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LIAQUAT UNIVERSITY
OF MEDICAL & HEALTH SCIENCES,
JAMSHORO, SINDH

STUDY GUIDE

SECOND PROFESSIONAL
MBBS

BATCH 2024-25

ACADEMIC SESSION 2025-26

ACADEMIC CALENDAR

Academic Session 2025-2026

Activity	Class Year	Dates
Classes starts	All Batches of MBBS	January 26, 2026
Summer Vacation/ Internship/Elective	1st to Final Year MBBS	June 01 to 27, 2026
Classes Resumes	All Batches of MBBS	June 29, 2026
Classes Ends	1st to 4th Year MBBS	October 30, 2026
	Final Year MBBS	November 27, 2026
Exam Preparation	1st to 4th Year MBBS	November 01 to November 27, 2026
	Final Year MBBS	November 30 to December 25, 2026
Annual Examination	1st to 4th Year MBBS	November 30 to December 27, 2026
	Final Year MBBS	December 28, 2026 to January 30, 2027
New session will start	1st to Final Year MBBS	January 11, 2027

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. Manzoor Ali Lakhair
Director Academics
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STUDY GUIDE

A study guide is a strategic and effective approach to

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

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

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

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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. • Describe external morphology of spinal cord.	**NS-S1-Ana-G-1** Introduction to Nervous System Spinal cord-1	Interactive Lecture	SBQs & OSVE
2	• Describe Internal structure of spinal cord (Gray Matter)	**NS-S1-Ana-G-2** Spinal cord II		
3	• Describe Internal structure of spinal cord (White Matter)	**NS-S1-Ana-G-3** Spinal cord III		
4	• Describe the development of neural tube, and neural crest cells and their derivatives. • Clinical correlates • Describe the development of spinal cord • Clinical correlates	**NS-S1-Ana-E-1** Development of neural tube & spinal cord		
5	• Describe the nervous tissue • Define neuron, its structure and function & types of neurons Define neuroglia, their types and functions • Able to identify the microstructure of spinal cord.	**NS-S1-Ana-H-1** Histology of the Nervous tissue (Types of Neuron and neuroglia) Histology of the Spinal Cord		
Physiology				
6	• Definition & Organization of the nervous system • Know about Physiological division of nervous system • Determine different Levels of	**NS-PHYS-1** Nervous system – overview	Interactive Lecture	SBQs & OSVE

	nervous system			
7	• Name and classify the neurotransmitters and neuropeptides • Describe the role of neurotransmitters in synaptic transmission, motor control, autonomic function, and cognition. • Describe the physiological roles of neuropeptides in pain modulation, stress response, circadian rhythms, and neuroendocrine control.	**NS-PHYS-2** Neurotransmitters and neuropeptides		
8	• Define a nerve fiber and describe its structural components (axon, myelin sheath, Schwann cells). • Explain the significance of nerve fiber diameter, myelination, and conduction velocity. • Describe the Erlanger & Gasser classification of nerve fibers (A, B, C groups). • Describe the Lloyd & Hunt classification of sensory nerve • fibers (Group I–IV).	**NS-PHYS-3** Classification of Nerve Fibers		
9	• Define Synapse, types and properties of synapse • Determine Structure of synapses • Discuss transmission of electrical signals between neurons	**NS-PHYS-4** Synapses		
10	• Describe properties of synapse. • Discuss tetanization • Describe Summation and types of summation	**NS-PHYS-05** Properties of Synapses		
11	• Describe briefly the physiological Anatomy of spinal cord • Describe the integration of spinal cord with higher centers • Explain the sensory and motor function of spinal cord.	**NS-PHYS-06** Spinal cord Physiology		

	• Explain the structure & function of muscle spindle • Explain the mechanism of Golgi tendon reflex. & its significance in controlling motor activities			
12	• Discuss general organization of autonomic nervous system • Describe the preganglionic and postganglionic fibers • Nicotinic and muscarinic receptors Adrenergic receptors • Discuss Fight or flight response • Describe "Rest and digest" concept.	**NS-PHYS-07** Autonomic Nervous system		
Clinical Lecture				
13	• 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
14	• Discuss the clinical presentations of anterior horn cell disorders	**NS-S1-NeurM-1** Anterior horn cell disorders		
15	• 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				
16	• Describe the development of brain vesicles. • Discuss development of brain stem	**NS-S1-Ana-E-2** Development of brain stem	Interactive Lecture	SBQs & OSVE
17	• Describe External structure of brain stem at different level (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-4** Brain stem I		
18	• Describe External structure of brain stem at different level (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-5** Brain stem II		
19	• Describe internal structure of brain stem at different levels. (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-6** Brain stem III		
20	• Describe internal structure of brain stem at different levels. (Medulla Oblongata, pons, midbrain)	**NS-S1-Ana-G-7** Brain stem IV		

21	• Define the organization, connections and distribution of the cranial nerves from cranial nerve-III to VI • Clinical correlates	**NS-S1-Ana-G-8** Cranial nerves-1 (V to VIII)		
22	• Define the organization, connections and distribution of the cranial nerves from cranial nerve- VII-XII • Clinical correlates	**NS-S1-Ana-G-9** Cranial nerves-2 (IX to XII)		
Physiology				
23	• 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 receptors • Define Tickle & itch, its receptors	**NS-PHYS-8** Sensory receptors & its modalities	Interactive Lecture	SBQs & OSVE
24	• Name the somatosensory pathways • Describe Antero-lateral system and its sensory modalities • Discuss relay station for somatosensory information. • Lesions of anterolateral pathway	**NS-PHYS-9** Sensory pathway (Anteriolateral pathway**)**		
25	• Discuss dorsal column medial lemnisci system, its location, receptors, and its sensory modalities • Lesions of dorsal column medial lemniscal pathway	**NS-PHYS-10** Somatosensory Pathways: Dorsal column medial lemniscal system		
26	• Define Pain • Discuss Types, qualities and receptors for pain Describe chemical mediators of pain pathway • Describe Referred pain, differentiate between somatic and visceral pain	**NS-PHYS-11** Pain Sensation		
27	• 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-12** Pain pathways		
28	• Define Analgesic system of brain & its physiological role • Define Methods of analgesia • Define Hyperalgesia	**NS-PHYS-13** Analgesic pathway		

	• List pain suppression and brain opoid system.			
29	• Explain the role of brainstem as a conduit for ascending and descending tracts. • Define the reticular formation • Describe how the brainstem interacts with the cerebral cortex, cerebellum, and spinal cord. • Explain the role of brainstem in sleep–wake cycles, alertness, and integration of sensory- motor responses.	**NS-PHYS-14** Brain stem physiology		
30	• To perform sensory testing for light touch, pain, and vibration perception • To assess sensory pathways and their clinical significance • To study variations in sensory perception among participants with different physical activity levels.	**NS-S1-Phy-P-1** Examination of sensory system	Practical	
Clinical Lecture				
31	• Discuss the clinical correlates and injuries of spinal cord	**NS-S1-NeurS-2** clinical conditions associated with brain stem	Interactive Lecture	SBQs & OSVE
32	• 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				
33	• Describe the structure of Diencephalon • Describe divisions of Diencephalon (thalamus, hypothalamus, subthalamus, epi-thalamus)	**NS-S1-Ana-G-10** Diencephalon I (boundaries of Diencephalon & thalamus)	Interactive Lecture	SBQs & OSVE
34	• Describe the morphological features and nuclei of thalamus • Explain the connections of thalamus and its relations	**NS-S1-Ana-G-11** Diencephalon II (thalamus)		
35	• Describe the hypothalamus • Identify the location, components & connections of limbic system.	**NS-S1-Ana-G-12** Hypothalamus and limbic system		

36	• Explain the dominance & non-dominance correlation with structure & functions of cerebral cortex • Describe functional areas of cerebral cortex Discuss lesions of functional areas of cerebral cortex	**NS-S1-Ana-G-13** Cerebral cortex I (gray matter)		
37	• Describe different types of fibers in cerebral hemisphere; association, projection & commissural fibers. • Explain parts of corpus callosum and fornix. • Clinical correlates.	**NS-S1-Ana-G-14** Cerebral cortex II (white matter; association, projection & commissural fibers, corpus callosum and fornix)		
38	• Name the parts and tracts of internal capsule. • Clinical correlates.	**NS-S1-Ana-G-15** Cerebral cortex III (white matter; internal capsule)		
39	• Define the organization, connections and distribution of the cranial nerves from cranial Nerve-I & II • Clinical correlates	**NS-S1-Ana-G-16** Cranial nerves-3		
40	• Describe the development of forebrain, diencephalon	**NS-S1-Ana-E-3** Development of forebrain & Diencephalon		
41	• Explain and identify the different types of cells of cerebral cortex • Describe and identify the layers of cerebral cortex	**NS-S1-Ana-H-2** Histology of cerebral cortex		
Physiology				
42	• Describe sensory and motor areas of brain • Describe the importance of Wernicke's area and Broca's area	**NS-PHYS-15** Areas of cerebral cortex	Interactive Lecture	SBQs & OSVE
43	• Define upper and lower motor neurons • Describe Pyramidal tracts features & its pathway, • Describe Extra pyramidal tracts features & its Pathway • Define brown-Sequard syndrome	**NS-PHYS-16** Motor pathways-(Pyramidal & extra pyramidal tracts		
44	• Discuss upper and lower motor neurons. • Differentiate between features of Upper motor neuron lesions and lower motor neuron lesions	**NS-PHYS- 17** Upper motor neuron lesions and		

	• What is Babinski sign	lower motor neuron lesions		
45	• What are the components of reflex arc? • Proprioceptors Sensory nerve fibers related to spinal reflexes • Motor unit and Motor neurons • Classification of reflexes • Flexor and Extensor reflexes Superficial and deep reflexes.	**NS-S1-Phy-18** Spinal cord reflexes, reflex arc, reflex action		
46	• Define memory • Give various types of memory & their importance • Describe neural mechanism involved in memory • Give disorders of memory (Alzheimer's disease)	**NS-S1-Phy-19** Memory		
47	• Define speech Name motor and sensory cortical areas of speech & their function Describe speech disorders	**NS-S1-Phy- 20** Speech		
48	• To examine body temperature and to related abnormalities	**NS-S1-Phy-Practical -02** Body temperature	Practical	OSPE & OSVE
49	• To perform cerebellar function tests and to identify associated disorders.	**NS-S1-Phy-Practical -03** Cerebral Function tests		
50	• To evaluate muscle strength (power), tone, and coordination in the upper and lower limbs. • To understand the clinical significance of abnormalities in motor function. • To assess motor strength and tone variations between dominant and non-dominant limbs among participants.	**NS-S1-Phy-Practical-04** Examination of Motor System		
51	• To observe superficial reflexes, including abdominal and plantar reflexes. • To understand their diagnostic significance. To explore the role of superficial reflexes in diagnosing upper or lower motor neuron lesions.	**NS-S1-Phy-Practical-05** Examination of Superficial reflexes		
52	• To assess deep tendon reflexes such as knee jerk, ankle jerk, and biceps reflex. • To evaluate the role of deep reflexes in diagnosing neurological conditions. • To identify variations in deep tendon reflexes among participants and	**NS-S1-Phy-Practical-06** Examination of deep reflexes		

	correlate them with physical activity levels			
Pharmacology				
53	• Describe the general organization and functions of the central nervous system.	**NS-S1-Pharm-1** Introduction drugs related to CNS	Interactive Lecture	SBQs & OSVE
54	• Classify commonly used sedative–hypnotic drugs. • Describe the mechanism of action and adverse effects of benzodiazepines, barbiturates, and newer hypnotics.	**NS-S1-Pharm-2** Sedative and Hypnotics		
55	• Classify major antiepileptic drugs. • Describe the mechanisms of action of commonly used antiepileptic agents.	**NS-S1-Pharm-3** Anti-epileptic Drugs-I		
56	• Explain the clinical uses of antiepileptic drugs in different seizure types. • Identify common adverse effects and drug interactions of antiepileptic medications.	**NS-S1-Pharm-4** Anti-epileptic Drugs-II		
57	• Describe the pathophysiology of Parkinson's disease. • Classify drugs used in the treatment of Parkinson's disease. • Explain the mechanism of action and adverse effects of drugs used for the treatment of Parkinson disease.	**NS-S1-Pharm-5** Drug treatment of Parkinsonism		
58	• Analyze a clinical case of epilepsy to identify seizure type, understand its pathophysiology, select appropriate antiepileptic therapy, and recognize potential adverse effects.	**NS-S1-Pharm-6** CBL on Epilepsy		
59	• Analyze a clinical case of Parkinson's disease to identify key features, understand its pathophysiology, select appropriate pharmacological therapy, and recognize potential adverse effects.	**NS-S1-Pharm-7** CBL on Parkinsonism		

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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
60	• Describe the detailed Anatomy of cerebellum • Explain the anatomical & physiological divisions of cerebellum	**NS-S1-Ana-G-17** Cerebellum I	Interactive Lecture	Interactive Lecture

	• Discuss characteristic features of cerebellar cortex; gray matter, white matter & deep cerebellar nuclei.			
61	• Explain connections of cerebellar cortex and deep cerebellar nuclei. • Clinical correlates.	**NS-S1-Ana-G-18** Cerebellum II		
62	• Identify the location and • components of basal nuclei. • Explain the connections of basal nuclei. Describe clinical aspects related to basal nuclei.	**NS-S1-Ana-G-19** Basal nuclei and their connections		
63	• Describe the development of hindbrain/cerebellum	**NS-S1-Ana-E-4** Development of hind Brain / cerebellum		
64	• Describe and identify the layers of cerebellar cortex • Describe and identify the cells of cerebellar cortex	**NS-S1-Ana-H-3** Histology of cerebellar cortex	Practical	OSPE & OSVE
Physiology				
65	• 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-21** Cerebellum & its lesion	Interactive Lecture	SBQs & OSVE
66	• 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-22** Basal nuclei and its' clinical correlation		
67	• To assess cerebellar function by testing coordination, balance, and muscle control. • To understand the clinical relevance of cerebellar dysfunction in conditions like • ataxia, dysmetria, and tremors.	**NS-S1-Phy-Practical-07** Cerbellar function test	Practical	OSPE & OSVE

Theme 5: CSF & Hydrocephalus

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
		Anatomy		
68	• Identify the ventricles of brain along with their location; Lateral, and 3RD ventricle • Discuss the location and structure of 4th ventricle and choroid plexus • Explain the formation, circulation and drainage of CSF	**NS-S1-Ana-G-20** Ventricular system, lateral and third Ventricle 4th ventricle and choroid plexus Cerebrospinal fluid	Interactive Lecture	SBQs & OSVE
		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-23** 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
71	• Classify CNS tumors according to WHO classification • List genetic mutations, pathogenesis, morphology and clinical features of brain tumors • Discuss the metastatic tumors to brain	**NS-S1-Path-1** Brain Tumors		
		Clinical Lecture		
72	• 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				
73	• Describe the arterial supply and venous drainage of cerebral hemispheres	**NS-S1-Ana-G-21** Blood supply of spinal cord, brain stem and cerebellum	Interactive Lecture	SBQs & OSVE
74	• Describe the branches of internal carotid artery • Formation of circle of villous and its distribution • Describe the arterial supply and venous drainage of cerebral hemispheres	**NS-S1-Ana-G-22** Internal carotid artery & Circle of villous Blood supply of cerebral hemispheres		
Physiology				
75	• To explain vegetative functions of hypothalamus • To explain the different functions of limbic system • To explain the functions of reward and punishment centers.	**NS-PHYS-24** Hypothalamus & Limbic System	Interactive Lecture	SBQs & OSVE
76	• 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-25** Sleep & its disorders		
Clinical Lecture				
77	• Discuss Surgical aspect of cerebrovascular disease	**NS-S1-NeuS-4** Surgical aspect of cerebrovascular disease	Interactive Lecture	SBQs & OSVE
78	• 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 head & Neck regions • Explain the overview of head surface, muscles, innervations, blood supply & venous drainage • Describe bones of skull and cranium • Explain overview of Skull Geography & Sutures • Differentiate the various views of the skull	**HN-S1-Ana-G-1** Overview of the head and neck regions Osteology of the Skull and the vault	Interactive Lecture	SBQs & OSVE

2	• Define norma frontalis and lateralis • Explain the different regions of it • Enumerate the muscle attachment • Describe Boundaries and features of its structure. • Enlist various bones in norma lateralis • Describe the Cranial and facial subdivisions • Define External acoustic meatus	**HN-S1-Ana-G-2** Skull: Norma frontalis Norma lateralis and occipitalis		
3	• 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-3** Norma Basalis Anterior , middle and posterior parts	Demonstration	SBQs, OSPE & OSVE
4	• Describe bones forming the cranial cavity • Explain the details of anterior, middle and posterior fossae of the cranial cavity • Identify different foramina and structures passing through them.	**HN-S1-Ana-G-4** Cranial cavity		
5	• Describe the meninges of the brain and spinal cord. • Discuss the venous sinuses. • Discuss the related clerical's	**HN-S1-Ana-G-5** The meninges of brain and spinal cord & the venous sinuses		
6	• 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-6** Scalp (layers, Nerves &Vessels)		

7	• 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	Interactive Lecture	SBQs & OSVE
8	• 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				
9	• 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	ASSESS MENT
Anatomy				
10	• 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-7** Temporal Region & Temporo-mandibular Joint and muscles of mastication	Interactive Lecture	SBQs & OSVE
11	• Describe boundaries and contents of Pterygopalatine & Infratemporal fossae. • Describe the muscles of mastication.	**HN-S1-Ana-G-8** Pterygopalatine & Infratemporal fossae.		
12	• Describe Parts of mandible and cervical vertebrae • Explain general and special features of each part. • Describe Blood and nerve supply	**HN-S1-Ana-G-9** Mandible & Hyoid bone. Cervical Vertebrae	Demonstrati on	SBQs, OSPE & OSVE

	• Interpret applied anatomy. • Explain general and special features.			
13	• Describe the boundaries of face • Enumerate the muscles and innervations of face • Describe the disorders and applied of face	**HN-S1-Ana-G-10** Muscles of the facial expression		
14	• Describe the cutaneous supply of the head and neck regions.	**HN-S1-Ana-G-11** Cutaneous supply of the head & neck region	Interactive Lecture	SBQs & OSVE
15	• Describe arterial supply of head and neck Major venous drainage to sinuses, • Head and neck major veins.	**HN-S1-Ana-G-12** Arteries & Veins of the Head & Neck.		
16	• 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				
17	• To assess the sensory and motor functions of the trigeminal nerve. • To evaluate its role in jaw movement and facial sensation. • To study the prevalence of sensory impairments in the trigeminal nerve among Participants	**HN-S1-Phy-Practical-2** Examination of trigeminal nerve.	Practical	OSPE & OSVE
18	• To assess facial nerve function through motor and sensory tests. • To understand its role in facial expressions and taste. • To evaluate facial nerve dysfunction and its clinical relevance in conditions like Bell's palsy	**HN-S1-Phy-Practical -3** Examination of facial nerve.		

Theme 3: Disorders of the Salivary Glands & Neck Lesions

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				

19	• Explain the parotid region. • Describe the anatomy parotid gland. • Define what otic ganglion is. • Interpret Applied anatomy of parotid gland	**HN-S1-Ana-G-13** Parotid region	Demonstration	SBQs, OSPE & OSVE
20	• 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-14** Submandibular region		
21	• 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-15** Deep Cervical fascia & platysma		
22	• 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-16** Anterior triangle of neck		
23	• 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 • Discuss the formation and branches of cervical plexus • Discuss the origin, course, branches and functions of cranial nerve XI.	**HN-S1-Ana-G-17** Posterior triangle of neck cervical plexus & cranial nerve XI.		
24	• Name the Salivary glands and their location. • Describe histology of parotid gland • Describe histology of submandibular gland	**HN-S1-Ana-H-1** Salivary Glands	Practical	OSPE & OSVE

	• Describe histology of sublingual gland.			
Pathology				
25	• 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				
26	• 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-4** Examination of Glossopharyngeal Vagus , Accessory and Hypoglossal nerves.	Practical	OSPE & OSVE
27	• To assess the function of accessory nerve in neck and shoulder movements. • Toevaluate hypoglossal nerve ,role in tongue movement .	**HN-S1-Phy-5** Examination of Glossopharyngeal Vagus , Accessory and Hypoglossal nerves.		

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

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
28	• 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-18** External nose & nasal cavity	Demonstration	SBQs, OSPE & OSVE
29	• Define & list names of paranasal sinuses • Describe functions of paranasal sinuses. • Identify Radiographic Protocols for sinuses	**HN-S1-Ana-G-19** Para-nasal sinuses		

	• Explain diseases of sinuses.			
30	• 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-20** Oral cavity hard and soft palate	Interactive Lecture	SBQs & OSVE
31	• 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-21** The tongue	Interactive Lecture	SBQs & OSVE
32	• Explain the structure, functions of various parts of pharynx & their blood supply & innervation. • Interpret related applied anatomy.	**HN-S1-Ana-G-22** Pharynx		
33	• Explain the structure, cartilages and functions of the various parts of larynx. • Describe the muscles, blood supply & innervation of the larynx. • Interpret related applied anatomy.	**HN-S1-Ana-G-23** Larynx	Demonstration	SBQs, OSPE & OSVE
34	• 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		
35	• 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	Practical	OSPE & OSVE
Physiology				
36	• Describe Primary tastes & taste receptors • Explain Taste transduction, Taste pathway	**HN-S1-Phy-1** Chemical senses of taste	Interactive Lecture	SBQs & OSVE
	• Discuss role of Olfactory mucosa, in Smell	**HN-S1-Phy-2** Chemical senses of		

	• Explain smell Pathway	smell		
37	• To examine and interpret the sense of taste and smell in a subject	**HN-S1-Phy-6** Examination of s taste & smell sensations	Practical	OSPE & OSVE
ENT				
38	• Discuss clinical significance of tonsils	**HN-S1-Ent-1** Tonsillitis	Interactive Lecture	SBQs & OSVE
39	• 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				
40	• Describe the boundaries of the orbit • Define the openings of the orbital cavity and their contents • Define the orbital fascia	**HN-S1-Ana-G-24** The Orbit (boundaries & openings)	Demonstration	SBQs, OSPE & OSVE
41	• 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-25** Contents of the orbital cavity (Extraocular muscles, nerves & vessels)		
42	• 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-26** Eyelids & lacrimal Apparatus & Ciliary Ganglion		
43	• Enlist the coats of Eyeball. • Describe the Cornea & Sclera • Describe the Choroid, Ciliary body & Iris • Describe the Retina • Describe the Aqueous humor, Vitreous body & lens • Interpret related applied anatomy.	**HN-S1-Ana-G-27** Structure of the eye Eyeball	Interactive Lecture	SBQs & OSVE

44	• 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		
45	• Describe the histology of Eyelids, Conjunctiva & Lacrimal Apparatus.	**HN-S1-Ana-H-4** Histology of Eyelids, Conjunctiva, Lacrimal Apparatus	Practical	OSPE & OSVE
Physiology				
46	• Describe the physiological anatomy of eye, Its layers, and chambers • Describe the Lens and its attachment • Describe importance of pupil in eye examination • Discuss the functions of retina.,	**HN-S1-Phy-3** Physiological Anatomy of eye	Interactive Lecture	SBQs & OSVE
	• Describe the Formation, composition, circulation & functions of aqueous humor	**HN-S1-Phy-4** Aqueous humor		
47	• Describe the physical principles of optics • Describe accommodation reflex & its control • Describe the refracting surfaces of eye	**HN-S1-Phy-5** Optics of vision		
48	• Describe the errors of refraction & their correction	**HN-S1-Phy-6** Errors of Refraction		
49	• 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-7** Physiology of Retina		
50	• Describe the basic mechanism of photo-transduction • Describe the structure of rhodopsin and its bleaching by light	**HN-S1-Phy-8** Photo-transduction		

	• Describe the role of Bipolar and ganglion cells in photo-transduction • Describe the steps involved in photo-transduction			
51	• 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-09** Color vision		
52	• 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-10** Visual pathway & its lesions Lacrimal apparatus	Interactive Lecture	SBQs & OSVE
53	• Discuss different movements of eye	**HN-S1-Phy-11** Movements of eye		
54	• 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-7** examination of the Optic nerve	Practical	OSPE & OSVE
Biochemistry				
55	• To enlist sources of Vitamin A • To describe active forms Vitamin A • Explain the Absorption and Functions of Vitamin A • To discuss the Deficiency Vitamin A.	**HN-S1-Bio-1** Vitamin A (I)	Interactive Lecture	SBQs & OSVE
56	• To explain the Visual Cycle	**HN-S1-Bio-2** Vitamin A (II)		
Ophthalmology				

57	• Define & Describe Refractive Errors, Emmetropia, Hypermetropia, Astigmatism	**HD-Oph-1** Errors of refraction, presbyopia and their correction	Interactive Lecture	SBQs & OSVE
58	• 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		
59	• Blockage of drainage (Glaucoma) • Discuss the Anatomy of angle, production and drainage of Aqueous	**HD-Oph-3** Glaucoma & its treatment		
60	• Define cataract • Describe the types of cataract • Discuss its management	**HN-S1-Oph-4** Cataract & its treatment		
Pharmacology				
61	• 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
62	• Describe the pharmacology of opioids, including their classification, mechanism of action, therapeutic uses, and adverse effects.	**HN-S1- Pharm-2** Opioids,	Interactive Lecture	SBQs & OSVE

Theme 6: Deafness, Vertigo, Otitis Media

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				
63	• Describe Parts of ear. • Explain gross features of middle ear. • Describe the applied anatomy of middle ear.	**HN-S1-Ana-G-28** External Ear & Middle Ear	Demonstration	SBQs, OSPE & OSVE
64	• Explain Organ of hearing and balance. • Interpret applied anatomy of inner ear.	**HN-S1-Ana-G-29** Inner Ear (cochlea & semicircular canals)		
65	• Explain development of inner ear. • Describe development of middle ear.	**NS-S1-Ana-E-5** Development of Ear	Interactive Lecture	SBQs & OSVE

	• Elaborate development of external ear			
66	• Describe the histology of the different parts of the Ear	**HN-S1-Ana-H-5** Histology of the Ear	Practical	OSPE & OSVE
Physiology				
67	• 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-12** External & middle ear	Interactive Lecture	SBQs & OSVE
68	• 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-13** Inner ear		
69	• Head movements • Functional anatomy of vestibular apparatus • To determine the role of utricle & saccule in static equilibrium. • To determine the role of semicircular Ducts in Angular Acceleration.	**HN-S1-Phy-14** Vestibular Apparatus		
70	• To test the function of vestibular and cochlear components. • To evaluate hearing and balance in participants. • To assess the correlation between age related hearing loss and balance	**HN-S1-Phy-8** Examination of the Vestibulocochlear nerve	Practical	OSPE & OSVE
ENT				
71	• Describe the causes of deafness • Describe the types of deafness • Discuss the management of deafness	**HN-S1-Ent-3** Deafness	Interactive Lecture	SBQs & OSVE

72	• 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 6 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	ASSESS MENT
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 • Describe nerve supply, blood supply and lymphatic drainage of antero-lateral abdominal wall • 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.	**GIL-S1-Ana-G2** Anterior abdominal wall	Demonstration	SBQs, OSPE & OSVE
3	• 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. • 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-G3** Inguinal canal Spermatic cord		
4	• 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-G4** Development of inguinal canal and Overview of the male and female genitalia		
5	• Define peritoneum and peritoneal cavity. • Discuss intraperitoneal and retroperitoneal relationships. • Explain peritoneal ligaments. • Define omenta and mesentries. • Discuss in detail the peritoneal	**GIL-S1-Ana-G5** General arrangement The peritoneum Pouches, Recesses,		

	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. • Discuss the clinical conditions related with peritoneum.	Spaces & Gutters		
6	• 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				
7	• Mention primary/basic functions of GIT • Describe physiological anatomy of gastrointestinal wall • Describe electrical activity of gastrointestinal smooth muscle • Describe slow wave and spikes	**GIT-S1-Phy-1** Overview of GIT physiology	Interactive Lecture	SBQs & OSVE
8	• 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				
9	• To describe the composition of Bile. • To explain the primary and secondary bile acids. • To describe the role of bile in digestion. • To Explain the synthesis & its regulation of bile.	**GIT-S1-Bio-1** Bile	Interactive Lecture	SBQs & OSVE

	• Differentiate primary vs secondary bile acids and bile acids vs bile salts. • To discuss clinical importance of bile.			
10	• To explain the digestion of carbohydrates at different organs of human body with their enzymatic reactions. • To describe the absorption of carbohydrates in human body • To explain the role of glucose transporters in different parts of human body. • To discuss the lactose intolerance.	**GIT-S1-Bio-1** Digestion and Absorption of Carbohydrates		
11	• To explain the process and enzymes involved in digestion and absorption of proteins. • To discuss Hartnup and Maple syrup disease.	**GIT-S1-Bio-1** Digestion & Absorption of proteins		
12	• To Describe the process of digestion and absorption of lipids. • To discuss the Explain steatorrhea	**GIT-S1-Bio-1** Digestion & Absorption of lipids and fatty acids		
Pathology				
13	• Mention Causes pathogenesis of gastritis (Acute and Chronic) • Describe causes etiopathology complications and morphology of peptic ulcer disease • Mention role H pylori in peptic ulcer diseases, describe various methods of diagnosis of H pylori infection	**GIL-S1-Path-1** Gastritis and peptic ulcer disease	Interactive Lecture	SBQs & OSVE

Theme 2: Upper Gastrointestinal Disorders

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
14	• 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-G6** Esophagus	Demonstrati on	SBQs, OSPE & OSVE

	• 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.	Stomach		
15	• 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-G7** Small intestine (duodenum)		
16	• 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-G8** Small intestine (jejunum and ileum)		
17	• Explain the process of development of GIT and divisions of primitive gut • 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 ii. Congenital hypertrophic pyloric stenosis iii. Duodenal atresia/ stenosis	**GIL-S1-Ana-E1** Overview of the GIT development Foregut		
18	• Explain the development of the duodenum. • Describe development of liver, biliary apparatus and gall bladder. • Discus extrahepatic biliary atresia	**GIL-S1-Ana-E2** Development of the Duodenum, Liver and gall bladder		
19	• 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		
20	• 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				
21	• 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** Salivary secretion	Interactive Lecture	SBQs & OSVE
22	• Define swallowing / deglutition and name its stages • Describe mechanism of each Stage • Mention function of lower esophageal sphincter	**GIT-S1-Phy-4** Mastication and Deglutition	Interactive Lecture	SBQs & OSVE
23	• Describe physiological anatomy of gastric glands • Describe composition of gastric juice • Mention functions of important constituents of gastric juice • Describe regulation/control of gastric juice secretion	**GIT-S1-Phy-5** Gastric secretion	Interactive Lecture	SBQs & OSVE
24	• 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		
25	• Describe the motor functions of stomach • Explain how the gastric emptying is regulated	**GIT-S1-Phy-7** Motor functions of stomach		
26	• Define the indications, contraindications and the complications of the nasogastric tube	**GIT-S1-Phy-P-1** Nasogastric Tube-1	Practical	OSPE & OSVE

Clinical Lecture				
27	• Discuss Clinical correlates of upper GIT (surgical aspects)	**GIT-S1-Surg-1** Upper GI disorders	Interactive Lecture	SBQs & OSVE
28	• 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	ASSESS MENT
Anatomy				
29	• Identify location of liver • Describe the surfaces and different peritoneal relations • Discuss formation of anatomical and functional (physiological) lobes of liver. • Identify porta hepatis and its contents • Mention blood vessels specially describing blood circulation through the liver • Discuss lymphatic drainage and nerve supply of this organ	**GIL- S1-Ana-G9** Liver	Demonstra tion	SBQs, OSPE & OSVE
30	• 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-G10** Hepatic portal system		
31	• 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. • 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	**GIL- S1-Ana-G11** Gall bladder Duct system of liver (hepatic biliary system)		

	including lymphatic drainage.			
32	• 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 a n d nerves supplying spleen	**GIL- S1-Ana-G12** Spleen		
33	• Describe the development of pancreas • Describe the following anomalies of pancreas: i. Annular pancreas ii. Accessory pancreatic tissue	**GIL- S1-Ana-E3** Development of the Pancreas		
34	• 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-E4** Midgut	Interactive Lecture	SBQs & OSVE
35	• Explain general hepatic structure. • Discuss the concept of three hepatic lobules. • Describe the histology of classical hepatic lobule. • Describe the different components of biliary tract • Describe the microscopic structure of gall bladder	**GIL- S1-Ana-H 4** Histology of liver & Gall bladder		
36	• Identify microscopically exocrine and endocrine pancreas • Discuss the histological features of secretory and duct part of exocrine pancreas Identify and explain endocrine pancreas and its different cell types.	**GIL- S1-Ana-H5** Histology of Pancreas	Practical	OSPE & OSVE
Physiology				
37	• Mention physiological anatomy of exocrine part of pancreas • Describe composition of pancreatic juice	**GIT-S1-Phy-8** Pancreatic juice; its composition,	Interactive Lecture	SBQs & OSVE

	• Mention functions of pancreatic juice • Mention importance of trypsin inhibitor • Describe basic stimuli that cause pancreatic secretion • Mention phases of pancreatic secretion	function and regulation		
Biochemistry				
38	• Definition/ Site/ Substrate • required for gluconeogenesis • Pathway of Gluconeogenesis • Regulatory Enzymes / Steps of Gluconeogenesis • Stimulator & Inhibitor Factors of Gluconeogenesis • Pathway	**GIL- S1-Bio-5** Gluconeoge nesis & cori's cycle	Interactive Lecture	SBQs & OSVE
39	• To Explain the HMP Shunt • To describe the Phases of HMP shunt • To enlist the regulatory steps and enzymes & their regulation • To explain the biochemical & clinical role of NADPH.	**GIL- S1-Bio-6** HMP Shunt		
40	• Definition / Site Substrates • Pathway of Glycogenesis & glycogenolysis • Regulatory Steps/ Enzymes • Biomedical • Importance of Glycogenesis & • glycogenolysis	**GIL- S1-Bio-7** Glycogenesis Glycogenolysis		
41	• Regulatory Enzymes of Glycogen metabolism • Glycogen Storage Diseases	**GIL- S1-Bio- 8** Regulation of glycogen metabolism & glycogen storage diseases		
42	• Site/ Substrates • Pathways • Regulatory Steps/ • Regulatory Factors • Biomedical Importance • Clinical Importance of • Fructose & Sorbitol Pathway	**GIL- S1-Bio- 9** Fructose & Sorbitol Metabolism		
43	• Types of Oxidation of F.A • Definition of Alpha/beta/ Omega Oxidation • Explain the Metabolic Pathway of Beta Oxidation	**GIL- S1-Bio-10** Oxidation of Fatty Acids		

	• Biomedical importance of Beta Oxidation • ATP molecules formation in • Beta oxidation			
44	• To explain the Metabolic Pathways. • To Discuss the regulatory steps & their Inhibitors & activators • To discuss the clinical importance of synthesis & degradation of ketone bodies	**GIL- S1-Bio-11** Ketonegensis & ketolysis		
45	• Enlist the components of L.F.T • Explain the functions of different components of L.F.T • Role of the L.F.T in the diagnosis/ prognosis of clinical disorders	**GIL- S1-Bio-12** Liver function Test		
46	• To explain the metabolic pathway of synthesis of aromatic amino acids. • To discuss the inborn errors of metabolism in detail	**GIL- S1-Bio-13** Metabolism of Aromatic Amino Acids		
47	• Describe Metabolic Pathway of Methonine/ Cysteine & Cystine • To discuss clinical disorders in relation with their metabolic pathway errors.	**GIL- S1-Bio-14** Metabolism of Sulphur containing Amino Acids		
48	• To clinical interpretation of enzymes of LFT in diagnosis of different clinical disorders.	**GIL- S1-Bio-15** Enzymes of L.F.T	Practical	OSPE & OSVE
49	• To clinical interpretation of Albumin: Globulin Ratio	**GLI- S1-Bio-16** Albumin: Globulin Ratio		
50	• To clinical interpretation of Serum bilirubin in different clinical disorders.	**GLI- S1-Bio-17** Serum bilirubin direct & indirect		
Pathology				
51	• Name inflammatory bowel diseases • Describe etiopathology clinical features and morphological features of Croh's disease and ulcerative colitis	**GIL-S1-Path-2** Inflammatory bowel diseases	Interactive Lecture	SBQs & OSVE
Clinical lecture				
52	• Discuss the clinical presentation and management of hepatitis	**GIL-S1-Med-2** Hepatitis	Interactive Lecture	SBQs & OSVE
53	• 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	ASSESS MENT
Anatomy				
54	• 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**.** • Discuss gross features of different parts of colon: Ascending colon, Transverse colon, descending and sigmoid colon and mention their peritoneal covering. • Give blood and nerve supply.	**GIL- S1-Ana-G13** Large intestine-1 Cecum and Vermiform appendix Colon	Demonstration	SBQs, OSPE & OSVE
55	• 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-G14** Rectum		
56	• Describethe ano-rectal junction • Discuss the location and basic structure of anal Canal • Contents of anal triangle • 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.	**GIL- S1-Ana-G15** Anal canal & Ischiorectal fossa		

	• Discuss the clinical correlates. • Describe ischiorectal fossa			
57	• 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-E5** Hind gut	Interactive Lecture	SBQs & OSVE
Physiology				
58	• Mention physiological anatomy of small intestine and large intestine • Describe secretion of small intestine and large intestine • Describe regulation of small intestinal secretion • Mention enzymes present in the brush border of small intestine • Describe defecation reflex • Explain the functions of different sphincters of GIT and their neural control	**GIT-S1-Phy-9** Secretion and movements of small intestine and large intestine	Interactive Lecture	SBQs & OSVE
Pharmacology				
59	• To treat Nausea and Vomiting • Uses in Motion sickness	**GIL- S1-Pharm-1** Drugs used as Anti-Emetics	Interactive Lecture	SBQs & OSVE
Clinical lecture				
60	• Discuss clinical presentation and surgical management of lower GI disorders	**GIL- S1-Surg-3** Lower GI disorders	Interactive Lecture	SBQs & OSVE
61	• 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	ASSESS MENT
Anatomy				
62	• Describe general characteristics of lumbar vertebrae • Explain the attachments of lumber fascia. • Discuss attachment of muscles of posterior abdominal wall. • Discuss nerve supply, lymphatic drainage of abdominal walls and viscera	**GIL-Ana-G16** Posterior abdominal wall Lumbar vertebrae & muscles	Demonstration	SBQs, OSPE & OSVE
63	• 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-G17** Blood supply of the gastrointestinal tract-I Abdominal Aorta		
64	• Describe the formation, course and termination of inferior vena cava • List the tributaries of inferior vena cava	**GIL-Ana-G18** Blood supply of the gastrointestinal tract-II Inferior vena cava		
65	• Name the groups of lymph nodes draining the abdomen. Explain them. • Describe lymphatic trunks, cisterna chili & thoracic duct.	**GIL-Ana-G19** Lymphatic drainage of GIT		
Physiology				

66	• Define three types of gastrointestinal reflexes that are essential to gastrointestinal control	**GIT-1-Phy-10** Gastrointestinal reflex	Interactive Lecture	SBQs & OSVE
67	• List important hormones secreted from the GIT mucosa • Describe role of these hormones in regulation/ control of GIT function	**GIT-1-Phy-11** Hormones of GIT		

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 adrenal 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

Theme 1: Short/Tall stature and the role of the pituitary gland

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
1	• Describe the embryological development & congenital anomalies of pituitary & Pineal gland. • Describe the gross anatomy, neurovascular supply & Clinical correlates of Pituitary & Pineal gland	**Endo-S1-Ana-E-1** Embryological development and Gross anatomy of pituitary and Pineal gland.		
2	• Discuss the microscopic features of Pituitary & Pineal gland	**Endo-S1-Ana-H-1** Microscopic Anatomy of Pituitary & Pineal gland	Practical	OSPE & OSVE
Biochemistry				
3	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
4	How hormones act through cAMP/cGMP/Tyrosine kinase pathway	**Endo-S1-Bio-2** Mechanism of action of Hormones (second messenger system)		
Physiology				
5	• 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

6	• Describe the hormones secreted by the anterior pituitary gland and describe their hypothalamic control & regulation by positive and negative feedback Mechanism	**Endo-S1-Phy-2** Classification of hormones, Regulation of secretion		
7	• Explain the structure, mechanism of action and physiological effects of Growth hormone.	**Endo-S1-Phy-3** Physiology and regulation of Growth hormone		
8	• Describe the functions of Pineal gland, how it control body's circadian rhythm.	**Endo-S1-Phy-4** Physiological effects of pineal gland		
Clinical lectures				
9	• 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				
10	• 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	ASSESS MENT
Anatomy				
11	• Describe the embryological development & congenital anomalies of Thyroid & Parathyroid gland. • Describe the gross anatomy, neurovascular supply & Clinical correlates of Thyroid & Parathyroid gland.	**Endo-S1-Ana-E-2** Embryological development & Gross Anatomy of Thyroid & Parathyroid gland.	Interactive Lecture	SBQs & OSVE
12	• Discuss the microscopic features of Thyroid & Parathyroid gland.	**Endo-S1-Ana-H-2** Microscopic Anatomy of Thyroid & Parathyroid gland.	Practical	OSPE & OSVE
Biochemistry				
13	• 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

14	• To discuss the clinical Interpretation of Thyroid Function Tests (TFTs)	**Endo-S1-Bio-4** To estimate the T3 T4 and TSH Levels	Practical	OSPE & OSVE
Physiology				
15	• Describe Physiological effects of Thyroid Hormone on Growth, metabolism and body systems	**Endo-S1-Phy-5** Physiological role of thyroid hormones	Interactive Lecture	SBQs & OSVE
16	• Explain Mechanism of action/target organ of PTH • Describe Effect of Parathyroid Hormone on Calcium regulation	**Endo-S1-Phy-6** Physiological role of PTH hormones		
17	• 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-7** Physiological role of Vitamin D and Calcitonin		
Pathology				
18	• Discuss the different disorders of Thyroid gland	**EndoS1-Path-2** Disorders of Thyroid gland	Interactive Lecture	SBQs & OSVE
Clinical Lectures				
19	• 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	ASSESS MENT
Anatomy				
20	• Describe the embryological development & congenital anomalies of Endocrine Pancreas. • Describe the gross anatomy, neurovascular supply & Clinical correlates of Endocrine Pancreas	**Endo-S1-Ana-E-3** Embryological development & Gross Anatomy of Endocrine Pancreas	Interactive Lecture	SBQs & OSVE
Biochemistry				
21	• To explain the Biosynthesis of Insulin & Glucagon • To describe Structure of Insulin &	**Endo-S1-Bio-5** Insulin and glucagon	Interactive Lecture	SBQs & OSVE

	Glucagon • Mechanism of action of Insulin and Glucagon. • To explain Metabolic functions of Insulin and Glucagon.			
22	• How blood glucose is maintained throughout a day in humans during different metabolic states	**Endo-S1-Bio-6** Maintenance of blood sugar during starvation and in well-fed states		
23	• The clinical interpretation of blood glucose levels in fasting as well as in random conditions	**Endo-S1-Bio-7** Estimation of blood glucose level	Practical	OSPE & OSVE
24	• Describe the synthesis of glucocorticoids • Explain the Biochemical actions of Glucocorticoid • hormones.	**Endo-S1-Bio-8** Glucocorticoids	Interactive Lecture	SBQs & OSVE
25	• To explain the RDA of Macro elements of diet • To discuss the glycemic index & BMR • Dynamic Action of food • HbA1c%	**Endo-S1-Bio-9** Balanced Diet		
26	• To describe the marasmus & kwashiorkor	**Endo-S1-Bio-10** Nutritional disorders		
Clinical Lectures				
27	• Define diabetes mellitus. • Types, risk factors, causes , clinical features, complications of DM	**Endo-S1-Med-2** Diabetes Mellitus	Interactive Lecture	SBQs & OSVE
Pathology				
28	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 Adrenal Gland

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESSMENT
Anatomy				

29	• Describe the embryological development & congenital anomalies of Adrenal gland. • Describe the gross anatomy, neurovascular supply & Clinical correlates of Adrenal gland.	**Endo-S1-Ana-E-4** Embryological development & Gross anatomy of Adrenal gland.		
30	• Discuss the microscopic features of Adrenal gland.	**Endo-S1-Ana-H-3** Microscopic Anatomy of Adrenal gland	Practical	OSPE & OSVE
Physiology				
31	• Name the hormones of Adrenal cortex, and regulation of adreno cortical hormone secretion.	**Endo-S1-Phy-8** Adrenal cortex Regulation of secretion	Interactive Lecture	SBQs & OSVE
32	• Describe the physiological Effects of Aldosterone	**Endo-S1-Phy-9** Physiological effects of Aldosterone		
33	• Describe BMI. • Calculate BMI • Describe factors affecting BMI • Classify obesity • Describe the factors affecting obesity	**Endo-S1-Phy-P 01** Calculation of BMI	Practical	OSPE & OSVE
Pathology				
34	• Describe the hyper-secretory & hypo-secretory disorders of Adrenal cortex & Medulla	**Endo-S1-Path-4** Hyper and Hypo-secretion of hormones from adrenal medulla & cortex	Interactive Lecture	SBQs & OSVE
Pharmacology				
35	• Describe the classification of oral hypoglycemic drugs and their target sites of action.	**Endo-S1-Pharm-1** Classification and target sites of oral hypoglycemic drugs	Interactive Lecture	SBQs & OSVE
36	• Describe the anterior pituitary hormones, their physiological functions, and target organs.	**Endo-S1-Pharm-2** Anterior Pituitary hormones		
Clinical Lectures				
37	• Define the clinical conditions related with the Adrenal gland	**Endo-S1-Med-3**	Interactive Lecture	SBQs & OSVE

		Clinical conditions related with Adrenal gland		

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 EXCRETORY SYSTEM

S. #	LEARNING OBJECTIVES	TOPICS	TEACHING STRATEGY	ASSESS MENT
	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 (External artery, External 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	• External cortex and medulla, External lobe External lobule, medullary rays, External 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 • External cortex and medulla,	**EXC-S1-Ana-H-1** Histology of the kidneys	Interactive Lecture	SBQs & OSVE

	External lobe External lobule, medullary rays, External columns • Nephron: Glomerulus, bowman's capsule, PCT, loop of henle, DCT, collecting tubules, collecting duct, clinical correlates.			
4	• 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				
5	• 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** Renal physiology overview	Interactive Lecture	SBQs & OSVE
Biochemistry				
6	• To discuss the normal biochemical components of urine • To discuss the abnormal biochemical components of urine & their clinical Interpretation	**EXC-S1-Bio-1** Analysis of Urine	Practical	OSPE & OSVE
Pathology				
7	• 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
8	• 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	ASSESS MENT
Anatomy				
9	• 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
10	• Ureter: Lumen, epithelium, histological layers, clinical correlates.		Interactive Lecture	SBQs & OSVE

	• Urinary bladder: epithelium, histological layers, clinical correlates. • Urethra: parts, epithelium, histological layers, difference of male and female urethra, clinical correlates.	**EXC-S1-Ana-H-2** Microscopic anatomy of the ureters, urinary bladder and urethra		
11	• Explain the development of ureters, urinary bladder & urethra (male & female)	**EXC-S1-Ana-E-2** Development of ureter , urinary bladder & urethra (male & female)		
12	• Components of juxtaglomerular apparatus, components of filtration membrane, clinical correlates.	**EXC-S1-Ana-H-3** Histology of the kidneys 2	Practical	OSPE & OSVE
Physiology				
13	• 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** Basic steps of urine formation Glomerular filtration and glomerular filtrate	Interactive Lecture	SBQs & OSVE
14	• Explain the functions of juxta glomerular apparatus and Macula densa • Define tubulo glomerular feedback • Discuss myogenic autoregulation • Explain renal blood flow	**EXC-S1-Phy-3** Autoregulation of GFR and blood flow		
15	• Enumerate indications contraindications and complications of urinary catheter (perform the procedure)	**EXC-S1-Phy-P 01** To pass the urinary catheter-1	Practical	OSPE & OSVE
Pathology				
16	• Classify of glomerular diseases • Discuss the clinical manifestation of glomerular diseases	**EXC-S1-Path-2** Introduction to glomerular diseases	Interactive Lecture	SBQs & OSVE
Clinical Lecture				

17	• 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	ASSESS MENT
Anatomy				
18	• 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
19	• 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
20	• Histology of the Ureter and Urinary bladder • 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-4** Histology of the Ureter and Urinary bladder	Practical	OSPE & OSVE
Physiology				
21	• Describe features of renal tubules • Explain the tubular reabsorption and secretion in different segments of renal tubule. • Define transport maximum (Tm), plasma threshold and splay. • 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-4** Basic steps of urine formation: Tubular reabsorption and secretion	Interactive Lecture	SBQs & OSVE
22	• Define renal clearance and related concepts • Explain the principles of inulin clearance and how it reflects GFR.	**EXC-S1-Phy-5** Renal clearance Tests		

	• Describe creatinine clearance as a practical clinical estimate of GFR and understand its limitations. • Discuss how plasma creatinine concentration alone can approximate GFR			
23	• 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-6** Hormonal regulation of tubular functions .		
Biochemistry				
24	• Describe the different sources of sodium & Potassium • Enlist different functions of sodium & Potassium • Justify their role in maintaining the osmolality of plasma. • Interpret the Normal & Abnormal serum levels in different clinical disorders	**EXC-S1-Bio-2** Na+ & K + Metabolism	Interactive Lecture	SBQs & OSVE
25	• To explain the metabolic pathway of urea cycle along with their regulatory enzymes. • To discuss the biomedical importance of urea cycle in humans	**EXC-S1-Bio-3** Urea Cycle		
26	• To describe the types, causes & clinical manifestation of Ammonia intoxication	**EXC-S1-Bio-4** Ammonia Intoxication		
27	• To describe the normal & abnormal range of blood urea level. • To clinical interpretation the abnormal blood urea level in different clinical disorders	**EXC-S1-Bio-5** Estimation of Blood Urea level	Practical	OSPE & OSVE
Pharmacology				
28	• Classification, Mechanism of action, indications, contraindications and adverse effects of excretory drugs	**EXC-S1-Pharm-1** Drug excretion	Interactive Lecture	SBQs & OSVE
Clinical Lecture				
29	• Describe the pathogenesis of glomerular disorder	**EXC-S1-Neph-3** Glomerular disease (Nephritic	Interactive Lecture	SBQs & OSVE

	• Discuss the clinical manifestation of glomerular diseases	and nephrotic syndrome)		

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

S. #	LEARNINGOBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
30	• Urethra: parts, epithelium, histological layers, difference of male and female urethra, clinical correlates.	**EXC-S1-Ana-H-5** Histology of the Urethra	Practical	OSPE & OSVE
Physiology				
31	• 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 medullary interstitium and to the urine concentration.	**EXC-S1-Phy-7** Concentration and Dilution of urine-I	Interactive Lecture	SBQs & OSVE
32	• Describe the role of vasa recta as countercurrent exchanger in maintaining the hyperosmolarity of the medulla. • Describe how the kidneys produce dilute and concentrated urine. • Define obligatory urine volume	**EXC-S1-Phy-8** Concentration and Dilution of urine-II		
33	• 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-9** Micturition reflex and its abnormalities		
34	• 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-10** Acidification of urine		
35	• Define dialysis • Describe mechanism of function of artificial kidney • Define dialysate, uraemia	**EXC-S1-Sk.Lab.1** Dialysis	Practical	OSPE & OSVE

	• Discuss peritoneal dialysis technique • Complications of the dialysis			
Biochemistry				
36	• Describe Normal & abnormal PH of body fluids • Describe the Body Buffers & their classification. • Role of the buffers to maintain the PH	**EXC-S1-Bio-6** PH & Buffers	Interactive Lecture	SBQs & OSVE
37	• Define the Acid Base balance. • Describe its related disorders. • Discuss its management.	**EXC-S1-Bio-7** Acid Base balance, Disorders & Management		
38	• Describe glomerular function • Explain clearance test (inulin, creatinine and urea) • Discuss tubular function test • Discuss proteinuria	**EXC-S1-Bio-8** Exc-S1 Renal Function Tests (RFT)		
39	• To discuss & clinical interpretation of ABG's in different acid base balance disorders.	**EXC-S1-Bio-9** Interpretation of ABG's	Practical	OSPE & OSVE
40	• To discuss & clinical interpretation of serum electrolytes in different acid base balance disorders	**EXC-S1-Bio-10** Serum Electrolytes		
Pathology				
41	• 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				
42	• 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
43	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	ASSESS MENT
		ANATOMY		
01	• Describe the bony pelvis • Differentiate the types of bony pelvis • Describe the structures constitute the pelvic floor • Explain the pelvic walls	**Rep-S1-Ana-G-1** Bony Pelvis (inlet and outlet) Difference b/w male & female pelvis Types of bony pelvis Pelvic walls Pelvic floor Pelvic fascia & Cavity	Demonstration	SBQs, OSPE & OSVE
02	• Describe the arrangement of viscera within the pelvic cavity • Define the male and female external and internal genital organs	**Rep-S1-Ana-G -2** Over view of pelvic viscera (urinary bladder, sigmoid colon, Rectum and Male & female genital organs)		
03	• 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 -3** Testis, epididymis ,Ductus deferens	Interactive Lecture	SBQs & OSVE

04	• Describe the anatomy of prostate, Seminal vesicles and ejaculatory ducts • Discuss the clinical correlates	**Rep-S1-Ana-G -4** Prostate, Seminal vesicles, Ejaculatory ducts	Demonstration	SBQs, OSPE & OSVE
05	• 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	Interactive Lecture	SBQs & OSVE
06	• 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
Physiology				
07	• Explain the functions of primary and accessory sex organs • Define Puberty and Menarche. Explain the roles of FSH, LH, estrogen, progesterone, testosterone, inhibin, and GnRH in puberty. • Explain the stages of spermatogenesis. Discuss oogenesis, phases of development of ova, and development of corpus luteum	**Rep–S1-Phy-1** Reproductive Physiology overview	Interactive Lecture	SBQs & OSVE
08	• To discuss the functions of testosterone • To describe mode of action of testosterone. • Discuss the regulation of male sex hormone.	**Rep– S1-Phy-2** Male Sex Hormones (Testosterone)		
Biochemistry				
09	• Describe the Synthesis & Regulation of Reproductive hormones	**Rep-S1-Bio- 1** Synthesis & Regulation of Reproductive hormones		
Pathology				
10	• 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	Interactive Lecture	SBQs & OSVE

Clinical lecture				
11	• 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)	Interactive Lecture	SBQs & OSVE

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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
ANATOMY				
12	• Describe the female internal genital organs • Explain the anatomy of ovaries • Discuss the anatomy of fallopian tube	**Rep–S1-Ana-G-5** Ovaries and Uterine tubes	Interactive Lecture	SBQs & OSVE
13	• Explain the anatomy of Uterine tubes Describe the parts of uterus, supports of uterus. • Explain the anatomy of vagina	**Rep–S1-Ana- G-6** Uterus and vagina		
14	• Explain the boundaries of perineum • Describe the division of perineum • Discuss perineal body	**Rep–S1-Ana-G-7** Divisions of perineum , Perineal body	Demonstration	SBQs, OSPE & OSVE
15	• Discuss the contents of anal triangle • Briefly discuss the anatomy of anal canal • Identify the boundaries of ischioanal fossa • Discuss the contents of ischiorectal fossa.	**Rep–S1-Ana-G-8** Contents of anal triangle Anal canal Ischiorectal fossa		
16	• Discuss the microscopic features of prostate and seminal vesicle	**Rep–S1-Ana-H-2** Histology of Prostate, Seminal Vesicle	Practical	OSPE & OSVE
Pathology				
17	• 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				
18	• 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	ASSESS MENT
Anatomy				
19	• Discuss the contents of urogenital triangle in the male and female • (external genitalia)	**Rep–S1-Ana-G-9** Male and female external genitalia	Interactive Lecture	SBQs & OSVE

	• Discuss the contents of superficial perineal pouch in the male • Discuss the contents of deep perineal pouch in male	Urogenital diaphragm and contents of superficial and deep perineal pouch in the male		
20	• Discuss the contents of superficial perineal pouch in female • Discuss the contents of deep perineal pouch in female	**Rep –S1-Ana-G-10** Contents of superficial perineal pouch and deep perineal pouch in the female		
21	• Describe the development of parts of female reproductive system • Discuss the development of gonads	**Rep –S1-Ana-E-3** Development of female reproductive System		
22	• 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		
PHYSIOLOGY				
23	• 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-3** Female reproductive cycle Menstrual cycle, Menarche and Menopause.	Interactive Lecture	SBQs & OSVE
PATHOLOGY				
24	• Enlist congenital anomalies of uterus and vagina	**Rep-S1-Path-3** Congenital anomalies of Female Genital Tract.		
25	• Define pelvic inflammatory disease and organism involved in it. • Discuss complications of pelvic inflammatory disease	**Rep-S1-Path-4** Inflammatory lesions of Female Genital Tract.		
26	• Endometrial histology during menstrual cycle • Define dysfunctional uterine bleeding and its causes. • Describe acute and chronic endometritis	**Rep-S1-Path-5** Diseases of Endometrium		

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

S. #	LEARNING OBJECTIVES	TOPIC	TEACHING STRATEGY	ASSESS MENT
Anatomy				
27	• Discuss the major blood vessels of pelvis and perineum • 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-11** Internal iliac artery and its branches Venous &Lymphatic drainage of pelvis and perineum	Interactive Lecture	SBQs & OSVE
28	• Describe the nerves of pelvis and perineum • Describe the sacral plexus and hypogastric plexus.	**Rep –S1-Ana-G-12** Nerves of Pelvis & Perineum, sacral Plexus Hypogastric plexus		
29	• 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		
30	• Discuss the microscopic features of uterus, cervix • Discuss the microscopic features of vagina	**Rep –S1-Ana -H-4** Histology of uterus, cervix, vagina		
PHYSIOLOGY				
31	• 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-4** Physiology of Pregnancy, placenta and placental hormones	Interactive Lecture	SBQs & OSVE
32	• Discuss Maternal physiological adaptation (CVS, Respiratory renal endocrine)	**Rep –S1-Phy-5** Maternal physiological adaptation		
33	• Describe mode of action of oxytocin • Describe the changes in uterus during pregnancy, and after birth. • Describe the involution of uterus7	**Rep–S1-Phy-6** Parturition and Oxytocin		
34	• Describe the physiology of the mammary gland. • Describe the lactation reflex. • Describe the weaning.	**Rep –S1-Phy-7** Breast and Lactation		

35	• Define the synthesis of function and regulation of estrogen and progesterone	**Rep –S1-Phy-08** Female sex hormones (Estrogen, Progesterone)		
36	• Define the neonatal period and describe the major physiological changes that occur immediately after birth. • Explain the transition from intrauterine to extra uterine life. Describe the initiation of breathing at birth	**Rep –S1-Phy-09** Neonatal physiology		
37	• Perform the pregnancy test, on pregnancy test-strip	**Rep–S1-Phy- P 01** Pregnancy test	Practical	OSPE & OSVE
Pharmacology				
38	• Describe androgens and anti-androgens, their mechanisms of action, clinical uses, and adverse effects.	**Rep-S1-Pharm-1** Androgen and Anti-androgen	Interactive Lecture	SBQs & OSVE
39	• Describe the drugs used in BPH, their mechanisms of action, clinical uses, and adverse effects.	**Rep-S1-Pharm-2** Drugs used in BPH		
Clinical Lecture				
40	• 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

COMMUNITY MEDICINE

HEALTH SYSTEM IN PAKISTAN
Total Lectures: 02
Learning Outcomes
By the end of this foundation module, students will be able to:

- Outline the structure of the health care delivery system in Pakistan, including primary, secondary, and tertiary levels of care.
- Identify key public and private sector health service providers in Pakistan, including Basic Health Units (BHUs), Rural Health Centers (RHCs), Tehsil and District Headquarter Hospitals.
- Explain the concept and importance of Sustainable Development Goals (SDGs) with special emphasis on SDG-3 (Good Health and Well-being).
- Describe the relationship between health and sustainable development, including social, economic, and environmental determinants of health.
- Explain how Pakistan's health policies and programs align with SDGs, particularly in maternal and child health, communicable and non-communicable diseases.
- Recognize major challenges in Pakistan's health delivery system, such as access, equity, financing, and workforce limitations.

Rationale

- The Community Medicine Foundation Module provides students with a conceptual framework for understanding health beyond the individual patient, emphasizing the community as a unit of care. Early exposure to public health principles helps future doctors develop a preventive, promotive, and population-based approach to health care. This module builds the foundation for later clinical and field-based learning by linking social, environmental, and behavioral factors with disease occurrence, thereby preparing students to address the major public health challenges of Pakistan effectively.

S. No	Sub Topic/ Lecture	Learning Objectives
01	Concept of Primary Health Care & Health care delivery system of Pakistan	• To discuss the "health for All", background, concepts and progress. • To discuss the Alma Ata Declaration • To discuss the Universal health coverage • To define Primary health care • Component of primary health care • To learn about health care delivery system of Pakistan • To define the concept of Vertical and horizontal program
02	Health policy and plans of Pakistan Sustainable Development Goals	• To describe the national health policy and plans of Pakistan • To define Sustainable Development Goals (SDGs). • To describe the 17 SDGs and their purpose. • To explain the importance of SDGs for global and national development. • To discuss the Pakistan's progress and challenges related to SDGs

UNDERGRADUATE RESEARCH MODULE
CERTIFICATE COURSE FOR UNDERGRADUATE MBBS STUDENTS

Basics of Epidemiology, Biostatistics, and Research (BEBR)
Total lectures in Research Module Unit I and II = 25
Research Module – I (2nd year MBBS)

Total Lectures: 11

Learning Outcomes:

By the end of this Module 1, the 2nd Year student will be able to:

- Define Evidence-Based Medicine and explain the components of the Epidemiological Triad (Agent, Host, Environment).
- Differentiate between key measures of disease frequency (Incidence and Prevalence) and explain the appropriate context for using each.
- Distinguish between the major observational study designs (Descriptive, Case-Control, Cohort) and experimental studies (RCTs).
- Interpret basic measures of association (Odds Ratio, Relative Risk) to determine if an exposure is a risk factor.
- Formulate a specific, focused clinical research question using the PICOT (Population, Intervention, Comparison, Outcome, Time) format.
- Draft the preliminary section (Phase 1) of a research proposal, including a Title, Rationale, and specific Objectives.

Rationale

In the first year of MBBS, students are introduced to the basic sciences (Anatomy, Physiology) to understand the normal functioning of the human body. It is equally critical to introduce the "Basic Science of Public Health" Epidemiology. This module provides the logical framework for understanding how diseases interact with populations. By learning study designs and the concept of risk early, students develop critical thinking skills necessary to understand why we treat patients the way we do, moving beyond rote memorization to an evidence-based mindset.

Lecture	Learning Objectives
Unit 1: **Foundation and Fundamentals of Epidemiology (Measuring Health & Disease)** Focus: What is research and what are we looking for? How do we track diseases in a population?	
Lecture 1. **Introduction to Research & Evidence-Based Medicine**	○ The "Physician-Scientist" concept ○ Research and Evidence based medicine importance ○ Triad of Evidence Based Medicine ○ Role of the Physician-Scientist as a bridge between the lab and the bedside ○ Why research is essential for patient care Students poll on why research matters for their future patients
Lecture 2. Introduction of epidemiology and concept of The Epidemiological Triad	○ Define epidemiology ○ Describe the basic terminologies objectives and uses of epidemiology ○ The Epidemiological Triad: Agent, Host, and Environment interaction.

	○ Burden of Disease: How to use global data (WHO/CDC) to justify why a research topic is important.
Lecture 3. Measures of Disease Frequency	○ Incidence vs. Prevalence: The "Bathtub Analogy" (New cases vs. Existing cases). ○ Rate, Ratio and Odds ○ Morbidity vs. Mortality rates
Lecture 4. The Concept of Risk	○ Association vs. Causation (Bradford Hill Criteria). ○ Risk Factors: Modifiable vs. non-modifiable.
Lecture 5: Framing the Research Question (PICOT)	○ Review of Population, Intervention, Comparison, Outcome. ○ Convert a vague statement ("I want to study smoking") into a PICOT question ("In adult males [P], does vaping [I] compared to cigarettes [C] reduce the risk of lung cancer [O] over 5 years [T]
Lecture 6: Proposal Writing Phase 1 (The "What" & "Why")	○ The Anatomy of a Proposal (Skeleton: Title→ Introduction → Methods→Analysis) ○ Drafting the Title ○ Writing the Rationale ○ Writing SMART Objectives
Unit 2: Study Designs & Epidemiology Focus: How do we design a study to answer the question?	
Lecture 7: Descriptive Studies	○ Study Designs and their purpose ○ Descriptive: Case Reports, Case Series. ○ Cross-sectional study (Prevalence studies) ○ Purpose and Uses ○ Advantages vs Disadvantages ○ Measure of occurrence in cross-sectional study
Lecture 8: Analytical Studies (Case-Control)	○ Concept of the Medical Detective: purpose of Case-Control study ○ Case-Control Studies (Looking Backward) ○ Advantages vs Disadvantages ○ Measure of occurrence and association in Case-control studies.
Lecture 9: Analytical Studies (Cohort Study)	○ Concept of the Medical Detective: purpose of Cohort study ○ Cohort Studies (Looking forward) ○ Advantages vs Disadvantages ○ Measure of occurrence and association in Cohort Study.
Lecture 10: Experimental Studies	○ Introduction to Experimental Research ○ Core Components of a Randomized Control Trial Blinding (Masking)
Lecture 11: Measures of associations	○ Different types of measures of associations ○ Measures used in different study designs ○ Rate ratio vs Risk ratio ○ Odds Ratio

Research Module – II (2nd year MBBS)

Total Lectures: 14

Learning Outcomes:

By the end of Research Module – II, the student will be able to:

- Classify data variables (Qualitative vs. Quantitative) in order to select appropriate statistical tests.
- Explain key concepts of inferential statistics, including Normal Distribution, p-values, and Confidence Intervals.
- Critically appraise a published research paper by identifying common errors, biases, and methodological flaws.
- Recognize the ethical standards of research, including the avoidance of plagiarism, fabrication, and falsification.
- Conduct a basic literature search using medical databases (e.g., PubMed) to support research arguments.
- Demonstrate basic data entry and cleaning skills using software (e.g., Excel/SPSS).
- Calculate and visualize descriptive statistics (Mean, Median, Mode, SD, Graphs).
- Develop the methodology section (Phase 2) of a research proposal, including Sampling techniques and Data Analysis plans.

Rationale:

Having understood how studies are designed in Research Module – I - the student must now learn how to handle the evidence. As students dive deeper into Pathology and Pharmacology, they encounter data (lab values, drug efficacy rates). This module equips them with Biostatistics and Data Literacy skills. Its transitions from theoretical design to practical execution by teaching students how to collect, analyze, and ethically present data, thereby preparing them for future independent research projects and clinical decision-making.

Unit 3: Basic Biostatistics (Interpreting the Data) Focus: Making sense of the numbers (Data Literacy)	
Lecture 12: Data and Variables	○ Data vs Variables ○ Types of data and Variables ○ Qualitative vs Quantitative ○ Categorical (Nominal/Ordinal) vs. Numerical (Discrete/Continuous).
Lecture 13: Descriptive Statistics (Central Tendency)	○ Measures of Central Tendency: ○ Concept of Mean, Median, Mode (When to use which?) ○ Importance in research ○ Basic Calculations
Lecture 14: Descriptive Statistics (Data dispersion and the Normal Distribution)	○ Measures of Dispersion: ○ Concept of Standard Deviation and Range (Concept: How spread out is the data?). ○ Understanding the normal distribution of data "Bell Curve." ○ Skewness vs normally distributed data
Lecture 15: Inferential Statistics	○ The Null Hypothesis (H_0): The assumption that "nothing happened." ○ The P-Value: The probability of results happening by chance. ○ Confidence Intervals: Understanding precision

Lecture 16: Methodology & Sampling	○ Population vs sample ○ Purpose of sampling ○ Sampling Techniques: Random vs. Non-random
Lecture 17: Data Collection and Presentation	○ Different methods of collection of data ○ Primary vs secondary data ○ Define the data presentation and its importance in research and public health ○ To describe the different methods of data presentation (tables, graphs & diagrams)
Lecture 18: Data Entry	○ Determine the steps of data entry using statistical software. ○ Understand the basics of operating SPSS. ○ Describe how to analyze data using SPSS
Lecture 19: Data Analysis Methods	○ Define the statistical tests ○ Describe the different statistical tests. Describe the interpretation of data analyzed through t-test and Chi-square test
Unit 4: The Research Process (Finding the Evidence)	
Lecture 20: Literature Search Strategies	○ How to search literature ○ Steps in literature search using key words strategy ○ Search engines: PubMed/Google Scholar basics
Lecture 21: Errors in research	○ Define different type off errors in research. ○ Define validity and reliability ○ Random vs Systematic errors ○ Confounders vs Effect modifiers ○ To identify various biases in research Discuss the method to minimize or eliminate these errors and biases.
Lecture 22: Critical Appraisal (How to read a research paper)	○ Reading a paper and identifying: ▪ What is citation? ▪ What was the research question / Objective? ▪ What was the Study Design? ▪ What was / were the outcome variable? ▪ What was/ were the exposure variables? ▪ What was the P-value? Is it significant? Is there any bias?
Lecture 23: Application & Ethics (Focus: Putting it all together)	○ Purpose of Research Ethics ○ Informed Consent (what is consent, informed consent, its significance in research) ○ Privacy & Confidentiality ○ The Declaration of Helsinki and handling vulnerable populations
Lecture 24: Research Misconduct & Plagiarism	○ Plagiarism ○ Using AI in research ○ Institutional and HEC policies for plagiarism and AI in research ○ Different ways to address these issues

Lecture 25: Proposal Writing Phase 2 (The "How")	○ Writing the Methodology Section ○ Describing Data collection ○ The Analysis Plan ○ Writing ethical consideration ○ References

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,	**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	**LECTURE**

	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.	•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.	

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	**PAR-S-1-BS-6 Life Events, Psycho-Trauma, Psychological Reactions, Stress and Stressor, Stress Management**	**LECTURE**

	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.	• 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.	

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

FEHM-UL-QURAN II

Model Course Outline
for the Course Understanding of Quran – II

Course Title: Understanding of Quran – II
Course Book: Muallim ul Quran (Volume 3, 4 & 5) by Dr Ubaid ur Rahman
Credit Hours: 1 (0-1)
Contact Hours: 3 per week
Weeks: 15-16 (45-48 hours)

Course Learning Outcomes:

By the end of this course, students will be able to:

1. Directly comprehend hundreds of Quranic sentences & verses.
2. Understand at least 80 to 85 % of each page of the holy Quran.
3. Understand common verses across different Quranic topics.
4. Achieve proficiency in the basic and advance linguistic aspects of the Arabic language.
5. Understand the difference between Quranic verbs in various forms, such as present, past and imperative.
6. Develop the ability to understand long verses of the holy Quran independently and then comprehend their interpretation.

Provision of material, content and books:

- **Paper book**: All volumes are available in printed book form.
- **Tutorial videos:** Teaching video of each lesson available on YouTube.
- **Confirmation Videos:** A complete series of confirmation videos of all lessons is available in which the student can confirm his answers.
- **A flipbook:** A flipbook edition is also accessible.
- **Helping material:** Helping material for the teachers like quizzes, question papers and images is available on website.

Course Outline:

Weeks	Lectures	Units	Lessons	Assignments/Home Task	
1.	1.	6	6	Understanding & Translation of Verses	Present Tense صیغة جمع مذکر غائب مثل یعبدون
	2.	6	7-8	Understanding & Translation of Verses	Present Tense صیغة جمع مذکر غائب مثل یعبدون
2.	1.	6	9-10	Understanding & Translation of Verses	Present Tense صیغة مفرد مذکر مخاطب (تعبد) وجمع مذکر مخاطب (تعبدون)
	2.	6	11-12	Understanding & Translation of Verses	Present Tense صیغة جمع مذکر مخاطب (تعبدون)

					صيغة المتكلم (أعبد)
3.	1.	6	13	Understanding & Translation of Verses	Present Tense صيغة جمع المتكلم (نعبد)
	2.	6	14-15	Understanding & Translation of Verses	Negative Imperative صيغة المفرد وصيغة الجمع , لا تعبدْ، لا تعبدوا
4.	1.	6	16-17	Understanding & Translation of Verses	Conditional Sentences & masdar moawal (مصدر موؤل)
	2.	6	18-19	Understanding & Translation of Verses	Laam uttaleel (لام التعليل) & Laam ul jhood(لام الجحود)
5.	1.	6	20-21	Understanding & Translation of Verses	Present with object pronouns & Passive Voice
	2.	6	Revision (Unit 6)	Quiz	
6.	1.	Unit 7	1 (sec 1-3)	Understanding & Translation of Verses	Past Tense صيغة المفرد الغائب
	2.	6	1 (Sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
7.	1.	6	1 (Sec 5-6)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
	2.	6	1 (Sec 7-9)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
8.	1.	7	Revision	Understanding & Translation of Verses QUIZ	Past Tense صيغة المفرد للغائب
	2.	MID TERM			
9.	1.	7	2 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
10.	1.	7	2 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 6-7)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
11.	1.	7	3 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا

	2.	7	3 (sec 2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
12.	1.	7	3 (sec 3-4)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
	2.	7	3 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
13.	1.	7	4 (sec 1-2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
	2.	7	4 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
14.	1.	7	5-6	Understanding & Translation of Verses Quiz	Past Tense صيغة المتكلم والمخاطب عبدتُ ، عبدتَ
	2.	7	7	Understanding & Translation of Verses	Past Tense صيغة المؤنث للغائب عبدَتْ
15.	1.	7	8	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول للمفرد
	2.	7	9	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول الجمع
16.	1.	8	1-4	Understanding & Translation of Verses	Imperative Verb for singular فعل الأمر للمفرد
	2.	7	5-8	Understanding & Translation of Verses	Imperative Verb for plural فعل الأمر للجمع

IDEOLOGY AND CONSTITUTION OF PAKISTAN

Course Description: This course provides a comprehensive overview of Pakistan's political and constitutional history, focusing on its formation, ideology, and the development of its legal and political structures. It starts with the Muslim community in India and examines pre-partition constitutional history, emphasizing the two-nation theory and its role in Pakistan's creation. Students will analyze the ideology of Pakistan and its significance in the constitution-making process, including a study of the 1973 Constitution and its amendments. Key topics include the distribution of state powers, fundamental rights, and policy principles to enable the citizens of Pakistan to function in a socially responsible manner. The course also covers the evolution of rights-based laws. By the end, students will gain a nuanced understanding of Pakistan's political history, constitutional framework, and relevance in shaping governance and legal systems.

Course Learning Outcomes:

• Analyze the role of distinct Muslim identity in the political struggle of Indian Muslims.
• Examine Two Nation Theory and ideology of Pakistan from a historical perspective.
• Analyze and demonstrate an understanding of the fundamental rights, principles of policy, and
responsibilities by commenting on contemporary issues.
• Examine the constitutional framework and its significance in shaping governance and the legal
system.

UNIT OUTCOMES

Unit I Historical Perspective

At the end of this unit, students will be able to
1. Identify the significant aspects of the Muslim community in India
2. Explain the British colonialism and governance system.

Unit II Nation, Nationality, and the Two-Nation Theory

At the end of this unit students will be able to:
1. Identify the relevance between the constitutional changes and the participation of the people of India in politics.
2. Analyze how events moved towards the idea of a separate Muslim State.
3. Discuss the role of the two-nation theory in the political struggle of Muslims.
4. Analyze the nature of the conflict between Congress and the Muslim League.

Unit III Ideology of Pakistan

At the end of this unit students will be able to:
1. Define the concept of ideology and its importance and significance.
2. Discuss the ideology of Pakistan.
3. Examine the contributions of the founding fathers and different segments of society in the Pakistan movement.

Unit IV Constitutional and Political Development

At the end of this unit, students will be able to

1. Explain the need and importance of the Constitution for a state.
2. Elaborate the history of the constitution-making process.
3. Identify the role of Ideology in the constitution-making process in Pakistan.
4. Discuss the ideological elements in the constitution of Pakistan.

Unit V Constitution of 1973 and State Structure

At the end of this unit students will be able to:

1. Identify the parts and chapters of the Constitution of Pakistan 1973
2. Highlight the salient features of the constitution of Pakistan 1973.
3. Explain the basic components of the governance system in Pakistan.
4. Distribution of powers between federal and provincial government

Unit VI Constitutional Amendments

At the end of this unit students will be able to:

1. Reflect on the procedure for constitutional amendments
2. Discuss the constitutional amendments
3. Examine the significant aspects of the constitutional amendments i.e. 18th amendment and 26th
amendments.

Unit VII Fundamental Rights, Principles of Policy and Responsibilities

At the end of this unit students will be able to:

1. Comment on the significance of the fundamental rights of the citizens
2. Demonstrate an understanding of the fundamental human rights (Articles 8-28) guaranteed in the constitution of Pakistan 1973
3. Reflect on the Principles of Policy (Articles 29-40).
4. Identify the responsibilities of the citizen of Pakistan (Article 5)

Unit VIII Rights-Based Laws

At the end of this unit students will be able to:

1. Recognize the movements based on rights.
2. Discuss the human rights-based laws in Pakistan.
3. Identify the challenges in achieving fundamental rights.

ENGLISH II

Course Objectives

Enhance language skills, develop critical thinking, and equip medical students with advanced academic research writing, technical reporting, and formal presentation expertise.

Course Learning Outcomes (CLOs)

1. Formulate well-structured academic essays, proposals, and scientific research papers with clarity and precision.

2. Draft technical medical reports, progress reports, and formal documentation adhering to scientific standards.

3. Demonstrate advanced presentation skills using visual tools and structured delivery methods.

4. Critically analyze and evaluate academic literature and technical documents.

Course Contents

1. Advanced Essay Writing & Rhetorical Modes

• **Descriptive Writing:** Detailed observation and sensory descriptions in medical context.

• **Narrative Writing:** Case history presentation and chronological event structuring.

• **Discursive Writing:** Balanced evaluation of topics, medical ethics, and multi-perspective reasoning.

• **Argumentative Writing:** Constructing logical arguments, evidence-based reasoning, and counter argumentation.

2. Academic & Research Writing

• **Research Proposals:** Structuring proposals for research papers, term papers, and grant applications.

• **Research Paper Writing:** Title, abstract, introduction, literature review, methodology, results, discussion, and conclusion (IMRaD format).

• **Style & Mechanics:** Scientific style, academic tone, clarity, conciseness, consistency, citations, and referencing.

3. Technical & Progress Report Writing

• **Technical Report Writing:** Structure, data presentation, charts/tables analysis, and medical technical reports.

• **Progress Report Writing:** Project monitoring, clinical milestone reporting, and updates writing.

4. Presentation Skills & Critical Reading

• **Advanced Presentation Delivery:** Structuring technical slides, managing Q&A sessions, visual
communication, and scientific seminars.

• **Extensive Reading & Vocabulary Building:** Critical reading of scientific journals, literature reviews, and vocabulary enhancement.

Recommended Books & Reading Material

• **Technical Writing & Academic Essay Writing:** Writing (Advanced) by Ron White (Oxford Supplementary Skills - particularly suitable for discursive, descriptive, argumentative, and report writing).

• **College Writing:** College Writing Skills by John Langan (McGraw-Hill Higher Education).

• **Patterns of College Writing:** Patterns of College Writing by Laurie G. Kirszner and Stephen R. Mandell (St. Martin's Press).

• **Presentation & Literature Reading:** The Mercury Reader: A Custom Publication (Compiled by Northern Illinois University; Editors: Janice Neulib, Kathleen Shine Cain, Stephen Ruffus, Maurice Scharton)

ISLAMIC STUDIES-II

Objectives: This course is aimed at:

1. To provide basic information about Islamic Studies
2. To enhance understanding of the students regarding Islamic Civilization
3. To improve students' skill to perform prayers and other worships
4. To enhance the skill of the students for understanding of issues related to faith and religious life

Detail of courses

Introduction to Islamic law & jurisprudence

1) Basic concepts of Islamic law & jurisprudence
2) History & importance of Islamic law & jurisprudence
3) Sources of Islamic law & jurisprudence
4) Nature of differences in Islamic law
5) Islam and sectarianism

Islamic culture and civilization

1) Basic concepts of Islamic culture & civilization
2) Historical development of Islamic culture and civilization
3) Characteristics of Islamic culture and civilization
4) Islamic culture and civilization and contemporary issues

Islam & Science

1) Basic concepts of islam and science
2) Contributions of muslims in development of science
3) Quranic and science

Islamic economic system

1) Basic concepts of Islamic economic system
2) Means of distribution of wealth in Islamic economics
3) Islamic concept of riba
4) Islamic ways of trade and commerce

Political system of Islam

1) Basic concepts of Islamic political system
2) Islamic concept of sovereignty
3) Basic institutions of Govt in islam

Islamic history

1) Period of khlaft-e-rashida
2) Period of ummayyads
3) Period of abbasids

Social system of Islam

1) Basic concepts of social system of islam
2) Elements of family
3) Ethical values of islam

Reference books:

1) Hameed ullah Muhammad, "**Emergence of Islam",** IRI, Islamabad
2) Hameed ullah Muhammad, "**Muslim conduct of state"**
3) Hameed ullah Muhammad, "**Introduction to Islam"**
4) Mulana Muhammad Yousaf Islahi
5) Hussain hamid hassan, "**An introduction to the study of Islamic law"** leaf publication Islamabad, Pakistan.
6) Ahmad hasan, principles of Islamic jurisprudence, Islamic research Institute, international Islamic university, Islamabad, 1993
7) Mir Waliullah, muslim jurisprudence and the quranic law of crimes Islamic book service 1982
8) H.S. Bhatia, Studies in Islamic law, religion and society, deep and deep Publications new delhi 1989
9) Dr. Muhammad Zia – ul – haq, Introduction to Al Sharia Al islamia, Allama Iqbal Open University, Islamabad 2001

ANNUAL EXAMINATION ASSESMENT

MBBS ASSESMENT STRUCTURE (THEORY) LUMHS

No.	Scoring Parameter	Marks in %
01	Main Examination Portion / BCQ's	80 %
02	**Internal Evaluation** Attendance as following **05 Marks** Above 90% = 5, 89-80%= 4, 79-70%=3, 65-70%=2 Below 65%=00 Module Tests (BCQ's) **15 Marks**	20 %
03	**TOTAL**	**100 %**

MBBS ASSESMENT STRUCTURE
(PRACTICAL-FIRST TO FOURTH PROFESSIONAL) LUMHS

No.	Scoring Parameter	Marks in %
01	Main Examination Portion / OSPE and VIVA Static Stations and interactive/ viva stations	80 %
02	**Internal Evaluation** Research **05 Marks** Practical Books **02 Marks** Module Tests (OSPE/VIVA)**13 Marks**	20 %
03	**TOTAL**	**100**

MBBS ASSESMENT STRUCTURE
(PRACTICAL-FINAL PROFESSIONAL) LUMHS

No.	Scoring Parameter	Marks in %
01	Main Examination Portion / OSCE and VIVA Static Stations and clinical Viva at wards	80 %
02	**Internal Evaluation** Research **05 Marks** log Books **02 Marks** Module Tests (OSCE/VIVA)**13 Marks**	20 %
03	**TOTAL**	**100**

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

Annexure

Policy for Electives

Introduction:

The undergraduate medical program (MBBS) aims to develop healthcare providers who provides care to community at large. It also envisages the student as a future scholar, specialist, researcher and scientist.

An elective permits the students to think of a career beyond examinations and offers students a stimulus to think laterally and creatively besides laying down the foundation for future professional pathways. It also lets the students to match their aspirations with the ground reality in a field of their dreams being a health care professional.

Pakistan Medical & Dental Council recommends to develop medical college's policy on electives for undergraduate medical students, implement it, monitor it and maintain the record of the students selected the electives and evaluate the elective program.

Liaquat University of Health Sciences (LUMHS) Jamshoro, Sindh follows the guiding principles of Higher Education Commission (HEC) of Pakistan and Pakistan Medical & Dental Council (PMDC) and has developed the policy on electives for undergraduate medical students and incorporated in undergraduate medical curriculum.

I. Policy on Electives

a. Definition of elective:

An elective is a learning experience created in the undergraduate medical curriculum to provide an opportunity for the learner (student) to explore, discover and experience areas or streams of his/her interest.

b. Objectives of elective

The objectives of electives are to provide the learner (student) opportunities: 1) for diverse learning experiences and to conduct research or community or institutional project that stimulates inquiry-based learning, self-directed learning, lateral thinking and thinking out of the box.

c. Duration of elective:

Duration for 2 electives is Six-eight weeks (3-4 weeks for each); the duration must be put in the time schedule for elective rotations.

d. Time of electives in Phase of MBBS Curriculum:

After completion of summative (University) examination of third year MBBS, each students have to complete 2 electives.

e. Elective a Compulsory part of course:

It is mandatory for the students to do electives.

f. Departments for electives:

Electives will be done in Pre-clinical, Para clinical and Clinical department

g. Structure of Electives:

1. There are two slabs of electives
2. The learner has to rotate through two elective slabs; each slab is of 3-4 weeks.
3. Focus of slab one is on pre-clinical and para-clinical subjects and two on clinical subjects.
4. Institutions selected for electives, nature of elective, number of students in each elective, name of supervisors and available resources will be determined 6-8 weeks ahead of schedule.
5. The list for the choice of electives will be made available six months ahead of schedule of electives.
6. The students fill the log book meant for electives and get it signed from the supervisor (internal, external if any) after completion of elective in one slab.
7. Ninety percent attendance must be ensured in each elective.
8. Learning must be focused on all three domains of learning, cognitive, psychomotor and affective.

h. Electives Slabs

Slab one	**Slab two**
Pre-Clinical and Para-clinical	***Clinical***
Experiential learning in any laboratory Pathology, Microbiology, Biochemistry, Molecular Biology, Genetics, Immunology.	**Community Experiential Learning** Care at Rural Health Centre level Care at Basic Health Units Care at Specialized clinics in community such as Diabetic Clinic
Other experiential learnings Pharmacovigilance and clinical pharmacology Infection Control Program Activities in Hospital	**Hospital Experiential Learning** Emergency care in emergency Intensive care in ICU or HDU Outpatient care any of the clinical sciences departments for 3-4 weeks
Research Activities Students initiated research Participation in faculty research Surveys: Community or epidemiological	**Others** Rehabilitation and palliative Care Sports Medicine Clinical Ethics CPR
Community Experiential Learning School Health Program Immunization Program Maternal and Child Health Program Other National Health Programs such TB Control, Tobacco Control	
Others Bio informatics Artificial Intelligence in Healthcare	

i. Template to be used for planning electives

Item	Response
Name of Slab	
Name of elective	
Place where elective will be done	
Name of Internal Supervisor	
Name of External Supervisor	
Learning Objective/s of the elective	
Number of students to be accommodated at the designated place	
Pre-requisite for the elective	
Learning resource to be utilized by the students	
Logbook/Portfolio entry	
Assessment	
Any other	

j. Obligation of Faculty Members/mentors

- The faculty members/mentors shall counsel the students to help students select desired electives.
- The faculty members/mentors must ascertain a student's expectation must be met from the selected electives.
- The faculty members/mentors must make aware students of the rules regarding attendance, work schedule, documentation and assessment requirements for each elective.

k. Obligation of In-charge of electives program

The allocation of electives shall be done based on the student's choice and availability of rotation by the faculty who have been identified to be in-charge of the electives program, for each slab in consultation with overall in-charge of elective program.

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l. Reflective Report on Elective:

Each student has to prepare 3-4 pages reflective report on elective. The font size will be 12 in Times New Roman. Student can include 1-2 photos of activities done during elective.

m. Evaluation of Electives Program

It is to be done every year by the independent team.

II. Conclusion:

Experiential learning through electives is essential for adult learner. This program helps in grooming of the students and permit students to reflect, plan and grow their career.

THE END