahida Shaikh
08	Dr. Arshi Naz
09	Dr. Abdul Rehman Khalil
10	Dr. Yousra Shafquat
LECTURERS	
11	Dr. Khalid Yousuf Memon
12	Dr. Shabnum Rustamani
13	Dr. Faheem Memon
14	Dr. Muhammad Ali Memon
15	Dr. Furqan Ahmed Bhatti
16	Dr. Aamir Ramzan
17	Dr. Sadia Akbar
18	Dr. Sidra Qadir
19	Dr Sorath Sindhu
20	Dr Rameez Iqbal Memon
21	Dr Yasmeen Bhutto
22	Dr Elaf Rasool
23	Dr Shariq Khan

DEPARTMENT OF PHARMACOLOGY	
PROFESSOR /DEAN BASIC MEDICAL SCIENCES	
01	Prof. Munawar Alam Ansari
ASSOCIATE PROFESSOR/ CHAIRMAN:	
02	Dr. Mashkoor Ahmed Ansari
ASSISTANT PROFESSOR :	
03	Dr. Gunesh Kumar
04	Dr. Sadat Memon
LECTURERS	
05	Dr. Adeela Mangrio
06	Dr. Rizwan Memon
07	Dr. Fazeela Mariam Memon
08	Dr. Naveeta Bai
09	Dr Mahnoor Legahri

NEUROSCIENCE MODULE-I

Introduction Welcome to the neuroscience module. This module is necessary for your future work as doctors. This module is designed to make your learning both interesting and productive by including activities.

This module provides basic understanding by integrating the teaching of Human Anatomy, physiology, Biochemistry of neurotransmitters, and the basic Pharmacology and Pathology related to the disorders of the central and peripheral nervous system and their relevant clinical applications. By adopting this approach, we are preparing you better for your future work as doctor, where patients will come to you with problems that are not categorized by discipline name.

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

Rationale Diseases of the nervous system are common all over the world. Timely diagnosis and management of acute CNS problems like cerebrovascular accidents and infections prevents morbidity and mortality. Early diagnosis and prompt treatment of degenerative and demyelinating diseases like Parkinson's disease and multiple sclerosis is important to reduce the occurrence of disability burden on community. Understanding the structure and function of nervous system and its relationship with pathophysiology of diseases is essential for diagnosis and management.

DURATION: 06 WEEKS

LEARNING OUTCOMES: AT THE END OF THIS MODULE STUDENTS WILL BE ABLE TO:

- Describe the anatomy of brain and spinal cord and the general organization of nervous system.
- Analyze the physiology of nervous system and Biochemistry of neuro-metabolites.
- Explain the mechanism of ischemia, hypoxia, infarction and intracranial hemorrhage.
- Elaborate the approach to a neurologic patient with its screening

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

- Recognize the structure and function of major division and components of central, peripheral and autonomic nervous system
- Recognize the structure and function of major division and components of central, peripheral and autonomic nervous system, with the role of hypothalamus
- Interpret the various clinical presentations of spinal cord disorders correlating with its organization, structure and function.
- Localize the common brain stem and cranial nerves lesions by recognizing the structure of brainstem and the associated cranial nerves.
- Differentiate between pyramidal and extrapyramidal syndromes and upper and lower motor neuron lesions with the knowledge of structure and types of fiber bundles traversing the brain and their functions.
- Differentiate between the functions of dominant and non-dominant cerebral hemispheres and between various parts of each hemisphere by identifying the surfaces, lobes, sulci & gyri of cerebral hemisphere.

- Correlate the clinical presentation of Parkinson's disease with the topographic anatomy and function of basal nuclei
- Appreciate the changes in emotions, behavior and personality by recalling the structure and functions of limbic system.
- Interpret the effects of increased intracranial pressure with the structure of cranio-spinal meninges, ventricular system, and mechanism of formation, flow, drainage and chemistry of C.S.F in normal and in disease.
- Relate the different syndromes of ischemia in brain and ischemic myelopathy with the pattern of arterial supply of brain and spinal cord, together with knowledge of blood brain barrier.
- Recognize the effects of venous stasis and obstruction by applying the knowledge of venous drainage and dural venous sinuses
- Identify various congenital malformations of brain and spinal cord by knowing the embryological basis of neurulation and transformation of neural tube into CNS and the anomalies in the process
- Deduce the neuro-anatomic basis of ataxia and incoordination by applying the knowledge of cerebellar cortex, nuclei and peduncles.

Clinical/ Practical Skills

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

Attitude

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

THEMES

Theme 1: Spinal cord trauma, anterior horn cell disorders, neuropathies & myopathies
Theme 2: Disorders of brain stem
Theme 3: Cerebral cortex diseases (upper motor neuron lesions, tumors, trauma, dementia, Epilepsy)
Theme 4: Gait abnormalities (Cerebellar diseases, Basal nuclei disorders).
Theme 5: Cerebrospinal fluid/ ventricular system and hydrocephalus
Theme 6: Cerebrovascular disorders, Intracranial hemorrhage, stroke

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab.

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Spinal Cord Trauma, Anterior Horn Cell Disorders, Neuropathies & Myopathies

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
1	• Describe organization and components of Nervous System. • Describe the parts of Brain and Spinal cord. • Describe the components of Peripheral Nervous System. • Describe the cranial and spinal nerves. • Describe the components of Autonomic Nervous System. • Associated clinical correlates and Imaging techniques.	**NS-S1-Ana-G-1** Introduction to Nervous System	Interactive Lecture	SBQs & OSVE
2	• Describe external morphology of spinal cord.	**NS-S1-Ana-G -2** Spinal cord I		
3	• Describe Internal structure of spinal cord (Gray Matter)	**NS-S1-Ana-G-3** Spinal cord II		
4	• Describe Internal structure of spinal cord (White Matter)	**NS-S1-Ana-G-4** Spinal cord III		
5	• Describe the development of neural tube, and neural crest cells and their derivatives. • Clinical correlates	**NS-S1-Ana-E-1** Development of neural tube		
6	• Describe the development of spinal cord • Clinical correlates	**NS-S1-Ana-E-2** Development of spinal cord		
7	• Describe the nervous tissue • Define neuron, its structure and function & types of neurons • Define neuroglia, their types and functions	**NS-S1-Ana-H-1** Microscopic anatomy of nervous tissue		
8	• Describe the nervous tissue • Define neuron, its structure and function & types of neurons Define neuroglia, their types and functions	**NS-S1-Ana-H-2** Histology of the Nervous tissue (Types of Neuron and neuroglia)	Practical	OSPE & OSVE

9	• Able to identify the microstructure of spinal cord.	**NS-S1-Ana-H-3** Histology of the Spinal Cord		
Physiology				
10	• Definition & Organization of the nervous system • Know about Physiological division of nervous system • Determine different Levels of nervous system	**NS-PHYS-1** Nervous system – overview	Interactive Lecture	SBQs & OSVE
11	• Discuss electrical properties of neuron • Discuss generation of action potential • List functions of neoroglial cells • Define Myelin sheath • Define Saltatory conduction Regeneration of nerve fiber • Blood brain barrier	**NS-PHYS-2** Neuron & Neuroglia		
12	• Define Synapse, types and properties of synapse • Determine Structure of synapses • Discuss transmission of electrical signals between neurons	**NS-PHYS-3** Synapses		
13	• Describe briefly the • physiological Anatomy of spinal cord • Meninges, parts & functions of spinal cord	**NS-PHYS-4** Spinal cord		
Clinical Lecture				
16	Discuss the clinical correlates and injuries of spinal cord	**NS-S1-NeurS-1** Injuries/trauma and clinical conditions associated with spinal cord	Interactive Lecture	SBQs & OSVE
17	Discuss the clinical presentations of anterior horn cell disorders	**NS-S1-NeurM-1** Anterior horn cell disorders		
18	Discuss the clinical presentations of Neuropathies /myasthenia Gravis	**NS-S1-NeurM-2** Neuropathies/ myasthenia Gravis		

Theme 2: Disorders of Brain Stem

S #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
19	• Describe the development of brain vesicles. • Discuss development of brain stem	**NS-S1-Ana-E-3** Development of brain stem	Interactive Lecture	SBQs & OSVE
20	• Describe External structure of brain stem at different level (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-5** Brain stem I		
21	• Describe External structure of brain stem at different level (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-6** Brain stem III		
22	• Describe internal structure of brain stem at different levels. (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-7** Brain stem III		
23	• Describe internal structure of brain stem at different levels. (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-8** Brain stem IV		
24	• Define the organization, connections and distribution of the cranial nerves from cranial nerve-III to VI • Clinical correlates	**NS-S1-Ana-G-9** Cranial nerves I		
25	• Define the organization, connections and distribution of the cranial nerves from cranial nerve-VII-XII • Clinical correlates	**NS-S1-Ana-G-10** Cranial nerves II		
26	• Describe the organization and division of the autonomic nervous system. • Define preganglionic and post ganglionic sympathetic and parasympathetic fibers	**NS-S1-Ana-G-11** The Autonomic nervous system		
Physiology				
27	• Describe general characteristics of Receptors • Classify receptors according to location and Modalities of sensation. • Define receptor potential and transduction • Define Touch & its receptors • Define Pressure & its receptors • Define Vibration & its	**NS-PHYS-5** Sensory receptors & its modalities	Interactive Lecture	SBQs & OSVE

	receptors • Define Tickle & itch, its receptors			
28	• Antero-lateral system (spino- List different types of sensory pathway • Discuss dorsal column medial laminiscal system, its location, receptors, tracts and sensory modalities. • Discuss thalamic), its location, receptors, tracts and sensory modalities. • Lesions of sensory pathways	**NS-PHYS-6** Sensory pathway (Anteriolateral pathway & DCMLP)		
29	• Describe Unconscious sensation & their pathways	**NS-PHYS-7** Spinocerebellar pathways		
30	• Define Pain Types, qualities and receptors Which Pathways are involved, discuss dual pathways for transmission of pain signals into CNS • What is Referred pain, differentiate btw somatic & Visceral pain	**NS-PHYS-8** Pain pathways		
31	• Define Analgesic system of brain & its physiological role • Define Methods of analgesia • Define Hyperalgesia • List pain suppression and brain opoid system.	**NS-PHYS-9** Analgesic pathway		
32	• Brainstem Motor Function	**NS-PHYS-10** Mid brain, pons & Medulla		
33	• Define following terms & their physiological importance: • Preganglionic & Postganglionic • Sympathetic & Parasympathetic • Define Dual innervations of viscera • AdExc-S1 medulla • Define Sympathetic discharge • Differentiate btw Receptors, Neurotransmitters & drugs	**NS-S1-Phy-11** Autonomic nervous system		
34	• To perform superficial & deep reflexes and its significance in different neurological disorders. • To perform Corneal reflexes • To perform Abdominal reflexes	**NS-S1-Phy-P-1** Superficial reflexes and deep reflexes	Practical	

	• To perform Plantar reflexes • To perform superficial deep reflexes and its significance			
Clinical Lecture				
38	• Discuss the clinical correlates and injuries of spinal cord	**NS-S1-NeurS-2** clinical conditions associated with brain stem	Interactive Lecture	SBQs & OSVE
39	• Discuss the clinical presentations of anterior horn cell disorders	**NS-S1-NeurM-3** clinical conditions associated with brain stem		

Theme 3: Cerebral Cortex Diseases (Upper Motor Neuron Lesions, Tumors, Trauma, Dementia, Epilepsy)

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
40	• Describe the structure of Diencephalon • Describe divisions of Diencephalon (thalamus, hypothalamus, subthalamus, epi-thalamus)	**NS-S1-Ana-G-12** Diencephalon I (boundaries of Diencephalon & thalamus)	Interactive Lecture	SBQs & OSVE
41	• Describe the morphological features and nuclei of thalamus • Explain the connections of thalamus and its relations	**NS-S1-Ana-G-13** Diencephalon II (thalamus)		
42	• Describe the hypothalamus • Identify the location, components & connections of limbic system.	**NS-S1-Ana-G-14** Hypothalamus and limbic system		
43	• Explain the dominance & non-dominance correlation with structure & functions of cerebral cortex	**NS-S1-Ana-G-15** Cerebral cortex I (gray matter)		
44	• Describe functional areas of cerebral cortex Discuss lesions of functional areas of cerebral cortex	**NS-S1-Ana-G-16** Cerebellar cortex I (gray matter)		
45	• Describe different types of fibers in cerebral hemisphere; association,	**NS-S1-Ana-G-17** Cerebral cortex III (white matter;		

	projection & commissural fibers. • Explain parts of corpus callosum and fornix. • Clinical correlates.	association, projection & commissural fibers, corpus callosum and fornix)		
46	• Name the parts and tracts of internal capsule. • Clinical correlates.	**NS-S1-Ana-G-18** Cerebral cortex IV (white matter; internal capsule)		
47	• Define the organization, connections and distribution of the cranial nerves from cranial Nerve-I & II • Clinical correlates	**NS-S1-Ana-G-19** Cranial nerves I		
48	• Describe the development of forebrain, diencephalon	**NS-S1-Ana-E-4** Development of forebrain & Diencephalon		
49	• Explain and identify the different types of cells of cerebral cortex • Describe and identify the layers of cerebral cortex	**NS-S1-Ana-H-4** Histology of cerebral cortex	Practical	OSPE & OSVE
Physiology				
50	• Functions of Specific Cortical Areas • Motor & sensory areas • Cortical Control of Motor Function	**NS-PHYS-12** Areas of cerebral cortex	Interactive Lecture	SBQs & OSVE
51	• Define Superficial & deep reflexes & their control by Upper & lower motor neurons • Difference b/w Upper & lower motor neurons lesion	**NS-PHYS-13** Spinal cord reflexes, reflex arc, reflex action		
52	• Define Pyramidal tracts features & its pathway, • Define Extra pyramidal tracts features & its Pathway • Define brown-sequard syndrome & its pathophysiology.	**NS-PHYS- 14** Descending pathways- (Pyramidal & extra pyramidal tracts		
53	• Define memory • Give various types of memory & their importance • Describe neural mechanism involved in memory	**NS-S1-Phy-15** Memory & Speech and its disorders		

	• Give disorders of memory (Alzheimer's disease) • Define speech • Name motor and sensory cortical areas of speech & their function • Describe speech disorders			
	• To examine body temperature and to related abnormalities	**NS-S1-Phy-P-2** Body temperature	Practical	OSPE & OSVE
54	• To perform cerebellar function tests and to identify associated disorders.	**NS-S1-Phy-P-3** Cerebral function tests	Practical	OSPE & OSVE
55	• To examine brain waves with the help of power lab.	**NS-S1-Phy-P-4** EEG		
Pharmacology				
56	• To modulate the activity of the brain and spinal cord • Describe its side effects	**NS-S1-Pharm-1** Introduction drugs related to CNS	Interactive Lecture	SBQs & OSVE
57	• It is drug that can be used for recreational, medicinal or spiritual purposes	**NS-S1-Pharm-2** Alcohol		

Theme 4: Gait Abnormalities (Cerebellar Diseases, Basal Nuclei Disorders)

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
59	• Describe the detailed Anatomy of cerebellum • Explain the anatomical & physiological divisions of cerebellum • Discuss characteristic features of cerebellar cortex; gray matter, white matter &deep cerebellar nuclei.	**NS-S1-Ana-G-20** Cerebellum I	Interactive Lecture	Interactive Lecture
60	• Explain connections of cerebellar cortex and deep cerebellar nuclei. • Clinical correlates.	**NS-S1-Ana-G-21** Cerebellum II		
61	• Identify the location and components of basal nuclei.	**NS-S1-Ana-G-22** Basal nuclei and their connections		

	• Explain the connections of basal nuclei. • Describe clinical aspects related to basal nuclei.			
62	• Describe the development of hindbrain/cerebellum	**NS-S1-Ana-E-5** Development of hind brain/ cerebellum		
63	• Describe and identify the layers of cerebellar cortex • Describe and identify the cells of cerebellar cortex	**NS-S1-Ana-H-5** Histology of cerebellar cortex	Practical	OSPE & OSVE
Physiology				
64	• Give the special features of cerebellum • Name its physiological divisions & their function • Explain the internal neuronal circuit of cerebellum and its functioning • Describe the features of cerebellar lesions	**NS-PHYS-16** Cerebellum & its lesion	Interactive Lecture	SBQs & OSVE
65	• Name the basal ganglia • List the functions of basal ganglia • Describe the functions of caudate & putamen circuits • Describe the lesions of basal ganglia (Parkinson's disease)	**NS-PHYS-17** Basal nuclei and its' diseases		

Theme 5: CSF & Hydrocephalus

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
66	• Identify the ventricles of brain along with their location; Lateral, and 3RD ventricle	**NS-S1-Ana-G-23** Ventricular system, lateral and third ventricle	Interactive Lecture	SBQs & OSVE
67	• Discuss the location and structure of 4th ventricle and choroid plexus	**NS-S1-Ana-G-24** 4th ventricle and choroid plexus		

68	• Explain the formation, circulation and drainage of CSF	**NS-S1-Ana-G-25** Cerebrospinal fluid		
Physiology				
69	• To explain the structure of the Ventricles of brain • To Describe how the brain and spinal cord are protected and nourished **(CSF)** • Obstruction of flow of CSF	**NS-PHYS-18** Formation, circulation & functions of CSF & abnormalities	Interactive Lecture	SBQs & OSVE
Pathology				
70	• Enlist the causes of meningitis. • Discuss the CSF findings of different types of meningitis	**NS-S1-Path-1** Meningitis& CSF Findings	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
71	Discuss clinical presentation & management of Hydrocephalus	**NS-S1-NeuS-3** Hydrocephalus	Interactive Lecture	SBQs & OSVE

Theme 6: Cerebro vascular disorders, intracranial hemorrhage, stroke

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
72	Describe the arterial supply and venous drainage of cerebral hemispheres	**NS-S1-Ana-G-26** Blood supply of spinal cord, brain stem and cerebellum	Interactive Lecture	SBQs & OSVE
73	• Describe the branches of internal carotid artery • Formation of circle of villous and its distribution	**NS-S1-Ana-G-27** Internal carotid artery & Circle of villous		
74	Describe the arterial supply and venous drainage of cerebral hemispheres	**NS-S1-Ana-G-28** Blood supply of cerebral hemispheres		
75	Explain how the Blood brain barrier is formed and what is its clinical significance	**NS-S1-Ana-G-29** Blood brain barrier		
Physiology				
76	• To explain vegetative functions of hypothalamus	**NS-PHYS-19** Hypothalamus	Interactive	SBQs & OSVE

	• To explain the different functions of limbic system • To explain the functions of reward and punishment centers.	& Limbic System	Lecture	
77	• To explain the physiology of slow wave sleep & rapid eye movement (REM) sleep. • To explain the basic theories of sleep • Describe the names & origin of brain waves. Describe epilepsy & clinical correlates	**NS-PHYS-20** Sleep & its disorders		
Clinical Lecture				
76	Discuss Surgical aspect of cerebrovascular disease	**NS-S1-NeuS-4** Surgical aspect of cerebrovascular disease	Interactive Lecture	SBQs & OSVE
77	Discuss clinical aspect of cerebrovascular disease	**NS-S1-NeuM-4** clinical aspect of cerebrovascular disease		

HEAD AND NECK MODULE

Introduction: Head & neck module includes anatomical structures of head & neck as well as physiological aspect of structures like Eyes (Vision), Ear (Hearing & body balance), nose (olfaction), & mouth (taste) i.e. physiology of special senses.

Although head & neck is not a separate system but its study as a system is essential as it contains important organs like eyes, ears, nose, mouth, larynx etc. These are all in proximity to one another and often diseases afflicting one of these also affect other organs by contiguity. Injuries to the region of head, face & neck are associated with high mortality & morbidity.

The head and neck module (HNM) for 2nd year MBBS aims to integrate both basic and clinical sciences. In basic sciences, students will be able to explain developmental, gross and microscopic anatomy of the head, neck, eyes, and ears along with relevant neurophysiology, pathology and Biochemistry. Integration with relevant clinical sciences disciplines will help students apply their knowledge from a meaningful clinical perspective.

This module provides the basic understanding of the anatomy and physiology of the components of head and neck

Rationale Head & neck contains very important structures like eyes, nose, ears, oral cavity, larynx and pharynx. A student should be well aware of anatomy of these structures as well their function. The diseases of these structures are very common like tonsillitis, rhinitis, sore throat, red eye etc. With knowledge of basic science and relevant clinical knowledge obtained through clinical lectures and case based scenarios, a student would be able to help patients in their community with these common diseases. Thus they can benefit their society and be a responsible member of community.

DURATION 06 WEEKS

LEARNING OUTCOMES AT THE END OF THIS MODULE STUDENT SHOULD BE ABLE TO:

- Describe in detail the anatomy of structures of head and neck
- Describe the development of branchial arches
- Elaborate the histopathology of neoplastic lesions involving head and neck
- Describe the and microscopic structural and functional anatomy of the EYE
- Explain the physical principles of optics
- Describe the errors of refraction & their correction
- Explain mechanism of Photo-transduction, Excitation and Receptor Potential of the Rods
- Explain the photochemistry of color vision by cones and the color blindness
- Describe the physiology of visual pathway, areas VISUAL CORTEX and Lesion at the different levels of visual pathway
- Explain the muscular control of eye movement,
- Describe the primary sensation of taste, the mechanism of taste perception and its transmission into central nervous system
- Discuss the primary sensation of smell, excitation of olfactory cells & its transmission into central nervous system.

Attitude

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

THEMES

To achieve these overall aims, this module comprises of seven weeks with a separate theme for each week for enhancing your learning around key areas in the region of Head & Neck and special senses diseases.

Theme 1: Fractures of the Skull & Scalp injuries
Theme 2: Facial injuries and the bell's palsy
Theme 3: Disorders of the salivary glands and neck lesions
Theme 4: Waldeyer's ring, Tonsillitis and oral cancers
Theme 5: Visual field defects, Glaucoma, Role of Vitamin A
Theme 6: Deafness, vertigo, otitis media

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Fractures of the Skull & Scalp Injuries

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
1	• Explain the overview of neck regions • Explain the overview of head surface, muscles, innervations, blood supply & venous drainage	**HN-S1-Ana-G-1** Overview of the head and neck regions	Interactive Lecture	SBQs & OSVE
2	• Define axial skeleton • Describe bones of skull and cranium • Explain overview of Skull Geography & Sutures • Differentiate the various views of the skull	**HN-S1-Ana-G-2** Osteology of the Skull and the vault		
3	• Define norma frontalis • Explain the different regions of it • Enumerate the muscle attachment • Describe Boundaries and features of its structure.	**HN-S1-Ana-G-3** Skull: Norma frontalis	Demonstration	SBQs, OSPE & OSVE
4	• Enlist various bones in norma lateralis • Describe the Cranial and facial subdivisions • Define External acoustic meatus	**HN-S1-Ana-G-4** Norma lateralis and occipitalis		
5	• Describe bones forming the base of skull • Explain the details of anterior, middle and posterior part of base of skull • Identify different foramina and structures passing through them at the base • Explain the attachments and relations of base of skull	**HN-S1-Ana-G-5** Norma Basalis Anterior , middle and posterior parts		
6	• Describe bones forming the cranial cavity • Explain the details of anterior, middle and	**HN-S1-Ana-G-6** Cranial cavity		

	posterior fossae of the cranial cavity • Identify different foramina and structures passing through them.			
7	• Describe the meninges of the brain and spinal cord. • Discuss the venous sinuses. • Discuss the related clerical's	**HN-S1-Ana-G-7** The meninges of brain and spinal cord & the venous sinuses	Interactive Lecture	SBQs & OSVE
8	• Explain the extent of scalp • Describe five layers of scalp • Identify the nerves and vessels of scalp • Enumerate the clinical correlates	**HN-S1-Ana-G-8** Scalp (layers, Nerves &Vessels)		
9	• Describe development of pharyngeal Apparatus • List the Parts of pharyngeal apparatus. • Describe development of pharyngeal arches. • Enlist the derivatives of pharyngeal arches. • Describe the related congenital anomalies.	**NS-S1-Ana-E-1** Pharyngeal Apparatus. Pharyngeal Arches		
10	• Describe development of pharyngeal pouches & clefts. • Enlist the derivatives of pharyngeal pouches & clefts. • Describe the related congenital anomalies.	**NS-S1-Ana-E-2** Pharyngeal pouches & clefts.		
Physiology				
11	• To perform the movements of eye ball and muscles controlling these movements • Accommodation reflex & pupillary light reflex their pathway • Diplopia, squint, Nystagmus, strabismus.	**HN-S1-Phy-1** Examination of oculomotor, Trochlear and Abducent nerve	Practical	OSPE & OSVE

Theme 2: Facial Injuries &the Bell's Palsy

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
12	• Describe the boundaries and contents of temporal fossa. • Describe the type, formation, neurovascular supply and movements of Temporomandibular joint. • Clinically correlate disorders of the Temporo-mandibular joint. • Describe the muscles of mastication.	**HN-S1-Ana-G-9** Temporal Region & Temporo- mandibular Joint and muscles of mastication	Interactive Lecture	SBQs & OSVE
13	• Describe boundaries and contents of Pterygopalatine& Infratemporal fossae. • Describe the muscles of mastication.	**HN-S1-Ana-G-10** Pterygopalatine & Infratemporal fossae.		
14	• Describe Parts of mandible • Explain general and special features of each part. • Describe Blood and nerve supply of mandible • Interpret applied anatomy of mandible. • Explain general and special features of Hyoid bone.	**HN-S1-Ana-G-11** Mandible & Hyoid bone.	Demonstration	SBQs, OSPE & OSVE
15	• Describe the boundaries of face • Enumerate the muscles and innervations of face • Describe the disorders and applied of face	**HN-S1-Ana-G-12** Muscles of the facial expression		
16	• Describe the cutaneous supply of the head and neck regions.	**HN-S1-Ana-G-13** Cutaneous supply of the head & neck region		
17	• Describe arterial supply of head and neck	**HN-S1-Ana-G-14** Arteries & Veins of the Head & Neck.	Interactive Lecture	SBQs & OSVE

	• Major venous drainage to sinuses, • Head and neck major veins.			
18	• Describe the Developmental stages of Face • Explain the congenital Anomalies of face • Describe the development of the nasal cavity • Describe the development of the paranasal sinuses. • Explain the congenital Anomalies of face	**HN-S1-Ana-E-3** Development of face and nose		
Physiology				
19	• To examine muscle of facial expression • To define and classify Bell's facial palsy • Correlate between 5th and 6th nerve • Interpret the problems of trigeminal nerve injury	**HN-S1-Phy-P-2** Examination of facial and trigeminal nerve.	Practical	OSPE & OSVE

Theme 3: Disorders of the Salivary Glands &Neck Lesions

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
20	• Explain the parotid region. • Describe the anatomy parotid gland. • Define what otic ganglion is. • Interpret Applied anatomy of parotid gland	**HN-S1-Ana-G-15** Parotid region	Demonstration	SBQs, OSPE & OSVE
21	• Explain the submandibular region. • List the Suprahyoid muscles. • Describe the submandibular gland. • Describe the sublingual gland. • Define what is submandibular ganglion	**HN-S1-Ana-G-16** Submandibular region		

22	• Describe the deep cervical fascia • Explain the four parts of deep cervical fascia and the structures it encloses: • the investing layer, pretrachial fascia, prevertebral fascia &the carotid sheath. • Define platysma muscle.	**HN-S1-Ana-G-17** Deep Cervical fascia & platysma		
23	• Discuss the boundaries and divisions of the anterior triangle of neck • List the subdivision of anterior triangle of neck. • Describe the boundaries and contents of sub divisions of anterior triangle.	**HN-S1-Ana-G-18** Anterior triangle of neck		
24	• Describe the division and boundaries of posterior triangle of neck • List the contents of posterior triangle of neck • Discuss the clinical conditions associated with posterior triangle of neck	**HN-S1-Ana-G-19** Posterior triangle of neck		
25	• Discuss the formation and branches of cervical plexus • Discuss the origin, course, branches and functions of cranial nerve XI.	**HN-S1-Ana-G-20** cervical plexus & cranial nerve XI.	Interactive Lecture	SBQs & OSVE
26	• Name the Salivary glands and their location. • Describe histology of parotid gland • Describe histology of submandibular gland • Describe histology of sublingual gland.	**HN-S1-Ana-H-1** Salivary Glands	Practical	OSPE & OSVE
Pathology				
27	• To describe the etiology, pathogenesis and major subtypes of Inflammatory, non-neoplastic lesions of salivary glands	**HN-S1-Path-1** Inflammatory and non- neoplastic lesions of salivary glands	Interactive Lecture	SBQs & OSVE
Physiology				

28	• To perform and interpret the function of nerves • The gag reflex. • To observe shrugging of shoulders with and without resistance • Check movements of tongue in all directions • Test the sensation of taste • To assess the deviation of the tongue when extended toward the weak side	**HN-S1-Phy-3** Examination of Glossopharyngeal Vagus , Accessory and Hypoglossal nerves.	Practical	OSPE & OSVE

Theme 4: Waldeyer's Ring, Tonsillitis & Oral Cancers

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
29	• Describe the anatomy of external nose. • Define the boundaries of nasal cavity. • Describe the lateral wall of nose. Identify & Describe Arterial & Venous supply of nose and nasal cavity. • Describe Nerve supply of nose and nasal cavity	**HN-S1-Ana-G-21** External nose & nasal cavity	Demonstration	SBQs, OSPE & OSVE
30	• Define & list names of paranasal sinuses • Describe functions of paranasal sinuses. • Identify Radiographic Protocols for sinuses • Explain diseases of sinuses.	**HN-S1-Ana-G-22** Para-nasal sinuses		
31	• Define the boundaries of oral cavity • (The roof, lateral walls and floor of oral cavity). • Describe the hard & soft palate. • Describe the vasculature and innervation of the oral cavity & palate. • Define the muscles of the soft palate.	**HN-S1-Ana-G-23** Oral cavity hard and soft palate	Interactive Lecture	SBQs & OSVE

32	• Describe what is tongue and Papilla. • Enumerate the Extrinsic and Intrinsic muscles of the tongue • Define the sensory & motor nerve supply of the tongue.	**HN-S1-Ana-G-24** The tongue	Interactive Lecture	SBQs & OSVE
33	• Explain the structure, functions of various parts of pharynx & their blood supply & innervation. • Interpret related applied anatomy.	**HN-S1-Ana-G-25** Pharynx		
34	• Explain the structure, cartilages and functions of the various parts of larynx.	**HN-S1-Ana-G-26** Larynx-1	Demonstration	SBQs, OSPE & OSVE
35	• Describe the muscles, blood supply & innervation of the larynx. • Interpret related applied anatomy.	**HN-S1-Ana-G-27** Larynx-2		
36	• Identify the microscopic features of the nose and paranasal sinuses. • Discuss the respiratory epithelium. • Explain the Olfactory epithelium.	**NS-S1-Ana-H-2** Histology of the Nasal cavity	Practical	OSPE & OSVE
37	• Describe the different parts of oral cavity. • Explain the histology of cheek and lip. • Describe microscopic features of tongue.	**NS-S1-Ana-H-3** Histology of oral cavity		
Physiology				
38	• Primary tastes & taste receptors • Taste transduction, Taste pathway • Olfactory mucosa, Smell pathway • Role of smell in memory & sex	**HN-S1-Phy-4** Chemical senses taste & smell	Interactive Lecture	SBQs & OSVE
39	• To examine and interpret the sense of taste and smell in a subject	**HN-S1-Phy-5** Examination of s taste & smell sensations	Practical	OSPE & OSVE
ENT				

40	• Discuss clinical significance of tonsils	**HN-S1-Ent-1** Tonsillitis	Interactive Lecture	SBQs & OSVE
41	• Correlate causes with clinical presentation of epistaxis	**HN-S1-Ent-2** Epistaxis		

Theme 5: Visual Field Defects, Glaucoma, Role of Vitamin A

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
42	• Describe the boundaries of the orbit • Define the openings of the orbital cavity and their contents • Define the orbital fascia	**HN-S1-Ana-G-28** The Orbit (boundaries & openings)	Demonstration	SBQs, OSPE & OSVE
43	• Explain the Extrinsic muscles and their innervations • Explain the structures supplied by nerves of orbital cavity. • Describe the blood vessels of orbit.	**HN-S1-Ana-G-29** Contents of the orbital cavity (Extraocular muscles, nerves & vessels)		
44	• Describe the palpebral fissure • Explain the different layers of the eyelid and its muscles. • Enumerate the blood supply and innervations of eyelids. • Illustrate lacrimal apparatus ciliary ganglion and their disorders. • Interpret related applied anatomy.	**HN-S1-Ana-G-30** Eyelids & lacrimal Apparatus & Ciliary Ganglion		
45	• Enlist the coats of Eyeball. • Describe the Cornea & Sclera • Describe the Choroid, Ciliary body & Iris • Describe the Retina	**HN-S1-Ana-G-31** Structure of the eye Eyeball-1 (Coats)	Interactive Lecture	SBQs & OSVE
46	• Describe the Aqueous humor, Vitreous body & lens • Interpret related applied anatomy.	**HN-S1-Ana-G-32** Eyeball-2 (Contents)		

47	• Describe the steps of development of human eye. • Explain the derivatives of different embryonic primitive eye layers. • Describe the development of various layers of eye individually, along with optic nerve.	**HN-S1-Ana-E-4** Development of Eye		
48	• Describe the histology of Eyelids, Conjunctiva & Lacrimal Apparatus.	**HN-S1-Ana-H-4** Histology of Eyelids, Conjunctiva, Lacrimal Apparatus	Practical	OSPE & OSVE
Physiology				
49	• Describe the physiological anatomy of eye, Its layers, Its chambers & Its systems • Describe the Lens and its attachment • Describe the Formation, composition, circulation & functions of aqueous humor	**HN-S1-Phy-6** Physiological Anatomy Aqueous humor	Interactive Lecture	SBQs & OSVE
50	• Describe the physical principles of optics • Describe accommodation reflex & its control • Describe the refracting surfaces of eye • Describe the errors of refraction&their correction	**HN-S1-Phy-7** Optics of vision		
51	• Describe the functional anatomy of retina • Describe the special features of photoreceptors i.e. rods & Cones • Describe the neuronal circuits within retina • Discuss Importance of Pigmented Layer of the Retina (albinos) • Describe Blind spot & Fovea & their importance	**HN-S1-Phy-8** Retina		

52	• Describe the basic mechanism of photo-transduction • Describe the structure of rhodopsin and its bleaching by light • Describe the role of Bipolar and ganglion cells in photo-transduction • Describe the steps involved in photo-transduction	**HN-S1-Phy-9** Photo-transduction		
53	• Name the three primary color • Describe Young - Helmholtz - theory of color vision. Describe color vision pathway • Describe color blindness and tests to detect it • Describe the mechanism of dark adaptation • Describe the mechanism of light adaptation • Describe night blindness & its cause	**HN-S1-Phy-10** Color vision Duplicity of vision & adaptation		
54	• Describe visual pathway & its order neurons • Describe the lesions of visual pathway • Describe functions of superior colliculi and lateral geniculate body. Describe visual cortex • Describe structure & function of lacrimal gland	**HN-S1-Phy-11** Visual pathway & its lesions Lacrimal apparatus	Interactive Lecture	SBQs & OSVE
55	• To demonstrate visual acuity of eye using Snelling eye chart in a subject provided • To interpret the visual acuity recording • To examine the color vision of a subject using ishiara eye chart. • To perform the technique of plotting visual field.	**HN-S1-Phy-12** examination of the Optic nerve	Practical	OSPE & OSVE

	• Read and interpret a given perimeter chart. • Examine pupillary reflexes			
Biochemistry				
56	• Sources, RDA, Active forms, Absorption, Functions	**HN-S1-Bio-1** Vitamin A (I)	Interactive Lecture	SBQs & OSVE
57	• Deficiency states & Hypervitaminosis. • Visual Cycle	**HN-S1-Bio-2** Vitamin A (II)		
Ophthalmology				
58	• Define & Describe Refractive Errors, Emmetropia, Hypermetropia, Astigmatism	**HD-Oph-1** Errors of refraction, presbyopia and their correction	Interactive Lecture	SBQs & OSVE
59	• Describe Distribution of cranial nerves Explain Functional classification of cranial nerves, their pathways • Explain Clinical features related to the disorders	**HD-Oph-2** Cranial nerve palsy affecting the eye and pupillary disorder		
60	• Blockage of drainage (Glaucoma) • Discuss the Anatomy of angle, production and drainage of Aqueous	**HD-Oph-3** Glaucoma & its treatment		
61	• Define cataract • Describe the types of cataract • Discuss its management	**HN-S1-Oph-4** Cataract & its treatment		
Pharmacology				
62	• Describe principles of pharmacological treatment. • Describe the adverse effects of drug used • Describe the mechanism of action of drug used	**HN-S1-Pharm–1** Pharmacological treatment of glaucoma	Interactive Lecture	SBQs & OSVE
63	• To observe effect of Atropine on frogs eye	**HN-S1- Pharm-2** Effects of Atropine	Practical	OSPE & OSVE
64	• To observe effect of Pilocarpine on frogs eye	**HN-S1- Pharm-3** Effects of Pilocarpine		

Theme 6: Deafness, Vertigo, Otitis Media

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	Assessment
Anatomy				
65	• Describe Parts of ear. • Explain gross features of middle ear. • Describe the applied anatomy of middle ear.	**HN-S1-Ana-G-33** External Ear & Middle Ear	Demonstration	SBQs, OSPE & OSVE
66	• Explain Organ of hearing and balance. • Interpret applied anatomy of inner ear.	**HN-S1-Ana-G-34** Inner Ear (cochlea & semicircular canals)		
67	• Explain development of inner ear. • Describe development of middle ear. • Elaborate development of external ear	**NS-S1-Ana-E-5** Development of Ear	Interactive Lecture	SBQs & OSVE
68	• Describe the histology of the different parts of the Ear	**HN-S1-Ana-H-5** Histology of the Ear	Practical	OSPE & OSVE
Physiology				
69	• Define sound and describe its characteristics • Describe tympanic membrane as resonator • Name ossicles of middle ear and their lever system • Define impendence matching & describe attenuation reflex • Define Masking	**HN-S1-Phy-13** External & middle ear	Interactive Lecture	SBQs & OSVE
70	• Physiologic anatomy of cochlea & organ of Corti • Describe passage of sound waves to inner ear • Describe Sound transduction • Describe Pitch & loudness discrimination • Describe Auditory pathway	**HN-S1-Phy-14** Inner ear		
71	• Head movements • Functional anatomy of vestibular apparatus	**HN-S1-Phy-15** Vestibular Apparatus		

	• To determine the role of utricle & saccule in static equilibrium. • To determine the role of semicircular Ducts in Angular Acceleration.			
72	• To perform and examine the Rinne's & weber's test by using a tuning fork • Identify conductive and sensorineural deafness based on the result and interpretation of tuning fork tests.	**HN-S1-Phy-16** Examination of the Vestibulocochlear nerve	Practical	OSPE & OSVE
ENT				
73	• Describe the causes of deafness • Describe the types of deafness • Discuss the management of deafness	**HN-S1-Ent-3** Deafness	Interactive Lecture	SBQs & OSVE
74	• Define vertigo • Describe the pathophysiology of Meniere 's disease	**HN-S1-Ent-4** Vertigo & Meniere's disease		

3 GIT & LIVER MODULE-I

INTRODUCTION THIS MODULE IS DESIGNED TO PROVIDE THE STUDENTS SOLID KNOWLEDGE OF ONE OF THE MOST ESSENTIAL SYSTEMS OF THE HUMAN BODY, GIT AND BILIARY SYSTEM AND HELP STUDENTS DEVELOP NECESSARY SKILLS TO BUILD THEIR ABILITY TO APPLY INFORMATION TO SOLVE HEALTH RELATED PROBLEMS OF GENERAL PUBLIC.

This module aims to provide students opportunities to understand the basis of how to integrate their knowledge of gross anatomy, histology and embryology related to GIT and liver with physiology, Biochemistry, pathology and pharmacology of GI system to diagnose and treat a disease. The students will learn basic structure, physiological and Biochemical aspects of Liver and viscera of GIT and will study different types of secretions of GIT and their role in processes of absorption and digestion. They will also learn basic knowledge of pathophysiology of common diseases of gastrointestinal tract and liver occurring in our country.
Real life scenarios have been added in the module which will be discussed in small groups to help students to develop them clinical approach to understand and solve the clinical problem by correlating their basic knowledge of anatomy, physiology, Biochemistry and pathology with findings of a clinical case.

Rationale Diseases of the GIT are common all over our country. It is essential to make early diagnosis and treat the disease in order to reduce morbidity and mortality.
Basic knowledge of the structure and function of GIT is must to achieve the goal.
This module provides an integrative understanding and detailed and clinically relevant information of anatomy, physiology, the Biochemistry along with pharmacology and pathology related to the digestive and biliary system.

DURATION **8 WEEKS**

LEARNING OUTCOMES AT THE END OF THE MODULE, THE STUDENTS WILL BE ABLE TO RELATE UNDERSTANDING OF THE DEVELOPMENT AND STRUCTURE WITH THE FUNCTIONS AND BIOCHEMICAL PROCESSES RELATED TO THE GASTROINTESTINAL TRACT & LIVER.

Knowledge: By the end of the module, the students should be able to:

- Describe the development of foregut, mid gut and hind gut.
- Discuss the anomalies of the gut.
- Describe gross and microscopic anatomy of various parts of GIT.
- Describe gross and microscopic features of liver and biliary system.
- Explain the physiology of GIT.
- Describe Biochemistry of digestive juices
- Describe Biochemistry of digestion and absorption of carbohydrates, proteins and lipids
- Understand and explain the mechanism of the metabolism of the liver
- Explain pathological findings identified in GIT pathology
- Enlist pathologies involving gastrointestinal tract.
- Identify role of pharmaceutical agents used for diseases involving GIT like vomiting and diarrhea.
- Interpret radiological investigations in relation to GIT.

Attitude The students must show positive attitude to:

- Develop good manners and should be honest to their studies
- Work hard and be regular and punctual in the class
- Participate in class and practical work efficiently
- Follow the basic laboratory protocols.
- Develop communication skills with sense of responsibility
- Demonstrate the effective attitude towards the teachers and colleagues
- Maintain ethical values in dealing with patients.

Demonstrate a professional attitude, team building spirit and good communication skills
This module comprises of 08 weeks to achieve the target with the learning of the following themes related to basic discipline.

THEMES

Theme 1: The anterior abdominal wall and the Hernias
Theme 2: Upper Gastrointestinal tract disorders
Theme 3: Hepatic and Portal system disorders
Theme 4: Lower Gastrointestinal tract disorders
Theme 5: Vascular disorders

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: The Anterior Abdominal Wall & the Hernias

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
	Anatomy			
1	• Describe divisions & components of GIT • Describe the planes and nine abdominal regions. • Identify four quadrants of abdomen. • Describe the arrangement of viscera in nine abdominal regions.	**GIL-S1-Ana-G1** An Overview of GIT & Surface anatomy of Abdomen	Interactive Lecture	SBQs & OSVE
2	• Discuss the attachment of the fasciae and muscles of antero-lateral abdominal wall in relation to its clinical importance. • Explain formation of rectus sheath with its contents	**GIL-S1-Ana-G2** Anterior abdominal wall-1	Demonstration	SBQs, OSPE & OSVE
3	• Describe nerve supply, blood supply and lymphatic drainage of antero-lateral abdominal wall	**GIL-S1-Ana-G3** Anterior abdominal wall-2		

	• Identify and palpate the bony landmarks of the abdomen like anterior superior iliac spine, pubic tubercle. • Identify surface marking of inguinal ligament, mid inguinal point, McBurney's point and lateral border of rectus abdominis.			
4	• Describe the inguinal canal under following heads: i. Location and Dimension ii. Walls of inguinal canal iii. Inguinal rings iv. Functions and mechanics of the inguinal canal.	**GIL-S1-Ana-G4** Inguinal canal		
5	• Explain coverings and contents of spermatic cord • Contents of inguinal canal in male & female • Define hernia and describe direct & indirect inguinal hernia • Differentiate between inguinal and femoral hernia	**GIL-S1-Ana-G5** Spermaticcord		
6	• Explain the development of the inguinal canal and briefly give the overview of the Scrotum, testis and epididymides. • Briefly define the labia majora.	**GIL-S1-Ana-G6** Development of inguinal canal and Overview of the male and female genitalia	Interactive Lecture	SBQs & OSVE
7	• Define peritoneum and peritoneal cavity. • Discuss intraperitoneal and retroperitoneal relationships. • Explain peritoneal ligaments. • Define omenta and mesentries.	**GIL-S1-Ana-G7** Peritoneum-1: General arrangement		
8	• Discuss in detail the peritoneal pouches, recesses, spaces and gutters. • Describe the boundaries of greater and lesser sac • Define the nerve supply of the peritoneum. • Discuss the functions of the peritoneum.	**GIL-S1-Ana-G8** The peritoneum-2: Pouches, Recesses, Spaces & Gutters	Demonstration	SBQs, OSPE & OSVE

	• Discuss the clinical conditions related with peritoneum.			
9	• Explain the process of development of GIT and divisions of primitive gut.	**GIL-S1-Ana-E1** Overview of the GIT development	Interactive Lecture	SBQs & OSVE
10	• Discuss general plan of histology of the wall of alimentary canal • Identify histological features of different layers of GIT. • Give an overview of different parts of esophagus • Identify the microscopic features of thoracic and abdominal parts of esophagus.	**GIL-S1-Ana-H1** General plan of GIT histology Histology of Esophagus	Practical	OSPE & OSVE
Physiology				
11	• Mention primary/basic functions of GIT • Describe physiological anatomy of gastrointestinal wall • Describe electrical activity of gastrointestinal smooth muscle	**GIT-S1-Phy-1** Overview of GIT physiology	Interactive Lecture	SBQs & OSVE
12	• Describe enteric nervous system and its two main plexuses • Mention the role of enteric nervous system in control of GIT function • Mention the role of autonomic nervous system in control of GIT function • Define three types of gastrointestinal reflexes that are essential to gastrointestinal control	**GIT-S1-Phy-2** Neural control of GIT function		
Biochemistry				
13	• Composition, functions and regulation of saliva and gastric juice	**GIT-S1-Bio-1** saliva and gastric juice	Interactive Lecture	SBQs & OSVE
14	• Composition, functions and regulation of pancreatic, bile and intestinal juice	**GIT-S1-Bio-2** pancreatic juice, bile juice and intestinal juice		

15	• Sites and enzymes involved in digestion, classification and functions of glucose transporters, factors affecting rate of absorption, lactose intolerance	**GIT-S1-Bio-3** digestion and absorption of carbohydrates		
16	• Describe the process and enzymes involved in digestion and absorption of proteins. Explain hartnup and maple serup disease.	**GIT-S1-Bio-4** Digestion & Absorption of proteins		
17	• Describe the process of digestion and absorption. Explain steatorrhea	**GIT-S1-Bio-5** Digestion & Absorption of lipids and fatty acids		
18	• Interpretate the normal levels of HCL	**GIT-S1-Bio-6** Interpretation of HCL	Practical	OSPE & OSVE
Pathology				
19	• Define atresia, fistulae, duplications diaphragmatic hernia, omphalocele, gastroschisis ectopia, meckel diverticulum,pyloric stenosis and hirschsprung disease	**GIL-S1-Path-1** Congenital Abnormalities of GIT	Interactive Lecture	SBQs & OSVE

Theme 2: Upper Gastrointestinal Disorders

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	Assessment
Anatomy				
20	• Explain gross features of esophagus in relation to its location and dimensions. • Mention its important relations especially in posterior mediastinum. • Describe its blood supply, nerve supply & lymphatic drainage. • Discuss its different areas of compression and their clinical importance	**GIL-S1-Ana-G9** Esophagus	Demonstration	SBQs, OSPE & OSVE

21	• Mention different parts of stomach. • Describe gross anatomical features of stomach including interior of stomach. • Give blood, nerve supply and lymphatic drainage. • Identify the structures forming stomach bed. • Explain peritoneal covering of the stomach and mention different peritoneal folds related to this organ along with contents.	**GIL-S1-Ana-G10** Stomach		
22	• Mention different parts of small intestine**.** Describe different parts of duodenum along with relations of each part. Mention the vessels and nerves supplying the duodenum.	**GIL-S1-Ana-G11** Small intestine (duodenum**)**		
23	• Explain basic anatomy of jejunum and ileum. • Distinguish between jejunum and ileum regarding their anatomical features. • Explain the terms mesentry,duodenal flexure and Meckel's diverticulum.	**GIL-S1-Ana-G12** Small intestine (jejunum and ileum)		
24	• Explain the process of development of GIT and divisions of primitive gut. • List the derivatives of foregut. • Describe the development of: i. Esophagus ii. Stomach iii. Lesser & greater sac • Discuss the following congenital anomalies: i. Esophageal atresia/stenosis	**GIL-S1-Ana-E2** Foregut	Interactive Lecture	SBQs & OSVE

	ii. Congenital hypertrophic pyloric stenosis iii. Duodenal atresia/ stenosis			
25	• Explain the development of the duodenum. • Describe development of liver, biliary apparatus and gall bladder. • Discus extrahepatic biliary atresia	**GIL-S1-Ana-E3** Development of the Duodenum, Liver and gall bladder	Interactive Lecture	SBQs & OSVE
26	• Identify various layers of the wall of stomach • Describe histology of gastric mucosa including different glands and cell types in different regions of stomach. • Identify different cells of mucosa under microscope and mention their functions.	**GIL-S1-Ana-H2** Histology of stomach	Practical	OSPE & OSVE
27	• Identify the parts of small intestine • Identify microscopically different layers of small intestine • Identify modifications of the luminal surface • Describe the glands and cells present in the small intestine • Discuss special microscopic features of duodenum, jejunum and ileum	**GIL-S1-Ana-H3** Histology of Small intestine		
Physiology				
28	• Mention major salivary glands • Describe the composition and function of saliva • Describe the role of saliva in oral hygiene • Explain regulation/control of salivary secretion	**GIT-S1-Phy-3** Saliva; its composition, function and regulation	Interactive Lecture	SBQs & OSVE
29	• Define mastication/chewing and mention its importance	**GIT-S1-Phy-4** Mastication and Deglutition	Interactive Lecture	SBQs & OSVE

	• Define swallowing/deglutition and name its stages Describe mechanism of each Stage • Mention function of lower esophageal sphincter			
30	• Describe physiological anatomy of gastric glands • Describe composition og gastric juice • Mention functions of important constituents of gastric juice • Describe regulation/control of gastric juice secretion	**GIT-S1-Phy-5** Gastric juice; its composition, function and regulation	Interactive Lecture	SBQs & OSVE
31	• Describe the mechanism of HCl secretion by parietal cells of oxyntic/gastric glands • Mention function of gastric NCl • Describe regulation of gastric acid secretion	**GIT-S1-Phy-6** Mechanism of gastric acid (NCI) secretion and its control		
32	• Describe the motor functions of stomach • Explain how the gastric emptying is regulated	**GIT-S1-Phy-7** Motor functions of stomach		
33	• Define the indications, contraindications and the complications of the nasogastric tube	**GIT-S1-Phy-8** Nasogastric Tube-1	Practical	OSPE & OSVE
Clinical Lecture				
34	• Discuss Clinical correlates of upper GIT (surgical aspects)	**GIT-S1-Surg-1** Upper GI disorders	Interactive Lecture	SBQs & OSVE
35	• Discuss Clinical correlates of upper GIT (surgical aspects)	**GIT-S1-Med-1** Upper GI disorders		

Theme 3: Hepatic & Portal System Disorders

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
36	• Identify location of liver • Describe the surfaces and different peritoneal relations	**GIL- S1-Ana-G13** Liver	Demonstration	SBQs, OSPE & OSVE

	• Discuss formation of anatomical and functional (physiological) lobes of liver. • Identify porta hepatis and its contents. • Mention blood vessels especially describing blood circulation through the liver • Discuss lymphatic drainage and nerve supply of this organ.			
37	• Explain the hepatic portal circulation • Discuss basic anatomy of portal vein. • Mention its tributaries • Discuss the sites of porto-systemic anastomosis with clinical importance.	**GIL- S1-Ana-G14** Hepatic portal system		
38	• Describe location and parts of gall bladder • Mention its important relations • Name blood and lymph vessels including nerves supplying this organ. • Describe clinical correlates of biliary system.	**GIL- S1-Ana-G15** Gall bladder		
39	• List different components of intra & extra-hepatic biliary system • Describe formation and termination of common bile duct. • Mention its important relations • Name blood vessels supplying different parts of bile duct including lymphatic drainage.	**GIL- S1-Ana-G16** Duct system of liver (hepatic biliary system)		
40	• Discuss location and gross features of pancreas • Mention its peritoneal relations • Describe the arterial supply, venous drainage and nerve supply of pancreas • Discuss the clinical correlates	**GIL- S1-Ana-G17** Pancreas		

41	• Explain location, surfaces and borders of spleen. • Mention its important relations with surrounding organs • Discuss peritoneal folds connecting spleen with other organs • Mention the vessels and nerves supplying spleen	**GIL- S1-Ana-G18** Spleen		
42	• Describe the development of pancreas • Describe the following anomalies of pancreas: i. Annular pancreas ii. Accessory pancreatic tissue	**GIL- S1-Ana-E4** Development of the Pancreas	Interactive Lecture	SBQs & OSVE
43	• List the derivatives of midgut • Describe the development of mid gut under following headings. i. Physiological herniation ii. Rotation of the mid gut iii. Retraction of herniated loops iv. Fixation of intestines • Discuss the following congenital anomalies involving midgut: i. Body wall defects ii. Vitelline duct abnormalities iii. Gut rotation defects iv. Gut atresias and stenoses	**GIL- S1-Ana-E5** Midgut		
44	• Explain general hepatic structure. • Discuss the concept of three hepatic lobules. • Describe the histology of classical hepatic lobule.	**GIL- S1-Ana-H 4** Histology of liver	Practical	OSPE & OSVE
45	• Describe the different components of biliary tract • Describe the microscopic structure of gall bladder	**GIL- S1-Ana-H5** Histology of Gall bladder		
46	• Identify microscopically exocrine and endocrine pancreas	**GIL- S1-Ana-H6** Histology of Pancreas		

	• Discuss the histological features of secretory and duct part of exocrine pancreas • Identify and explain endocrine pancreas and its different cell types.			
Physiology				
47	• Mention physiological anatomy of exocrine part of pancreas • Describe composition of pancreatic juice • Mention functions of pancreatic juice • Mention importance of trypsin inhibitor • Describe basic stimuli that cause pancreatic secretion • Mention phases of pancreatic secretion	**GIT-S1-Phy-9** Pancreatic juice; its composition, function and regulation	Interactive Lecture	SBQs & OSVE
48	• Describe the main functions of liver • Describe composition of bile juice • Mention difference between hepatic bile and gallbladder bile	**GIT-S1-Phy-10** Functions of liver and composition of bile		
49	• List the functions of bile • Mention the role of bile acids/salts in fat digestion and absorption • Describe enterohepatic circulation of bile salts • Describe regulation of bile secretion • Describe mechanism of gallbladder emptying	**GIT- S1-Phy-11** Function and regulation of bile secretion		
50	• Demonstrate the procedure of how to pass the nasogastric tube	**GIL- S1-Phy-12** Nasogastric Tube-II	Practical	OSPE & OSVE
Biochemistry				
51	• Definition/ Site/ Substrate required for gluconeogenesis • Pathway of Gluconeogenesis • Regulatory Enzymes / Steps of gluconeogenesis	**GIL- S1-Bio-7** Gluconeogenesis & cori's cycle	Interactive Lecture	SBQs & OSVE

	• Stimulator & Inhibitor Factors of Gluconeogenesis Pathway			
52	• Definition / Site • Types or Phases of HMP Shunt • Name of regulatory Enzyme • Biochemical importance of HMP Shunt • Role of NADPH compound in Human Life • Regulatory Steps of HMP Shunt & Their regulatory factors	**GIL- S1-Bio-8** HMP Shunt		
53	• Definition / Site / Substrates • Pathway of Glycogenesis & glycogenolysis • Regulatory Steps/ Enzymes • Biomedical Importance of Glycogenesis & glycogenolysis	**GIL- S1-Bio-9** Glycogenesis Glycogenolysis		
54	• Regulatory Enzymes of Glycogen metabolism • Glycogen Storage Diseases	**GIL- S1-Bio-10** Regulation of glycogen metabolism & glycogen storage diseases		
55	• Site/ Substrates • Pathways • Regulatory Steps/ Regulatory Factors • Biomedical Importance • Clinical Importance of Fructose & Sorbitol Pathway	**GIL- S1-Bio-11** Fructose & Sorbitol Metabolism		
56	• Define Amino Acids Pool • Describe Protein turn over • Describe Protein Degradation • Define Nitrogen Balance • Describe Positive & Negative Nitrogen Balance	**GIL- S1-Bio-12** Amino Acids Pool & nitrogen balance		
57	• Describe Transamination & its Biomedical importance • Describe Deamination & Its Biomedical importance • Describe Transmethylation &Biomedical importance • Describe Deacrboxylation & its Biomedical Importance	**GIL- S1-Bio-13** Amino Acids Reactions		
58	• Definition/ Site/ Substrate/ Products	**GIL- S1-Bio-14** Urea Cycle		

	• Pathways Mitochondrial/ Cytosol Steps • Regulatory Enzymes • Regulatory Factors of Urea Cycle • Relation of Urea Cycle with TCA Cycle • Disorders of urea Cycle			
59	• Definition • Types • Clinical Manifestation & their Biochemical causes of clinical features • Names of Enzymes involve in Ammonia Intoxication • Definition of Ureamia • Normal Level of Blood Urea & Ammonia • Causes of Hyperureamia	**GIL- S1-Bio-15** Ammonia Intoxication		
60	• Metabolic Pathway of Phenylalanine, Tyrosine, Tryptophan • Describe Phenylketonurea • Describe tyrosinemia & Types • Describe Albinism • Describe Alkaptonurea	**GIL- S1-Bio-16** Metabolism of Aromatic Amino Acids		
61	• Describe Metabolic Pathway of Methonine/ Cysteine & Cystine • Describe their metabolic disorder	**GIL- S1-Bio-17** Metabolism of Sulphur containing Amino Acids		
62	• Types of Oxidation of F.A • Definition of Alpha/ beta/ Omega Oxidation • Explain the Metabolic Pathway of Beta Oxidation • Biomedical importance of Beta Oxidation • ATP molecules formation in Beta oxidation	**GIL- S1-Bio-18** Oxidation of Fatty Acids		
63	• Definition / Site / Substrates/ Products & Metabolic Pathway of Ketogenesis • Regulatory Steps or Enzymes of Ketogenesis • Definition of Ketonemia/ Ketonurea/ Ketosis	**GIL- S1-Bio-19** Ketonegensis & ketolysis		

	• Diabetic ketoacidosis • Definition / Sites / Substrates • Describe the metabolic Pathway of ketolysis • Regulatory Enzymes & Regulatory Factors • Role of thiophorase enzyme • Clinical Importance of ketolysis			
64	• Enlist the components of L.F.T • Explain the functions of different components of L.F.T • Estimation of serum SGOT, SGPT. • Role of the L.F.T in the diagnosis/ prognosis of clinical disorders	**GIL- S1-Bio-20** Liver function Test		
65	• Enlist the components of L.F.T • Explain the functions of different components of L.F.T • Estimation of serum SGOT, SGPT. • Role of the L.F.T in the diagnosis/ prognosis of clinical disorders	**GIL- S1-Bio-21** Liver function test	Practical	OSPE & OSVE
66	• To estimate normal serum urea level. • Describe the conditions of increased or decreased urea levels.	**GIL- S1-Bio-22** estimation of serum urea		
67	• To estimate albumin: globulin ratio from given sample	**GLI- S1-Bio-23** Albumin: Globulin ratio		
68	• To estimate serum bilirubin direct & indirect from given sample	**GLI- S1-Bio-24** Serum bilirubin direct & indirect		
69	• To interpretate the PT & APTT	**GLI-S1-Bio-25** Interpretation of PT & APTT		
Pathology				
70	• Explain etiology, pathogenesis, mode of transmission, clinical diagnosis of Hepatitis.	**GIL-S1-Path-2** Hepatitis	Interactive Lecture	SBQs & OSVE
Clinical lecture				
71	• Discuss the clinical presentation and management of hepatitis	**GIL-S1-Med-2** Hepatitis	Interactive Lecture	SBQs & OSVE

72	• Discuss the clinical presentation and management of cholecystitis	**GIL-S1-Surg-2** Hepatitis		

Theme 4: The Lower Gastrointestinal Disorders

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
73	• Identify different parts of large intestine. • Mention general characteristics of most of large intestine. • Discuss basic anatomical differences between large and small intestine. • Explain basic anatomy of cecum and vermiform appendix. • Identify different positions of the appendix and give clinical importance**.**	**GIL- S1-Ana-G19** Large intestine-1 Cecum and Vermiform appendix	Demonstration	SBQs, OSPE & OSVE
74	• Discuss gross features of different parts of colon: Ascending colon, Transverse colon, descending colon and mention their peritoneal covering. • Give blood and nerve supply.	**GIL- S1-Ana-G20** Large intestine-2 Colon		
75	• Describe location, course and other gross anatomical features of rectum. • Mention important relations. • Explain blood supply, lymph drainage & nerve supply. • Discuss clinical correlates of rectum • Explain the difference of peritoneal covering in a male and female.	**GIL- S1-Ana-G21** Rectum		
76	• Describe the ano-rectal junction • Discuss the location and basic structure of anal canal	**GIL- S1-Ana-G22** Anal canal		

	• Describe the difference of neurovascular supply and lymphatic drainage between upper and lower half of anal canal. • Explain the relations of the anal canal. • Discuss the anatomy of anal sphincters. • Discuss the clinical correlates. • Describe ischiorectal fossa.			
77	• List the derivatives of hindgut. • Describe the developmental process of the following. i. Partitioning of the cloaca ii. Anal canal • Discuss main features related to abnormalities of hindgut including: i. Recto-anal atresia, and fistula ii. Imperforate anus iii. Congenital megacolon	**GIL- S1-Ana-E6** Hind gut	Interactive Lecture	SBQs & OSVE
78	• Discuss the important gross and histological features of large intestinal wall. • Identify intestinal glands and different cell types. • Identify and explain the lymphoid ring around the vermiform appendix. • Differentiate between gross and microscopic features of large and small intestine. • Describe the histology of anorectal junction.	**GIL- S1-Ana-H7** Histology of Large intestine	Practical	OSPE & OSVE
Physiology				
79	• Mention physiological anatomy of small intestine • Describe secretion of small intestine	**GIT-S1-Phy-13** Secretion and movements of small intestine	Interactive Lecture	SBQs & OSVE

	• Mention function and regulation of small intestinal secretion • Mention enzymes present in the brush border of small intestine • Describe movements of small intestine			
80	• Mention physiological anatomy of large intestine • Describe the secretions of large intestine and mention their function • Describe movements of large intestine • Describe defecation and defecation reflex	**GIT-S1-Phy-14** Secretion and movements of large intestine		
Pharmacology				
81	• To treat Nausea and Vomiting • Uses in Motion sickness	**GIL- S1-Pharm-1** Drugs used as Anti-Emetics	Interactive Lecture	SBQs & OSVE
Clinical lecture				
83	• Discuss clinical presentation and surgical management of lower GI disorders	**GIL- S1-Surg-3** Lower GI disorders	Interactive Lecture	SBQs & OSVE
84	• Discuss clinical presentation and management of lower GI disorders	**GIL- S1-Med-3** Lower GI disorders		

Theme 5: Vascular Disorders

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	Assessment
Anatomy				
85	• Describe general characteristics of lumbar vertebrae • Explain the attachments of lumber fascia. • Discuss attachment of muscles of posterior abdominal wall.	**GIL-Ana-G28** Posterior abdominal wall-I: Lumbar vertebrae & muscles	Demonstration	SBQs, OSPE & OSVE
86	• Discuss lumbosacral plexus • Explain formation of cisterna chyli and thoracic duct	**GIL-Ana-G29** Posterior abdominal wall-II		

	• Discuss nerve supply, lymphatic drainage of abdominal walls and viscera			
87	• Describe the location of abdominal aorta in respect of beginning, course and termination mentioning important relations and vertebral levels**.** • Identify paired and unpaired branches & area of their supply.	**GIL-Ana-G30** Blood supply of the gastrointestinal tract-I Abdominal Aorta		
88	• Describe the formation, course and termination of inferior vena cava • List the tributaries of inferior vena cava	**GIL-Ana-G31** Blood supply of the gastrointestinal tract-II Inferior vena cava		
89	• Name the groups of lymph nodes draining the abdomen. Explain them. • Describe lymphatic trunks, cisterna chili & thoracic duct.	**GIL-Ana-G32** Lymphatic drainage of GIT		
Physiology				
90	• List important hormones secreted from the GIT mucosa • Describe role of these hormones in regulation/ control of GIT function	**GIT-1-Phy-15** Hormones of GIT	Interactive Lecture	SBQs & OSVE

ENDOCRINOLOGY MODULE-I

Introduction the endocrine system is made up of ductless glands, which secrete chemical substances (hormones) directly into blood, relays information and maintains a constant internal environment of the body called homeostasis.

The endocrine glands where hormones are produced, stored, and released. Once released into the bloodstream, they travel to their target organ or tissue, which has receptors that recognize and react to the hormone. Hormones of the endocrine system coordinate and control growth, metabolism, temperature regulation, the stress response, reproduction, and many other functions.

This module will help the students to develop knowledge and understanding the basic concepts of endocrine hormone their structure, physiological actions & disorders relates to primary pathogenesis, and how this knowledge help in diagnosis and treatment.

This endocrine system module will facilitate to recognize the clinical presentations of common endocrinological and metabolic disorders and relate clinical manifestations to basic sciences.

Rationale Endocrine disorders like Diabetes Mellitus and Thyroid related diseases are very common in all parts of Pakistan. This module provides the basis on which 2nd year MBBS students

will learn not only knowledge application but also the ability to link normal and the abnormal in the 2nd spiral of the curriculum.

DURATION **06 WEEKS**

LEARNING OUTCOMES

- To explain the role of the endocrine system in maintaining homeostasis, integrating growth and development and promoting successful reproduction.
- To study the histological features of different glands.
- To distinguish between endocrine, paracrine and autocrine messengers.
- To describe the chemical structures of hormones & their mechanism of action.
- To describe the synthesis and modes of secretion of hormones.
- To explain how the secretion of hormones is regulated, including the principles of negative and positive feedback mechanisms.
- To explain how hormones are transported in the blood and the consequences of the reversible binding of many hormones by plasma proteins.
- To explain the basis of hormone assays and assessment of Biological activity.
- To describe how hormones are metabolized in blood and tissues and the importance of hormone activation and degradation.
- To discuss the clearance and excretion of hormones and their metabolic derivatives.
- To define and discuss the physiological actions of hormones
- To explain the consequences of under and overproduction of hormones.
- To describe and discuss the roles of hormone receptors in hormone action including their location, type and signaling pathways.
- To apply endocrinologicall principles to determine the pathophysiological basis and consequences of specific endocrine disorders.
- To understand the role of pharmacology to treat common endocrine disorders.
- Discuss the epidemiology and consequences of iodine deficiency and the salient features of iodine control program in Pakistan
- Describe the epidemiology of diabetes mellitus in terms of global perspectives in Pakistan
- Describe the levels of prevention of diabetes mellitus and its control

Practical/ Laboratory Work

- Microscopic features of Pituitary & Pineal gland
- Microscopic features of Thyroid & Parathyroid gland.
- Microscopic features of AdExc-S1 gland.
- Microscopic features of Endocrine Pancreas
- To detect Hormonal level by ELISA method
- Thyroid function test (TSH, T3, T4)
- Laboratory diagnosis of diabetes mellitus (HbA1C, GCT, OGTT, FBS, RBS)
- To calculate BMI (Body Mass Index)

The outcomes of the Endocrinology Module According to the PMC are as follows:

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

Cognitive Domain

By the end of this module, 2nd year MBBS students shall be able to:

- Identify the various endocrine glands their Anatomy, Physiology &Biochemistry & pathology.
- Describe the, synthesis, structure, histological features, functions and Pathophysiology of various hormones secreted by endocrine glands.
- Describe the regulation of hormones (Positive & Negative feedback mechanism).
- Describe the conditions associated with dysfunction of endocrine glands.
- Describe the basic mechanism of action of drugs used to treat these disorders.

Psychomotor Domain

By the end of endocrine Module, the student should be able to:

- Carry out practical work as instructed in an organized and safe manner
- Make and record observations accurately.
- Determine the serum levels of different hormones by ELIZA technique and have knowledge of normal and abnormal value.
- Determine the different blood sugar level HbA1c and have knowledge of normal and abnormal value.

Attitude & Behaviour

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

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

THEMES

To achieve these overall aims, this module comprises of four weeks with a separate theme for each week for enhancing your learning around key areas in endocrinology.

Theme 1: Short/Tall stature and the role of the pituitary gland
Theme 2: Neck swelling with bulging eyes & Tetany and the role of the thyroid gland
Theme 3: Increased thirst and urination (Diabetes Mellitus/ Diabetes Insipidus) and the role of the pancreas
Theme 4: Moon face and the role of the adExc-S1 gland

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme1: Short/Tall Stature &the Role of the Pituitary Gland

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
1	• Define the endocrine system. • Classify the endocrine system. • What are the functions of the endocrine system?	**Endo-S1-Ana-G-1** Introduction of the anatomy of the Endocrine system	Interactive Lecture	SBQs & OSVE
2	• Describe the embryological development & congenital anomalies of pituitary & Pineal gland.	**Endo-S1-Ana-E-1** Embryological development of pituitary and Pineal gland.		
3	• Describe the gross anatomy, neurovascular supply & Clinical correlates of Pituitary & Pineal gland	**Endo-S1-Ana-G-2** Gross Anatomy of Pituitary and Pineal gland.		
4	• Discuss the microscopic features of Pituitary & Pineal gland	**Endo-S1-Ana-H-1** Microscopic Anatomy of Pituitary & Pineal gland	Practical	OSPE & OSVE
Biochemistry				
5	How Hormones are classified on the basis of their Chemical Nature	**Endo-S1-Bio-1** Classification of Hormones on the basis of chemical Nature.	Interactive Lecture	SBQs & OSVE
6	How hormones act through cAMP/cGMP/Tyrosine kinase pathway	**Endo-S1-Bio-2** Mechanism of action of Hormones (second messenger system)		
Physiology				
7	• Define different types of chemical messengers • Describe the functional relationships between the Hypothalamus -Pituitary Axis	**Endo-S1-Phy-1** Introduction to endocrinology Hypothalamus-pituitary Axis	Interactive Lecture	SBQs & OSVE
8	• Describe the hormones secreted by the anterior pituitary gland and describe their hypothalamic control &	**Endo-S1-Phy-2** Classification of hormones, Regulation of secretion		

	regulation by positive and negative feedback Mechanism			
9	• Explain the structure, mechanism of action and physiological effects of Growth hormone.	**Endo-S1-Phy-3** Physiology and regulation of Growth hormone		
10	• Describe the functions of Pineal gland, how it control body's circadian rhythm.	**Endo-S1-Phy-4** Physiological effects of pineal gland		
Clinical lectures				
11	• Define the clinical conditions related to the pineal and the pituitary gland	**Endo-S1-Med-1** Clinical conditions related with pineal and pituitary gland.	Interactive Lecture	SBQs & OSVE
Pathology				
12	• Describe the different types of Anterior Pituitary gland disorders.	**Endo-S1-Path-1** Disorders of Pituitary gland.	Interactive Lecture	SBQs & OSVE

Theme 2: Neck Swelling with Bulging Eyes & Tetany and the Role of the Thyroid Gland

S. #	LEANING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
13	• Describe the embryological development & congenital anomalies of Thyroid & Parathyroid gland.	**Endo-S1-Ana-E-2** Embryological development of Thyroid & Parathyroid gland.	Interactive Lecture	SBQs & OSVE
14	• Describe the gross anatomy, neurovascular supply & Clinical correlates of Thyroid & Parathyroid gland.	**Endo-S1-Ana-G-3** Gross Anatomy of Thyroid & Parathyroid gland.		
15	• Discuss the microscopic features of Thyroid & Parathyroid gland.	**Endo-S1-Ana-H-2** Microscopic Anatomy of Thyroid & Parathyroid gland.	Practical	OSPE & OSVE
Biochemistry				
16	• Describe the Biosynthesis of thyroid hormones from Tyrosine and Iodine trapping by thyroid gland.	**Endo-S1-Bio-3** Synthesis of thyroid hormones	Interactive Lecture	SBQs & OSVE
17	• What are thyroid function tests (TFTs)? Describe their Biochemical interpretation.	**Endo-S1-Bio-4** Biochemical Interpretation of Thyroid Function Tests (TFTs)		

18	• Describe the Biochemical role of parathyroid hormones in Calcium and phosphate metabolism in humans.	**Endo-S1-Bio-5** Biochemical actions of parathyroid hormones		
19	• Estimation of thyroid hormones	**Endo-S1-Bio-6** Estimation of thyroid hormones	Practical	OSPE & OSVE
		• **Physiology**		
20	• Describe formation, Secretion and transport of thyroid hormones	**Endo-S1-Phy-5** Introduction of Thyroid hormones	Interactive Lecture	SBQs & OSVE
21	• Describe Physiological effects of Thyroid Hormone on Growth, metabolism and body systems	**Endo-S1-Phy-6** Physiological role of thyroid hormones		
22	• Explain Mechanism of action/target organ of PTH • Describe Effect of Parathyroid Hormone on Calcium regulation	**Endo-S1-Phy-7** Physiological role of PTH hormones		
23	• Explain the function, secretion and regulation of Vitamin D and Calcitonin • Describe Effect of Describe Effect of Parathyroid Hormone on Calcium regulation Vitamin D and calcitonin Hormone on Calcium regulation	**Endo-S1-Phy-8** Physiological role of Vitamin D and Calcitonin		
		Pathology		
24	• Discuss the different disorders of Thyroid gland	**EndoS1-Path-2** Disorders of Thyroid gland	Interactive Lecture	SBQs & OSVE
		Clinical Lectures		
25	• Define the procedure of thyroidectomy. • What are the indications for thyroid surgery? • What are the complications related to this surgery?	**Endo-S1-Surg-1** Thyroidectomy	Interactive Lecture	SBQs & OSVE

Theme 3: Increased Thirst and Urination (DM/DI) and the Role of the Pancreas

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		

26	• Describe the embryological development & congenital anomalies of Endocrine Pancreas.	**Endo-S1-Ana-E-3** Embryological development of Endocrine Pancreas	Interactive Lecture	SBQs & OSVE
27	• Describe the gross anatomy, neurovascular supply & Clinical correlates of Endocrine Pancreas	**Endo-S1-Ana-G-4** Gross Anatomy of Endocrine Pancreas		
Biochemistry				
28	• Biosynthesis of Insulin. • Structure of Insulin. • Mechanism of action of Insulin and Glucagon. • Factors affecting Insulin secretion. • Metabolic functions of Insulin and Glucagon.	**Endo-S1-Bio-7** Insulin and glucagon	Interactive Lecture	SBQs & OSVE
29	• How blood glucose is maintained throughout a day in humans during different metabolic states	**Endo-S1-Bio-8** Maintenance of blood sugar during starvation and in well-fed states		
30	• What are Ketotic & non ketotic Complications of Diabetes Mellitus and explain their Biochemical basis.	**Endo-S1-Bio-9** Ketotic & Non ketotic Complications associated with Diabetes Mellitus		
31	• Estimation of serum Insulin	**Endo-S1-Bio-10** Estimation of serum Insulin	Practical	OSPE & OSVE
Physiology				
32	• Describe secretion and physiological functions of ADH • Describe SIADH (syndrome of inappropriate Anti Diuretic Hormone)	**Endo-S1-Phy-9** Post pituitary	Interactive Lecture	SBQs & OSVE
33	• Name the hormones of pancreas. Explain Mechanism of action of insulin. Describe the Control of Insulin Secretion	**Endo-S1-Phy-10** Endocrine Pancreas		
34	• Describe the effects of insulin on carbohydrates, proteins and Fats metabolism	**Endo-S1-Phy-11** Pancreas (Insulin)		

35	• Describe regulation of glucagon &its effects on body	**Endo-S1-Phy-12** Pancreas (Glucagon)		
Clinical Lectures				
36	• Define diabetes mellitus. • Types, risk factors, causes , clinical features, complications of DM	**Endo-S1-Med-2** Diabetes Mellitus	Interactive Lecture	SBQs & OSVE
Pathology				
37	Describe the different types of Endocrine Pancreas& discuss briefly the Diabetes Mellitus.	**Endo-S1-Path-3** Disorder of Endocrine Pancreas, Diabetes Mellitus	Interactive Lecture	SBQs & OSVE

Theme 4: Moon Face and the Role of the AdExc-S1 Gland

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
38	• Describe the embryological development & congenital anomalies of AdExc-S1 gland.	**Endo-S1-Ana-E-4** Embryological development of AdExc-S1 gland.	Interactive Lecture	SBQs & OSVE
39	• Describe the gross anatomy, neurovascular supply & Clinical correlates of AdExc-S1 gland.	**Endo-S1-Ana-G-5** Gross anatomy of AdExc-S1 gland.		
40	• Discuss the microscopic features of AdExc-S1 gland.	**Endo-S1-Ana-H-3** Microscopic Anatomy of AdExc-S1 gland	Practical	OSPE & OSVE
Biochemistry				
41	• Describe the actions of mineralocorticoid hormones in water and electrolyte balance.	**Endo-S1-Bio-11** Biochemical actions of mineralocorticoids.	Interactive Lecture	SBQs & OSVE
42	• Describe the Biochemical actions of Glucocorticoid hormones.	**Endo-S1-Bio-12** Biochemical actions of Glucocorticoids		
43	• Estimation of serum Cortisol	**Endo-S1-Bio-13** Estimation of serum Cortisol	Practical	OSPE & OSVE
Physiology				
44	• Name the hormones of adExc-S1 cortex, and regulation of adreno	**Endo-S1-Phy-13** AdExc-S1 cortex	Interactive Lecture	SBQs & OSVE

	cortical hormone secretion.	Regulation of secretion		
45	• Describe the physiological Effects of Aldosterone	**Endo-S1-Phy-14** Physiological effects of Aldosterone		
46	• Describe Effects of Cortisol on Carbohydrate, Proteins and Fat Metabolism, role of Cortisol in Stress, Inflammation and Allergy	**Endo-S1-Phy-15** Physiological effects of Glucocorticoid (Cortisol)		
47	• Describe BMI. • Calculate BMI • Describe factors affecting BMI • Classify obesity • Describe the factors affecting obesity	**Endo-S1-Phy-16** Calculation of BMI	Practical	OSPE & OSVE
Pathology				
48	• Describe the hyper-secretory & hypo-secretory disorders of adExc-S1 cortex & Medulla	**Endo-S1-Path-4** Hyper and Hypo-secretion of hormones from adExc-S1 medulla & cortex	Interactive Lecture	SBQs & OSVE
Pharmacology				
49	• To restore normal hormonal regulation and physiological functions • Describe its uses and side effects	**Endo-S1-Path-1** Instruction to Endocrine Pharmacology	Interactive Lecture	SBQs & OSVE
Clinical Lectures				
50	• Define the clinical conditions related with the AdExc-S1 gland	**Endo-S1-Med-3** Clinical conditions related with AdExc-S1 gland	Interactive Lecture	SBQs & OSVE

RENAL & EXCRETORY MODULE-I

INTRODUCTION WELCOME TO THE EXC-S1& EXCRETORY MODULE. THIS EXCITING MODULE WILL SERVE AS BUILDING BLOCK AND IS VERY ESSENTIAL TO YOUR FUTURE WORK AS DOCTORS. THIS MODULE IS DESIGNED TO MAKE YOUR LEARNING BOTH INTERESTING AND PRODUCTIVE BY INCLUDING SEVERAL ACTIVITIES.

Fluid balance is the most important feature of life. Every cell in our body bathed in the cellular (extracellular and intracellular) fluid compartment, movements of ions and balance between the media is of the utmost important for the normal functioning of human being. Functions of Kidneys and their encountering system are beautiful and well organized. Human beings contain pair of kidneys, whose unit cell is Nephron, which functions in a systemic manner to perform many physiological functions, it is well oriented to counter the effect of fluid balance and maintain normal pH within physiological limits.

Rationale Exc-S1 system and excretory system is responsible for the body to get rid of waste and toxic substances. In this module the Exc-S1 and excretory system will be examined in detail with emphasis on how the Exc-S1 system develops and functions on a cellular level as well as the mechanisms that underlie Exc-S1 diseases such as electrolyte imbalance, dehydration, Exc-S1 hypertension, Exc-S1 failure, polycystic kidney, nephrotic and nephritic syndrome.

This module will enable the students of second year to recognize the clinical presentations of common Exc-S1 diseases and relate clinical manifestations to basic sciences. It will be further revisited in the following years.

DURATION 06 WEEKS

LEARNING OUTCOMES AT THE END OF THIS MODULE, THE STUDENTS WILL BE ABLE TO:

- Describe the development, structure and functions of various parts of the Exc-S1& excretory system and its clinical importance.

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

- Describe the components of the Exc-S1& excretory system by learning and applying the relevant basic sciences.
- Apply the above knowledge to a few common real-life situations (Nephritis, Metabolic disorders, UTI) to explain how the anatomy, physiology and Biochemistry are altered in the given situation.
- Describe the anatomy of the different parts of the Exc-S1& excretory system in detail.
- Describe the development and anomalies of the Exc-S1& excretory system
- Define and identify the microscopic features of the Exc-S1& excretory system
- Describe the functions of the Exc-S1& excretory system
- Interpret the Biochemical changes in the body related to the Exc-S1& excretory system
- Enlist pathologies involving Exc-S1& excretory system
- Describe the management of the Exc-S1& excretory system
- Perform the Exc-S1& excretory system examination.
- Take the history of the patients and co-relate the Exc-S1& excretory system sign & symptoms to reach the differential diagnosis.
- To counsel the people in community regarding the risk factors of the Exc-S1 diseases.

THEMES

To achieve these overall aims, this module comprises four weeks with a separate theme for enhancing your learning.
Theme 1: Overview structure & functions of Exc-S1 system
Theme 2: Exc-S1 circulation, GFR & its regulation
Theme 3: Tubular reabsorption & secretion
Theme 4: Electrolyte and fluid balance, Acid-base balance (Micturition & Dialysis)

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: OVERVIEW STRUCTURE & FUNCTIONS OF EXC-S1 SYSTEM

S. #	LEARNING OBJECTIVES	TOPICS	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
1	• Describe the different parts of excretory system. • Describe the gross anatomical structure & internal structure of kidneys • Differentiate the anterior and posterior surfaces and anatomical relations of kidneys.	**EXC-S1-Ana-G-1** Gross anatomy of the kidneys	Interactive Lecture	SBQs & OSVE
2	• Describe the blood supply (Exc-S1 artery, Exc-S1 vein) of the kidneys. • Define the lymphatic drainage & innervation of the kidneys.	**EXC-S1-Ana-G-2** Blood supply, nerve supply and lymphatic drainage of the kidneys	Demonstration	SBQs, OSPE & OSVE
3	• Exc-S1 cortex and medulla, Exc-S1 lobe Exc-S1 lobule, medullary rays, Exc-S1 columns • Nephron: Glomerulus, bowman's capsule, PCT, loop of Henle, DCT, collecting tubules, collecting duct, clinical correlates. • Components of juxtaglomerular apparatus, components of filtration membrane	**EXC-S1-Ana-H-1** Microscopic anatomy of the kidneys	Interactive Lecture	SBQs & OSVE

4	• Exc-S1 cortex and medulla, Exc-S1 lobe Exc-S1 lobule, medullary rays, Exc-S1 columns • Nephron: Glomerulus, bowman's capsule, PCT, loop of henle, DCT, collecting tubules, collecting duct, clinical correlates.	**EXC-S1-Ana-H-2** Histology of the kidneys-1	Practical	OSPE & OSVE
5	Describe the Development of intermediate mesoderm, Development of kidney (pronephron, mesonepheron, metanephron)	**EXC-S1-Ana-E-1** Development of kidney	Interactive Lecture	SBQs & OSVE
Physiology				
6	• Describe the different functions of the kidney and its role in homeostasis. • Describe the different parts of the nephron. • Distinguish between the 2 different types of nephrons.	**EXC-S1-Phy-1** General functions of kidneys and excretory system	Interactive Lecture	SBQs & OSVE
Biochemistry				
7	• Discus normal and abnormal constituents of urine (Urine analysis). • Discuss all the reagents, instruments required along with the methodology.	**EXC-S1-Bio-1** Analysis of Urine	Practical	OSPE & OSVE
Pathology				
8	• Discuss the congenital and developmental anomalies of kidney • Describe autosomal dominant & autosomal recessive polycystic kidney disease	**EXC-S1-Path-1** Anomalies of kidney	Interactive Lecture	SBQs & OSVE
9	• Describe the pathogenesis of the acute kidney injury	**EXC-S1-Neph-1** Acute kidney injury		

Theme 2: Exc-S1 Circulation, GFR & Its Regulation

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
10	• Describe the gross structure of ureters • Define its blood supply, innervation & lymphatic drainage	**EXC-S1-Ana-G-3** Gross anatomical features of the ureters	Demonstration	SBQs, OSPE & OSVE
11	• Ureter: Lumen, epithelium, histological layers, clinical correlates. • Urinary bladder: epithelium, histological layers, clinical correlates. • Urethra: parts, epithelium, histological layers, difference of male and female urethra, clinical correlates.	**EXC-S1-Ana-H-3** Microscopic anatomy of the ureters, urinary bladder and urethra	Interactive Lecture	SBQs & OSVE
12	• Explain the development of ureters, urinary bladder & urethra (male & female)	**EXC-S1-Ana-E-2** Development of ureter , urinary bladder & urethra (male & female)		
13	• Components of juxtaglomerular apparatus, components of filtration membrane, clinical correlates.	**EXC-S1-Ana-H-4** Histology of the kidneys-2	Practical	OSPE & OSVE
		Physiology		
14	• Explain how glomerular filtrate is formed. • Describe the composition of the glomerular filtrate. • State the main determinants of solute filterability. • Define glomerular filtration rate (GFR) and state its normal value. • Discuss the major factors that regulate the GFR (Net filtration pressure, hydrostatic, and colloid osmotic pressures)	**EXC-S1-Phy-2** Glomerular filtration rate (GFR) and its regulating factors	Interactive Lecture	SBQs & OSVE

15	• Define tubulo glomerular feedback • Explain the functions of juxta glomerular apparatus and Macula densa • Discuss myogenic autoregulation	**EXC-S1-Phy-3** Autoregulation of GFR and Exc-S1 blood flow		
16	• Define the conditions when to pass the urinary catheter • How to insert the urinary catheter. (perform the procedure)	**EXC-S1-Phy-4** To pass the urinary catheter-1	Practical	OSPE & OSVE
Pathology				
17	• Classify of glomerular diseases • Discuss the clinical manifestation of glomerular diseases	**EXC-S1-Path-2** Introduction toglomerular diseases	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
18	• Describe pathogenesis of chronic kidney injury	**EXC-S1-Neph-2** Chronic kidney injury	Interactive Lecture	SBQs & OSVE

Theme 3: Tubular Reabsorption & Secretion

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
19	• Describe the gross structure of urinary bladder and urethra, its blood supply, nerve supply	**EXC-S1-Ana-G-4** Gross anatomical features of the urinary bladder and urethra	Demonstration	SBQs, OSPE & OSVE
20	• Explain the congenital anomalies related with excretory system • Differentiate between the congenital abnormalities and pathological conditions of excretory system.	**EXC-S1-Ana-E-3** Congenital anomalies of excretory system	Interactive Lecture	SBQs & OSVE
21	• Histology of the Ureter and Urinary bladder • Ureter: Lumen, epithelium, histological layers, clinical correlates.	**EXC-S1-Ana-H-5**	Practical	OSPE & OSVE

	• Urinary bladder: epithelium, histological layers, clinical correlates. • Urethra: parts, epithelium, histological layers, difference of male and female urethra clinical correlates.			
Physiology				
22	• Describe features of the Exc-S1 tubules. • Define the Exc-S1 processes: tubular reabsorption & tubular secretion. • Discuss the transport mechanisms among different segments of Exc-S1 tubule.	**EXC-S1-Phy-5** Features of Exc-S1 tubules	Interactive Lecture	SBQs & OSVE
23	• Explain the regulation of tubular reabsorption and secretion • Define transport maximum (Tm), Exc-S1 plasma threshold and splay.	**EXC-S1-Phy-6** Tubular reabsorption and secretion – I		
24	• Describe the mode of reabsorption of different substances (e.g. Na+, K+, Cl-, glucose, urea, and water). • Describe the mode of secretion of different substances (e.g. K+, H+ and organic ions).	**EXC-S1-Phy-7** Tubular reabsorption and secretion – II		
25	• To describe the nervous mechanisms that regulates tubular function (Exc-S1 sympathetic nerves. • To describe the hormonal mechanisms that regulate tubular function: i. Renin-angiotensin system. ii. Aldosterone. iii. Atrial natriuretic peptides. iv. Antidiuretic hormone. v. Parathyroid hormone	**EXC-S1-Phy-8** Hormonal regulation of tubular functions .		
26	• Define the conditions when to pass the urinary catheter • How to insert the urinary catheter. (perform the procedure)	**EXC-S1-Phy-9** To pass the urinary catheter-2	Practical	OSPE & OSVE
Biochemistry				

27	• Describe the different sources of sodium. • Enlist different functions of sodium. • Justify their role in maintaining the osmolality of plasma. • Interpret the Normal values of sodium in serum and urine.	**EXC-S1-Bio-2** Na+ Metabolism	Interactive Lecture	SBQs & OSVE
28	• Describe the different sources of potassium & Chloride. • Enlist different functions of potassium & Chloride. • Justify their role in maintaining the osmolality of plasma. • Interpret the Normal values of potassium & chloride in serum and urine	**EXC-S1-Bio-3** K+, Cl- Metabolism		
29	• To estimate the serum electrolytes level in a given serum. • Discuss all the reagents, instruments required along with the methodology	**EXC-S1-Bio-4** Estimation of serum Electrolytes	Practical	OSPE & OSVE
Pharmacology				
30	Classification, Mechanism of action, indications, contraindications and adverse effects of excretory drugs	**EXC-S1-Pharm-1** Drug excretion	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
31	• Describe the pathogenesis of glomerular disorder • Discuss the clinical manifestation of glomerular diseases	**EXC-S1-Neph-3** Glomerular disease (Nephritic and nephrotic syndrome)	Interactive Lecture	SBQs & OSVE

Theme 4: Electrolyte and Fluid Balance, Acid-Base Balance (Micturition & Dialysis)

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
32	• Explain perinephric abscess, nephrotosis, Exc-S1transplantation, Exc-S1 cysts, pain in paraExc-S1 region, accessory Exc-S1 vessels	**EXC-S1-Ana-G-5** Applied anatomy related with kidneys	Interactive Lecture	SBQs & OSVE
33	• Urethra: parts, epithelium, histological layers, difference of male and female urethra, clinical correlates.	**EXC-S1-Ana-H-6** Histology of the Urethra	Practical	OSPE & OSVE

Physiology				
34	• Describe the mechanisms behind the establishment of an osmotic gradient in the medullary interstitium. • Describe the countercurrent multiplication system. • Describe how urea contributes to the hyperosmotic Exc-S1 medullary interstitium and to the urine concentration.	**EXC-S1-Phy-10** Concentration and Dilution of urine-I	Interactive Lecture	SBQs & OSVE
35	• Describe the role of vasa recta as countercurrent exchanger in maintaining the hyperosmolarity of the Exc-S1 medulla. • Describe how the kidneys produce dilute and concentrated urine. • Define obligatory urine volume	**EXC-S1-Phy-11** Concentration and Dilution of urine-II		
36	• Define micturition. • Describe process of storage, elimination of urine and its control (Autonomic nervous system) • Explain micturition reflex. • Define atonic and autonomic bladder	**EXC-S1-Phy-12** Micturition reflex and its abnormalities		
37	• Discuss different buffer systems in the body (bicarbonate, phosphate, ammonia) • Explain the role of kidneys in acid base balance • Discuss the changes in the level of urine PH (maximum /minimum level; 4.5-8)	**EXC-S1-Phy-13** Acidification of urine		
38	• Define dialysis • Describe mechanism of function of artificial kidney • Define dialysate, uraemia • Discuss peritoneal dialysis technique • Complications of the dialysis	**EXC-S1-Sk.Lab.1** Dialysis	Practical	OSPE & OSVE
Biochemistry				
39	• Describe the Body Buffers. • Describe its related disorders. • Discuss its management	**EXC-S1-Bio-4** Body Buffers	Interactive Lecture	SBQs & OSVE

40	• Define the Acid Base balance. • Describe its related disorders. • Discuss its management.	**EXC-S1-Bio-5** Acid Base balance, Disorders & management		
41	• Describe glomerular function • Explain clearance test (inulin, creatinine and urea) • Discuss tubular function test • Discuss proteinuria	**EXC-S1-Bio-6** Exc-S1 Function Tests		
42	Demonstrate the normal and abnormal blood Ph, bicarbonate, carbon dioxide and oxygen levels.	**EXC-S1-Bio-7** Interpretation of ABG's	Practical	OSPE & OSVE
43	• Describe glomerular function • Estimation of serum creatinine • Explain clearance test (inulin, creatinine and urea) • Discuss tubular function test	**EXC-S1-Bio-8** Exc-S1 Function Tests Discuss proteinuria		
Pathology				
44	• Enlist infection related to kidney & lower urinary tract • Define acute and chronic pyelonephritis • Describe causes, of acute and chronic pyelonephritis • Define acute and chronic cystitis and mention its causes	**EXC-S1-Path-3** Infections of kidney & lower urinary tract	Interactive Lecture	SBQs & OSVE
Clinical Lectures				
45	• Describe the sign and symptoms of the urinary system diseases • What should be the differential diagnosis to approach the urinary system diseases	**EXC-S1-Uro-1** How to approach urological patient	Interactive Lecture	SBQs & OSVE
46	Describe the basic investigations to diagnose the urinary system diseases	**EXC-S1-Uro-2** How to investigate urological patient		

REPRODUCTION MODULE-I

INTRODUCTION THE REPRODUCTIVE MODULE IS DESIGNED TO STUDY THE ANATOMY, PHYSIOLOGY OF THE MALE AND FEMALE REPRODUCTIVE ORGANS IN DETAIL TO 2ND YEAR MBBS STUDENTS AIMS TO INTEGRATE BOTH BASIC AND CLINICAL SCIENCES.

The pelvis is the region of the trunk that lies below the abdomen. Although the abdominal and pelvic cavities are continuous, the two regions are described separately.

The pelvic cavity contains the lower ends of the intestinal and urinary tracts and the internal organs of reproduction. The physician is often confronted with problems involving infections, injuries and prolapses of the rectum, uterus and vagina. Emergency situations involving the bladder, the pregnant uterus, ectopic pregnancy, spontaneous abortion and acute pelvic inflammation diseases are examples of problems found in the female. The urinary bladder and the prostate in the male are the frequent sites of disease.

Without knowledge of the anatomic position of the veins in the anal canal, the physician would not have been able to make a diagnosis. The purpose of this module is to review the significant anatomy of the reproductive organs relative to clinical problems. This is a fact that in-depth knowledge of the anatomy, physiology of the pelvic and perineum regions is necessary before a physician can even contemplate making an initial examination and start treatment.

Rationale This module provides extensive information about reproductive system. It enables the undergraduate students to narrate the knowledge of Anatomy, Physiology, Biochemistry Pharmacology and Pathology of the structures and functions of the male and female reproductive system. The motive is that students can correlate this knowledge with the clinical presentation of internal and external genital diseases in forthcoming years in order to be able to manage general gynecological problems, pregnancy related issues in the mother and neonates, sexually transmitted infections, infertility issues and breast disorders

DURATION 6 WEEKS

LEARNING OUTCOMES

Knowledge, Skill, Attitude

- Describe the anatomy of female reproductive organs.
- Describe the anatomy of male reproductive organs.
- Discuss the development of reproductive organs (male and female).
- Study the related embryological disorders of male and female reproductive system
- Identify the different histological features of male and female reproductive organs
- Describe the difference in reproductive functions of male & female
- Define Puberty and describe its onset by hormones
- Define what do you mean by secondary sexual characteristics
- Explain sex determination and differentiation
- Define & describe spermatogenesis
- Describe the role of hormones in spermatogenesis
- Describe the functions of male genital ducts & glands and their contribution in formation of semen
- Describe the secretion & functions of testosterone
- Define capacitation

- Describe the abnormalities of testicular function
- Describe the functions of ovary
- the secondary sexual features of female
- Describe Oogenesis
- Describe the ovarian cycle with hormonal attribution
- Describe the formation & function of corpus luteum
- Describe uterine cycle with hormonal attribution
- Define the terms Amenorrhea, polymenorhea, oligomenorhea, and menoraghea
- Describe the process of fertilization
- Describe the changes in physiology of various body systems during pregnancy
- Describe the functions of placenta.
- Describe the process of fertilization
- Describe the changes in physiology of various body systems during pregnancy
- Define labor and describe the factors that initiate labor and mechanism of labor-hormonal attributions and various stages of labor.
- Describe the development of breasts and changes at puberty Describe Lactation & its 'Control and the effects of lactation on menstrual cycle
- Define contraception and sterilization Describe the male and female methods of contraception.
- To explain the synthesis and regulation of reproductive hormones.
- To explain what metabolic changes occur in mother during pregnancy.
- To explain the Biochemical basis of tests used for determination of pregnancy.
- To explain the Biochemistry of contraception.
- To explain the Biochemistry of menopause.
- To explain the hormonal status of reproductive hormones after menopause and their impact on various organ systems with special emphasis on bones.
- Understand the importance of maternal healthcare
- Identify the approaches for reducing maternal mortality
- Understand the concept of Safe motherhood initiative
- Recognize the importance of family planning and contraception.
- Understand the importance adolescent Health

THEMES

Theme 1: Pelvimetry and the injuries to the pelvic floor
Theme 2: Morbidity and Mortality related with the Genital Organs Malignancies
Theme 3: Pregnancy, Parturition, Child birth and the Congenital anomalies
Theme 4: Role of the Reproductive hormones, Contraception and Menupause

These themes will be covered in different topics which will be taught in Lectures, demonstrations, Practical's, small group discussions, CBLs and skill lab

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

Theme 1: Pelvimetry and the Injuries to the Pelvic Floor

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		ANATOMY		
01	• Describe the bony pelvis • Differentiate the types of bony pelvis	**Rep-S1-Ana-G-1** Bony Pelvis (inlet and outlet) Difference b/w male & female pelvis Types of bony pelvis	Demonstration	SBQs, OSPE & OSVE
02	• Describe the structures constitute the pelvic floor • Explain the pelvic walls	**Rep-S1-Ana-G-2** Pelvic walls Pelvic floor Pelvic fascia		
03	• Describe the arrangement of viscera within the pelvic cavity • Define the male and female external and internal genital organs	**Rep-S1-Ana-G -3** Over view of pelvic viscera (urinary bladder, sigmoid colon, Rectum and Male & female genital organs)	Interactive Lecture	SBQs & OSVE
04	• Discuss the gross features of testis and epididymis and ductus deferens • Importance of descend of testis • Correlate the arterial supply, venous drainage and lymphatic drainage of testis. • Discuss the clinical correlates	**Rep-S1-Ana-G -4** Testis, epididymis ,Ductus deferens	Demonstration	SBQs, OSPE & OSVE
05	• Describe the anatomy of prostate, Seminal vesicles and ejaculatory ducts • Discuss the clinical correlates	**Rep-S1-Ana-G -5** Prostate, Seminal vesicles, Ejaculatory ducts	Interactive Lecture	SBQs & OSVE
06	• Explain development of male reproductive system. • Discuss the development of gonads. • Discuss the fate of genital ducts in the male.	**Rep-S1-Ana-E-1** Development of Gonads and genital ducts		
07	• Discuss the development of male external genitalia. • Describe the anomalies of the male reproductive system.	**Rep-S1-Ana-E-2** Development of male external genitalia		

08	• Identify the microscopic features of the parts of male reproductive system. • Identify the histological features of testis and epididymis	**Rep-S1-Ana-H-1** Microscopic features of testis and epididymis	Practical	OSPE & OSVE
09	• Parts of male and female reproductive system. Primary sex organs, Accessory sex organs Hormones (terminologies) Puberty, Menarche.	**Rep–S1-Phy-1** General introduction of Reproductive System	Interactive Lecture	SBQs & OSVE
10	• Explain the process (stages) spermatogenesis. • Describe the hormonal influence on spermiogenesis. • Discuss the function of prostate gland	**Rep– S1-Phy-2** Spermatogenesis, spermiogenesis, sperm		
11	• To discuss the secretion & functions of testosterone with its metabolism. • To describe mode of action of testosterone. • Discuss the regulation of male sex hormone.	**Rep– S1-Phy-3** Male Sex Hormones (Testosterone) Genital ducts and Glands		
12	• Describe the Synthesis & Regulation of Reproductive hormones	**Rep-S1-Bio- 1** Synthesis & Regulation of Reproductive hormones		
13	• Describe the synthesis , role and mechanism of action of male sex hormones	**Rep-S1 Bio- 2** Male sex hormones		
14	• Enlist congenital anomalies of penis • Describe congenital anomalies of testis & epididymis • Discuss atrophy of testis	**Rep-S1-Path-1** Congenital anomalies of male genital tract		
15	• Define BPH • List the sign and symptoms of BPH • Medical and surgical treatment of BPH • Describe when a patient of BPH should contact to a urologist.	**Rep-S1-Uro-1** Benign prostatic hypertrophy (BPH)		

Theme 2: Morbidity and Mortality Related with the Genital Organs Malignancies

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		ANATOMY		
16	• Describe the female internal genital organs • Explain the anatomy of ovaries • Discuss the anatomy of fallopian tube	**Rep–S1-Ana-G-6** Ovaries and Uterine tubes	Interactive Lecture	SBQs & OSVE
17	• Explain the anatomy of Uterine tubes Describe the parts of uterus, supports of uterus. • Explain the anatomy of vagina	**Rep–S1-Ana- G-7** Uterus and vagina		
18	• Explain the boundaries of perineum • Describe the division of perineum • Discuss perineal body	**Rep–S1-Ana-G-8** Divisions of perineum , Perineal body	Demonstration	SBQs, OSPE & OSVE
19	• Discuss the contents of anal triangle • Briefly discuss the anatomy of anal canal	**Rep–S1-Ana-G-9** Contents of anal triangle Anal canal		
20	• Identify the boundaries of ischioanal fossa • Discuss the contents of ischiorectal fossa.	**Rep–S1-Ana-G-10** Ischiorectal fossa		
21	• Discuss the microscopic features of prostate and seminal vesicle	**Rep–S1-Ana-H-2** Histology of Prostate, Seminal Vesicle	Practical	OSPE & OSVE
		Pathology		
22	• Define inflammatory conditions of spermatic cord and testis. • Describe morphology and its clinical feature	**Rep-S1-Path-2** Inflammatory lesions of male genital organs	Interactive Lecture	SBQs & OSVE
		Clinical lecture		
24	• Describe the menstrual cycle related abnormalities	**Rep- S1-Gyne& obs1** Menstrual disorders	Interactive Lecture	SBQs & OSVE

Theme 3: Pregnancy, Parturition, Child Birth and the Congenital Anomalies

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
25	• Discuss the contents of urogenital triangle in the male and female • (external genitalia)	**Rep–S1-Ana-G-11** Male and female external genitalia	Interactive Lecture	SBQs & OSVE

26	• Discuss the contents of superficial perineal pouch in the male • Discuss the contents of deep perineal pouch in male	**Rep –S1-Ana- G-12** Urogenital diaphragm and contents of superficial and deep perineal pouch in the male		
27	• Discuss the contents of superficial perineal pouch in female • Discuss the contents of deep perineal pouch in female	**Rep –S1-Ana-G-13** Contents of superficial perineal pouch and deep perineal pouch in the female		
28	• Describe the development of parts of female reproductive system • Discuss the development of gonads	**Rep –S1-Ana-E-3** Development of female reproductive System		
29	• Identify the microscopic features of the parts of female reproductive system. • Discuss the epithelial lining of ovary and fallopian tube	**Rep –S1-Ana- H-3** Microscopic features of Ovary and Fallopian tube	Practical	OSPE & OSVE
30	• Discuss oogenesis, phases of development of ova, and development of corpus luteum • Describe the synthesis, function and regulation of estrogen and progesterone	**Rep –S1-Phy-4** Oogenesis, Female sex hormones (Estrogen Progesterone)	Interactive Lecture	SBQs & OSVE
31	• Discuss the ovarian cycle, endometrial cycle and its phases. • Explain menarche, menupause. • Describe the phases of menstrual cycle. • Describe the hormonal variations and regulatory mechanism of changes occurring during cycle. • Describe the hormonal changes and control mechanism of the changes that occur at menopause.	**Rep–S1-Phy-5** Female reproductive cycle Menstrual cycle, Menarche and Menopause.		
32	• Describe the syntheses, role and mechanism of action of female sex hormones	**Rep-S1-Bio-3** Female sex hormones		
33	• Enlist congenital anomalies of uterus and vagina	**Rep-S1-Path-3**		

	• Define pelvic inflammatory disease and organism involved in it. • Discuss complications of pelvic inflammatory disease.	Female Genital Tract. Congenital anomalies & Inflammatory diseases		
34	• Endometrial histology during menstrual cycle • Define dysfunctional uterine bleeding and its causes. • Describe acute and chronic endometritis	**Rep-S1-Path-4** Diseases of Endometrium		

Theme 4: Role of the Reproductive Hormones, Contraception and Menupause

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
36	• Discuss the major blood vessels of pelvis and perineum	**Rep –S1-Ana-G-14** Internal iliac artery and its branches	Interactive Lecture	SBQs & OSVE
37	• Describe the nerves of pelvis and perineum • Describe the sacral plexus and hypogastric plexus.	**Rep –S1-Ana-G-15** Nerves of Pelvis & Perineum, sacral Plexus Hypogastric plexus		
38	• Discuss the venous drainage of the pelvis and perineum. • Explain the areas of lymph drainage of pelvis and perineum • Clinical importance	**Rep –S1-Ana-G-16** Venous &Lymphatic drainage of pelvis and perineum		
39	• Discuss the development of genital ducts in female • Discuss the development of female external genitalia. • Explain the clinical correlates	**Rep –S1-Ana-E-4** Development of genital ducts Development of female external genitalia		
40	• Discuss the microscopic features of uterus, cervix • Discuss the microscopic features of vagina	**Rep –S1-Ana -H-4** Histology of uterus, cervix, vagina	Practical	OSPE & OSVE
41	• Describe the synthesis, and function of B-HCG (Human chorionic gonadotropin) • Explain the effects of HCG in causing persistence in pregnancy • Describe the physiological events taking place during Pregnancy.	**Rep –S1-Phy-6** Physiology of Pregnancy, placenta and placental hormones	Interactive Lecture	SBQs & OSVE

42	• Describe parturition and its various stages, & hormonal changes • Discuss the secretion & functions of oxytocin. • Describe mode of action of oxytocin • Describe the changes in uterus during pregnancy, and after birth. • Describe the involution of uterus. • Describe the hormone required to develop mammary glands during pregnancy.	**Rep–S1-Phy-7** Parturition and Oxytocin		
43	• Describe the physiology of the mammary gland. • Describe the lactation reflex. • Describe the weaning.	**Rep –S1-Phy-8** Breast and Lactation		
44	• Perform the pregnancy test, on pregnancy test-strip	**Rep–S1-Phy-9** Pregnancy test	Practical	OSPE & OSVE
Pharmacology				
45	• Describe The Pharmacology of Oral Contraceptive Drugs. • To describe their adverse effects and contraindication. • Explain drug Interactions of Oral Contraceptive Drugs.	**Rep-S1-Pharm-1** Contraceptive Drugs	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
46	• Describe the patho-physiology of mammary gland disorders. • Describe the lactation reflex • Describe the hormonal effect • Student guide for complete protocol of lactation and weaning	**Rep-S1-PAEDS-1** Breast feeding guide for medical profession	Interactive Lecture	SBQs & OSVE

BEHAVIOURAL SCIENCES

Introduction

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

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

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

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

Rationale

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

Learning Outcomes of Behavioral Sciences Among MBBS Students:

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

KNOWLEDGE:

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

- Understand and recognize common psychiatric ailments like anxiety, depression, and stress.

SKILLS

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

ATTITUDE

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

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

LEARNING METHODOLOGIES

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

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

THEME 1: Psychological Reactions and Psycho-Social Issues in Specialized Healthcare Settings.

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	To explore the emotional and psychological reactions to adversity, including grief, trauma, loss, chronic illness, and death, and to understand the psycho social issues and assessment techniques in specialized healthcare settings.	**PAR-S-1-BS-1** **Psychological Reactions and Psycho-Social Issues in Specialized Healthcare Settings.** •Psychological Reactions to Loss, Illness, and Trauma: Grief, bereavement, death, dying, terminal illness, sexual assault, and torture. •Psycho-social Issues in Specialized Healthcare Settings: Emergency Departments, Intensive Care Units, Coronary Care Units, Operating Theaters, Oncology Wards, and Organ Transplant Units.	**LECTURE**

THEME 2: Cultural Influences on Medical Practice and Child-Rearing

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	To understand how culture shapes health, it's essential to consider factors like group dynamics, social roles, and health beliefs. Cultural values and attitudes influence health behaviors and treatment adherence. Additionally, child rearing practices impact long-term health.	**PAR-S-1-BS-2** **Cultural Influences on Medical Practice and Child-Rearing** •Group dynamics, attitudes, values, beliefs, myths, social class, stigma, the sick role, illness, health belief models, and treatment adherence (compliance) •Child-rearing practices significantly influence individual development and health outcomes.	**LECTURE**

THEME 3: Pain, Sleep, Consciousness and Sexuality

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	To understand pain, its assessment, and management, especially in chronic and intractable cases, is crucial. Understanding the stages of sleep, consciousness, and the factors influencing them is essential for overall well-being. Additionally, exploring the psychological and social aspects of gender, sexuality, and reproductive health is vital for holistic health.	**PAR-S-1-BS-3** **Neurobiology and Psycho-social Aspects of Human Behavior: Pain, Sleep, Consciousness, and Sexuality.** •Concept of pain, psychosocial assessment, and management of chronic and intractable pain •Sleep and its stages, consciousness and altered states of consciousness, influences on sleep and consciousness, non-pharmacological methods for inducing sleep, and changes in consciousness •Psychosocial aspects of gender and sexuality: sex, gender, psychosexual orientation, sexual behavior, stages of sexual activity, and reproductive health.	**LECTURE**

THEME 4: Interviewing and Psychosocial History Taking

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Develop techniques for effective clinical interviewing and comprehensive psychosocial data collection across various medical specialties, including Medicine, Surgery, Gynecology & Obstetrics, Pediatrics, and general health conditions.	**PAR-S-1-BS-5 Interviewing and Psychosocial History Taking.** • Effective clinical interviewing techniques and history-taking, focusing on the collection of psychological factors relevant to Medicine, Surgery, Gynecology and Obstetrics, Pediatrics, and other general health conditions.	**LECTURE**

THEME 5: Common Psychiatric Disorders in General Health Settings

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Identify and understand the presentation and diagnosis of common psychiatric disorders encountered in general health settings.	**PAR-S-1-BS-5** Common Psychiatric Disorders in General Health Settings. • Mood Disorders • Anxiety Disorders • Psychotic Disorders • Bodily Distress Disorders • Dissociative Disorders • Drug Abuse and Dependence • Suicide and Deliberate Self-Harm (DSH) • Delirium	**LECTURE**

THEME 6: Life Events, Psycho-Trauma, Psychological Reactions, Stress and Stressor, Stress Management

S#	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY
1.	Understand, analyze, and evaluate the concepts of stress, life events, and psycho-trauma, with a focus on their impact on health. Examine the role of life events and psycho-trauma in triggering stress-related conditions. Develop a comprehensive understanding of stress management strategies.	**PAR-S-1-BS-6 Life Events, Psycho-Trauma, Psychological Reactions, Stress and Stressor, Stress Management** • Define and classify stress and stressors. Discuss the relationship between stress, stressors, and illness. • Life events, Psycho-trauma: Explain concepts and their relationship with stress and illness. • Stress management: Discuss coping skills, psychological defense mechanisms, conflict and frustration, and the concept of adjustment and maladjustment.	**LECTURE**

INFORMATION TECHNOLOGY

Introduction/ Rationale

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

Learning Outcomes

After completing this IT module, students will be able:

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S. #	LEARNING OBJECTIVES	LECTURE TITLE	TEACHING STRATEGY
01	To familiarize students with a range of tools and technologies used for medical visual communication, including illustration software, medical imaging tools, and 3D modeling	**PAR-S-2-IT-1** Overview and importance of visual comm: for healthcare professionals	Lecture
		PAR-S-2-IT-2 Visual Design with Canva	Practical
		PAR-S-2-IT-3 Image Editing for Medical Illustrations	
		PAR-S-2-IT-4 AI based image editing tools	
02	To know the significance of EHR and HMIS in modern healthcare. Learn to navigate and use EHR and HMIS effectively and develop skills for data entry, retrieval, and management within systems	**PAR-S-2-IT-5** Introduction to EHR and HMIS	Lecture
		PAR-S-2-IT-6 Exploring EHR and HMIS Applications	Practical
03	To learn about digital evidence types, e.g., electronic documents, emails, images, videos. To familiarize students with the tools and techniques of digital forensics used to collect and preserve evidence.	**PAR-S-2-IT-7** Data and Evidence Recovery in Medical Investigations	Lecture
		PAR-S-2-IT-8 Security Issues	Lecture Practical
		PAR-S-2-IT-9 Video Technology	Practical
04	To know about a range of data visualization tools and software (Tableau, Power BI, and Python libraries). To develop expertise in advanced visualization techniques, including heatmaps, treemaps, network diagrams	**PAR-S-2-IT-10** Tools and Techniques for Data Visualization	Lecture
		PAR-S-2-IT-11 Mastery of Tableau	Practical

Recommendation:

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

BIOMEDICAL ETHICS

Introduction/ Rationale

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

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

RESEARCH

Introduction

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

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

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

Rationale

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

Learning Objectives:

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

TOPICS WITH SPECIFIC LEARNING OBJECTIVES AND TEACHING STRATEGIES

S #	LEARNING OBJECTIVE	TOPICS	TEACHING STRATEGY
1	Explain the significance of hypothesis and P- value in research	**PAR-S-1-RES-1** Introductory class & Hypothesis testing and P-value	Lecture
2	Describe the basic principles of Statistical analysis software	**PAR-S-1-RES-2** Introduction to SPSS	Practical
3	data analysis techniques and statistical methods.	**PAR-S-1-RES-3** SPSS Software Introduction	Practical
4	Explain types of sampling techniques and their application	**PAR-S-1-RES-4** Sampling Techniques Designing Questionnaire/Pro Forma	Lecture
5	Define different types of articles	**PAR-S-1-RES-5** Types of articles	Lecture
6	Explain primary cell culture	**PAR-S-1-RES-6** Primary cell culture	Lecture
7	Outline the expected outcomes and findings of the research	**PAR-S-1-RES-7** Finalizing Research Proposal	Practical
8	Reinforce the importance of the research and its potential impact in Ethical review committee	**PAR-S-1-RES-8** Research Ethics & Approval of Research proposal from ERC	Lecture

ASSESSMENT

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

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

LEARNING RESOURCES

Anatomy:

❖ GROSS ANATOMY

- Clinical Anatomy by Richard S. Snell (10th Edition)
- Clinically Oriented Anatomy by K.L. Moore (09th Edition)
- Neuro Anatomy by Richard Snell (08th, 09thEddition)

❖ HISTOLOGY

- Wheather's Functional Histology by B. Young J. W. Health (07th Edition)
- Junqueira's Basic Histology by Anthony L. Mescher (17thEdition)

❖ EMBRYOLOGY

- The Developing Human by Keith L. Moore& TVN Persuad (10th Edition)
- Langman's Medical Embryology by TW Saddler (15th Edition)

Biochemistry:

❖ TEXTBOOKS

- Harper's Illustrated Biochemistry by Peter Kennelly (32nd Edition)
- Lehninger Principle of Biochemistry by David L. Nelson Michael M. Cox (08th Edition)
- Text book of Biochemistry with Clinical Correlations by Thomas M. Devlin (05th Edition)

Community Medicine:

❖ TEXT BOOKS

- Parks Textbook of Preventive and Social Medicine by K. Park (26thEdition)
- Public health and Community Medicine by Ilyas, Ansari (08thEdition)
- Textbook of Community Medicine and Public Health by Saira Afzal - Sabeen Jalal (01stEdition)
- Fundamental of Preventive Medicine by Dr. Zulfikar Ali Shaikh (05thEdition),
- Basic Statistics for the Health Sciences by Jan W. Kuzma (05th Edition)

Pathology/ Microbiology:

❖ TEXT BOOKS

- Robbins & Cotran, Pathologic Basis of Disease by Kumar Abbas Aster (09th, 10thEdition)
- Rapid Review Pathology by Edward F. Goljan MD (4thEdition)

Pharmacology:

❖ TEXT BOOKS

- Lippincot Illustrated Pharmacology by Karen Whalen (08th Edition)
- Basic and Clinical Pharmacology by Bertram G. Katzung & Anthony Trevor (15th Edition)

Physiology:

❖ TEXTBOOKS

- Textbook of Medical Physiology by Guyton and Hall (14th Edition)
- Ganong's Review of Medical Physiology by Kim Barrett, Susan Barman and Jason Yuan(26th Edition)

- Fundamental of Human Physiology by Lauralee Sherwood (04th Edition)
- Berne & Levy Physiology by Bruce M. Koeppen (08th Edition)
- Best & Taylor Physiological Basis of Medical Practice by John B. West

❖ **REFERENCE BOOKS**

- Guyton & Hall Physiological Review by John E. Hall (04th Edition)
- Essentials of Medical Physiology by Jaypee
- Textbook of Medical Physiology by Indu Khurana
- Short Textbook of Physiology by Mrthur
- NMS Physiology
- Monoo's Physiology

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

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

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

Journals:

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

Online Databases:

- PubMed

THE END