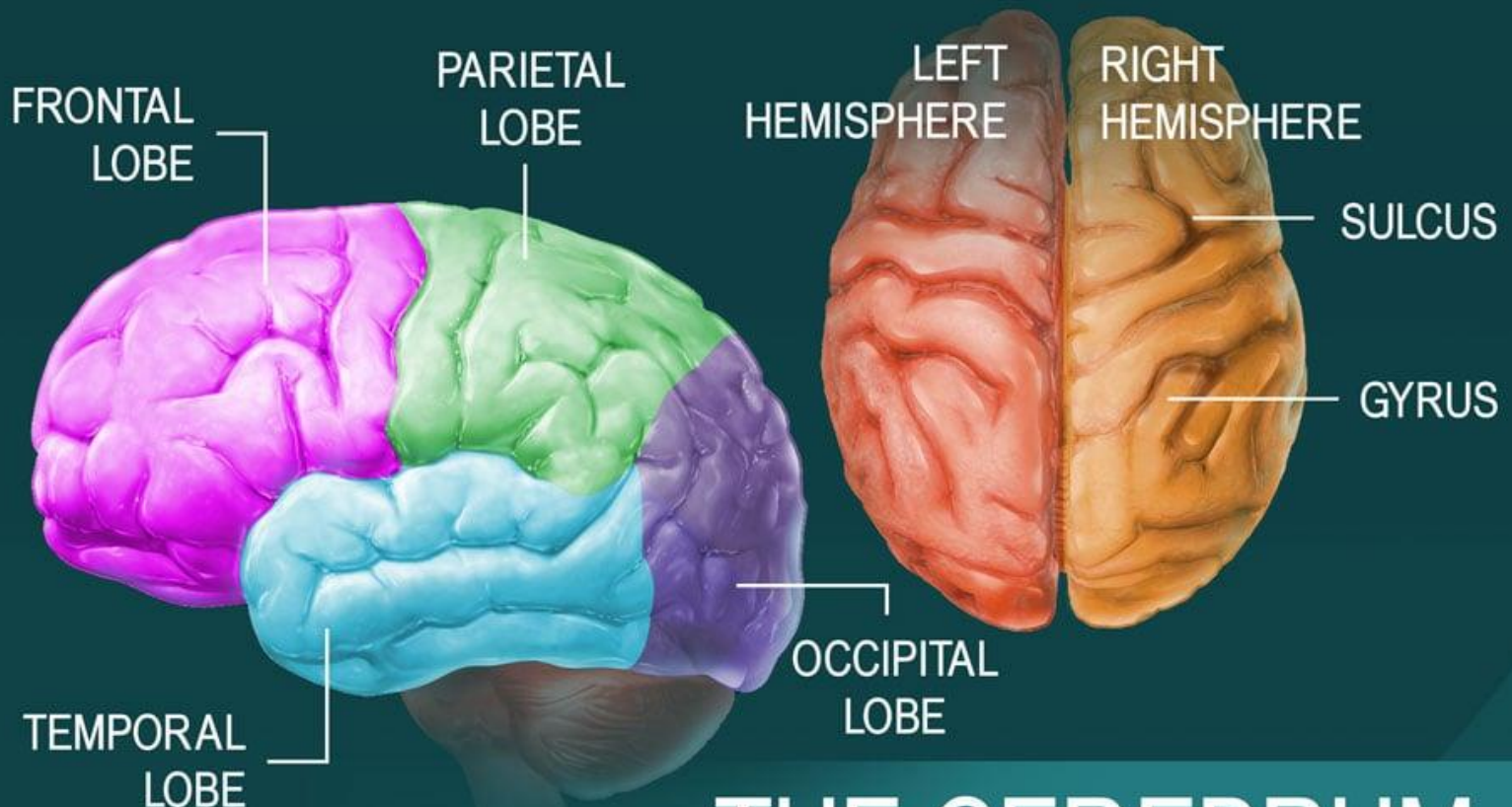
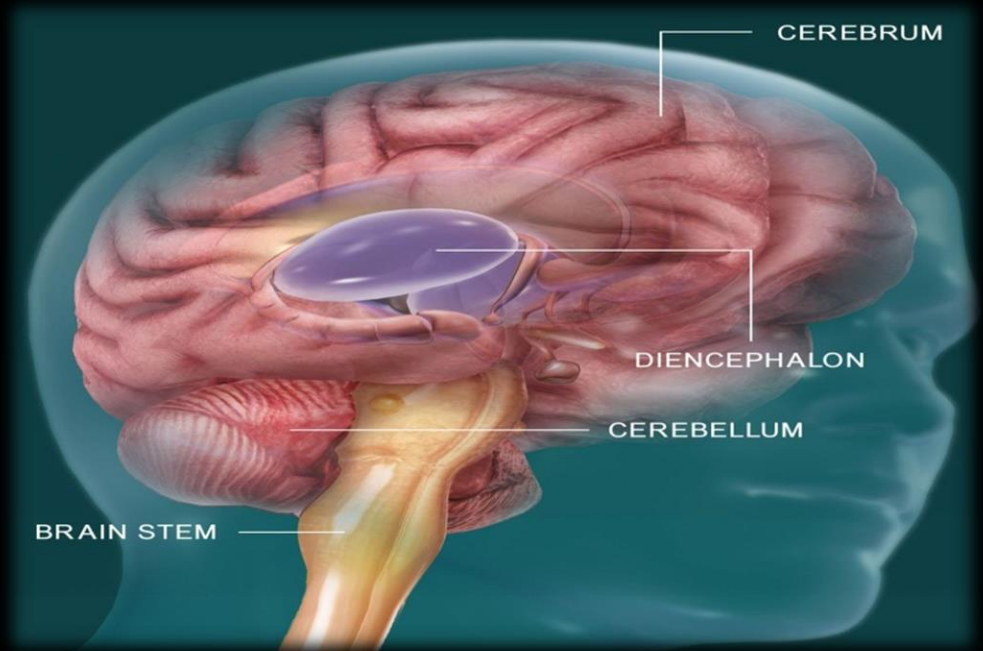


Study Guide – Second Year MBBS

23rd February – 15th April 2026

Duration: 7 weeks

Neuroscience-1 Module



THE CEREBRUM



LIAQUAT NATIONAL HOSPITAL AND MEDICAL COLLEGE

Institute for Postgraduate Medical Studies & Health Science



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Module name: *Neurosciences -I* Year: *Two* Duration: *7 weeks (23rd February to 15th April 2026)*

Timetable hours: **Interactive Lectures, Case-Based Learning (CBL), Practical, Skills, Self-Directed Learning**

MODULE INTEGRATED COMMITTEE

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CO-COORDINATOR		
Dr. Nimra Akhtar (Community Medicine)		
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BIOCHEMISTRY	NEUROMEDICINE	
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PHYSIOLOGY	RADIOLOGY	
Professor Syed Hafeezul Hassan	Professor Muhammad Ayub Mansoor	
PHARMACOLOGY	FAMILY MEDICINE	
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LNH&MC MANAGEMENT		
Professor KU Makki, Principal LNH&MC		
STUDY GUIDE COMPILED BY: Department of Health Professions Education		

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

- Inform the students how the student learning program of the module has been organized
- Help students organize and manage their studies throughout the module
- Guide students on assessment methods, rules, and regulations

THE STUDY GUIDE:

- Communicates information on the organization and management of the module. This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as lectures, small group teachings, clinical skills, demonstration, tutorial, and case-based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources such as books, computer-assisted learning programs, web- links, and journals for students to consult to maximize their learning.
- Highlights information on the contribution of continuous 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.
- Focuses on information about examination policy, rules, and regulations.

CURRICULUM FRAMEWORK

Students will experience an integrated curriculum similar to previous modules.

INTEGRATED CURRICULUM comprises system-based modules such as Head and Neck, Nervous system Endocrinology, Reproductive and Renal which links basic science knowledge to clinical problems. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have a better understanding of basic sciences when they repeatedly learn about clinical examples.

Case-based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of the integrated teaching program

LEARNING METHODOLOGIES

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

- Interactive Lectures
- Small Group Discussion
- Case-Based Learning
- Practicals
- Skills session
- Self-Directed Learning

INTERACTIVE LECTURES

In the large group, the lecturer introduces a topic or common clinical conditions and explains the underlying phenomena through questions, pictures, and videos of patients' interviews, exercises, etc. Students are actively involved in the learning process.

SMALL GROUP DISCUSSION: This format helps students to clarify concepts and acquire skills or attitudes. Sessions are structured with the help of specific exercises such as patient cases, interviews, or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials, and self-study. The facilitator's role is to ask probing questions, summarize, or rephrase to help clarify concepts.

CASE-BASED LEARNING: A small group discussion format where learning is focused on a series of questions based on a clinical scenario. Students discuss and answer the questions by applying relevant knowledge gained in clinical and basic health sciences during the module.

PRACTICAL: Basic science practicals related to anatomy, biochemistry, pathology, pharmacology, and physiology are scheduled for student learning.

SKILLS SESSION: Skills relevant to the respective module are observed and practiced where applicable in the skills laboratory or Department of Physiotherapy.

SELF-DIRECTED LEARNING: Students assume responsibilities for their learning through individual study, sharing and discussing with peers, and seeking information from Learning Resource Center, teachers, and resource persons within and outside the college. Students can utilize the time within the college's scheduled hours of self-directed learning.

MODULE: NEUROSCIENCES -I

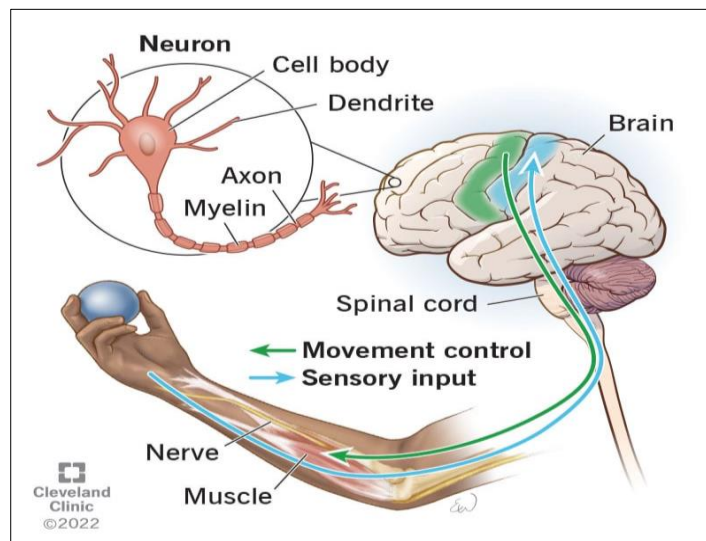
INTRODUCTION

Neuroscience is the study of the nervous system. It is a cross-disciplinary field that engages in investigating how the nervous system develops and functions on a cellular level as well as the mechanisms that underlie neurological disease. This module combines breadth of exposure to the field as a whole with the opportunity for depth of experience in one of three central domains of neuroscience: Cellular and Systems, Functional and Integration, and Clinical Neurosciences.

When someone in the neighborhood develops a stroke and the family wants to know what more can be done to improve the patient's lifestyle, or what are the chances his /her children will have a stroke, it is our primary responsibility as future doctors to know not just the treatment but also preventive strategies for a healthy living.

Importance of Neurosciences -I

Through this module, you will develop integrated, scientific knowledge that you can put into practice in a clinical setting, plus creative and problem-solving skills. These key skills will prepare you for a career helping to progress scientific discovery into clinical and medical practice, ultimately improving human health.



COURSE OBJECTIVES AND STRATEGIES

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

ANATOMY	
1. General organization & Histology of the Nervous system, different types of nerve tissue cells (Neurons & Neuroglia)	
<input type="checkbox"/> Explain the general components of nervous system.	Interactive Lecture
<input type="checkbox"/> Discuss the division of the nervous system into CNS, ANS & PNS.	
<input type="checkbox"/> Discuss the structural/ cellular organization of the nervous system.	
<input type="checkbox"/> Classify the types of neuron & neuroglia.	
<input type="checkbox"/> Describe the structure of neuron & neuroglia.	
2. Development of Brain and Spinal cord & anomalies (Embryology)	
<input type="checkbox"/> Describe the formation of primary & secondary vesicles and flexures.	Interactive Lecture
<input type="checkbox"/> Relate the components of ventricular system with the cavities of secondary vesicles.	
<input type="checkbox"/> Describe the differentiation of the layers from neuroepithelium in primitive spinal cord.	
<input type="checkbox"/> Describe derivation of alar & basal plates, neuron and neuroglia cells.	
<input type="checkbox"/> Discuss positioning of spinal cord.	
<input type="checkbox"/> Describe the congenital anomalies of spinal cord viz. Spina bifida occulta, spina bifida cystica, Myeloschisis.	
3. Gross External features of the spinal cord	
<input type="checkbox"/> Discuss the extent (starting & terminating point) of the spinal cord	Interactive Lecture
<input type="checkbox"/> Describe the gross features of spinal cord and its blood supply.	
<input type="checkbox"/> List the regional enlargements of the spinal cord.	
4. Histology of spinal cord	
<input type="checkbox"/> Discuss the microscopic structure of spinal cord.	Interactive Lecture
<input type="checkbox"/> Compare the sections at different segmental levels (cervical, thoracic)	
5. Internal features of spinal cord I- (Ascending tracts)	
<input type="checkbox"/> Discuss the internal features of the spinal cord, gray (groups) & white (columns) matter.	Interactive Lecture
<input type="checkbox"/> Discuss 1st, 2nd & 3rd order neurons of sensory pathway.	
<input type="checkbox"/> Discuss in detail the ascending (sensory) tracts of the spinal cord and their lesions.	
6. Internal features of spinal cord II- (Descending tracts)	
<input type="checkbox"/> Discuss in detail the descending (motor) tracts of the spinal cord.	Interactive Lecture
<input type="checkbox"/> Relate the lesions of descending tracts.	

7. Development of forebrain (Embryology)	
<input type="checkbox"/> Discuss the process of development of the forebrain and its anomalies.	Interactive Lecture
8. Development of midbrain & hindbrain (Embryology)	
<input type="checkbox"/> Discuss the process of development of the midbrain & hindbrain and their anomalies.	Interactive Lecture
9. Blood supply (arterial supply & venous drainage) of the spinal cord and clinical manifestation of ischemia	
<input type="checkbox"/> Describe the Vertebral Systems of arteries.	Interactive Lecture
<input type="checkbox"/> Describe the area of spinal cord supplied by different branches.	
<input type="checkbox"/> Discuss the role of radicular and feeder arteries.	
<input type="checkbox"/> Describe the venous drainage of spinal cord.	
<input type="checkbox"/> Describe the clinical consequences of ischemia of the spinal cord	
10. Gross anatomy of Cerebellum	
<input type="checkbox"/> Describe the gross anatomy of the cerebellum location, structural & functional division (lobes) and its blood supply.	Interactive Lecture
<input type="checkbox"/> Discuss various terms like folia, vermis, tracts, and nuclei of the cerebellum	
<input type="checkbox"/> Relate the clinical conditions associated with cerebellar dysfunction.	
11. Histology of Cerebellum	
<input type="checkbox"/> Describe the layers of cerebellar cortex.	Interactive Lecture
<input type="checkbox"/> Describe the cellular organization in each layer.	
12. Diencephalon I- Thalamus	
<input type="checkbox"/> Describe the gross features, boundaries and division of diencephalon and its blood supply.	Interactive Lecture
<input type="checkbox"/> Describe the gross features and relations of Thalamus.	
<input type="checkbox"/> Discuss the functions, nuclei, and connections of the thalamus.	
<input type="checkbox"/> Discuss the clinical conditions associated with the thalamus	
13. Diencephalon II- Sub thalamus, Hypothalamus & Epithalamus	
<input type="checkbox"/> Briefly describe the structure, division, and boundaries of the diencephalon	Interactive Lecture
<input type="checkbox"/> Discuss the functions, nuclei, and connections of the subthalamus, hypothalamus & Epithalamus.	
<input type="checkbox"/> Discuss the lesions of the subthalamus, hypothalamus & Epithalamus.	
14. Limbic system & Reticular formation	
<input type="checkbox"/> Describe the various parts of limbic system.	Interactive Lecture
<input type="checkbox"/> Describe the hippocampus formation	
<input type="checkbox"/> Discuss the disorders of the limbic system	

15. Basal ganglia & its nuclei	
<input type="checkbox"/> Describe the location and components of basal ganglia and their blood supply.	Interactive Lecture
<input type="checkbox"/> Discuss the connections and functions of basal ganglia and its nuclei	
<input type="checkbox"/> Discuss the lesions of basal ganglia & its nuclei	
16. Histology of cerebrum	
<input type="checkbox"/> Describe the layers of cerebral cortex.	Interactive Lecture
<input type="checkbox"/> Discuss the variation of layers in different cortical regions.	
<input type="checkbox"/> Describe the types of neurons and fibers distributed in different layers.	
17. White matter of cerebrum I- Projection fibers and Internal capsule	
<input type="checkbox"/> Discuss the basic concepts of the white matter of the cerebrum.	Interactive Lecture
<input type="checkbox"/> Describe the location, parts, connections, and relations of the internal capsule and its blood supply.	
<input type="checkbox"/> Discuss the common lesion associated with the internal capsule.	
18. White matter of cerebrum II- Commissural & Association fibers	
<input type="checkbox"/> Discuss the commissural fibers and their connections	Interactive Lecture
<input type="checkbox"/> Describe the corpus callosum and its parts.	
<input type="checkbox"/> Explain the association fibers and their connections	
<input type="checkbox"/> Discuss the common lesions associated with commissural and association fibers.	
19. Meninges of the brain & spinal cord	
<input type="checkbox"/> List the meninges of the brain & spinal cord	Interactive Lecture
<input type="checkbox"/> Describe the Dural layers, folds, extensions and spaces (subdural etc.)	
<input type="checkbox"/> Discuss pia mater and its modifications (ligamentum denticulatum, tela choroidea).	
<input type="checkbox"/> Describe the arachnoid mater, subarachnoid space and cisterns.	
<input type="checkbox"/> Describe the blood and nerve supply of meninges	
20. Dural venous sinuses	
<input type="checkbox"/> Describe the location, relations, and drainage of dural venous sinuses of the brain	Interactive Lecture
<input type="checkbox"/> Describe the contents of cavernous sinus and extra cranial communication.	
<input type="checkbox"/> Discuss the clinical importance of different sinuses.	
21. Autonomic nervous system I (Sympathetic)	
<input type="checkbox"/> Describe the divisions of ANS (sympathetic & parasympathetic).	Interactive Lecture
<input type="checkbox"/> Describe the components of sympathetic nervous system	
22. Autonomic nervous system II (Para sympathetic)	
<input type="checkbox"/> Discuss the components of parasympathetic part of nervous system	Interactive Lecture

<input type="checkbox"/> List the parasympathetic ganglia	
<input type="checkbox"/> Describe the pathways of pre and post-ganglionic parasympathetic fibers	
<input type="checkbox"/> Differentiate between the parasympathetic and sympathetic systems on the basis of structure and function	
23. Skull as whole, vault of skull + Anterior cranial fossa	
<input type="checkbox"/> Describe the gross anatomy of skull.	Tutorial
<input type="checkbox"/> Discuss the sutures of skull.	
<input type="checkbox"/> Discuss different views (normal) of skull	
<input type="checkbox"/> Discuss the division of the cranial cavity	
<input type="checkbox"/> Describe the boundaries, bony prominences, and foramina of the anterior cranial fossa	
24. Middle & Posterior cranial fossa	Tutorial
<input type="checkbox"/> Describe the boundaries, bony prominences, and foramina of the anterior cranial fossa	
25. Spinal cord lesions, transection & spinal shock	
<input type="checkbox"/> Discuss the lesions of anterior & posterior nerve roots	Tutorial
<input type="checkbox"/> Elaborate on the lesions of ascending & descending tracts	
<input type="checkbox"/> Discuss the mechanism & consequences of tabes dorsalis, spinal shock syndrome, Brown Sequard syndrome, poliomyelitis, syringomyelia	
26. Brainstem I- Medulla Oblongata	
<input type="checkbox"/> Enumerate the parts of brainstem.	Tutorial
<input type="checkbox"/> Describe the gross anatomical features of Medulla Oblongata its blood supply.	
<input type="checkbox"/> Discuss in detail the internal features of Medulla Oblongata.	
<input type="checkbox"/> List the cranial nerves emerging from the medulla oblongata.	
<input type="checkbox"/> Discuss the clinical conditions associated with the medulla oblongata	
27. Brainstem II- Pons	
<input type="checkbox"/> Describe the location of Pons with respect to the brainstem	Tutorial
<input type="checkbox"/> Discuss the external & internal features of Pons and its blood supply.	
<input type="checkbox"/> Discuss the relation of Pons with the 4th ventricle	
<input type="checkbox"/> List the cranial nerves emerging from Pons	
<input type="checkbox"/> Discuss the clinical conditions associated with Pons	
28. Brainstem III- Midbrain	
<input type="checkbox"/> Describe the location of the midbrain with respect to the brainstem	Tutorial
<input type="checkbox"/> Discuss the external & internal features of the midbrain with its supply.	
<input type="checkbox"/> Discuss the relation of Pons with cerebral aqueduct	
<input type="checkbox"/> List the cranial nerves emerging from the midbrain	
<input type="checkbox"/> Discuss the clinical conditions associated with midbrain	

29. Gross anatomy of Cerebrum (external features, surfaces, gyri & sulci)	
<input type="checkbox"/> Discuss the gross anatomical features of the cerebrum (surfaces, borders, poles, lobes, sulci & gyri)	Tutorial
<input type="checkbox"/> Describe the blood supply of cerebrum.	
30. Functional cortical areas of the cerebrum & their lesions I (Frontal And Occipital)	
<input type="checkbox"/> Identify the anatomical locations and boundaries of the frontal and occipital lobes.	Tutorial
<input type="checkbox"/> Describe the functional areas in the frontal lobe (primary motor cortex, premotor cortex, prefrontal cortex, Broca's area).	
<input type="checkbox"/> Explain the functions of these areas in motor control, speech production, and executive behavior.	
<input type="checkbox"/> Describe the functional areas of the occipital lobe (primary and secondary visual cortices).	
<input type="checkbox"/> Discuss the visual processing pathway and the effects of lesions in the occipital cortex.	
31. Functional cortical area of Cerebrum & their lesions II (Parietal And Temporal)	
<input type="checkbox"/> Identify the anatomical locations and boundaries of the parietal and temporal lobes.	Tutorial
<input type="checkbox"/> Describe the functional areas in the parietal lobe (primary and secondary somatosensory cortex, association areas).	
<input type="checkbox"/> Explain the functional areas in the temporal lobe (primary and secondary auditory cortices, Wernicke's area).	
<input type="checkbox"/> Correlate clinical manifestations with lesions in these cortical areas	
32. Ventricular system I- Lateral ventricle	
<input type="checkbox"/> Describe the ventricles of the brain	Tutorial
<input type="checkbox"/> Discuss the location, boundaries, and relations of lateral ventricles and its blood supply.	
<input type="checkbox"/> Discuss the clinical conditions associated with lateral ventricles	
33. Ventricular system II- 3rd & 4th ventricles and CSF circulation	
<input type="checkbox"/> Describe the structure and location of the 3 rd , and 4 th ventricles and cerebral aqueduct	Tutorial
<input type="checkbox"/> Briefly discuss the normal CSF secretion, circulation & blood-brain barrier	
<input type="checkbox"/> Discuss the applied anatomy of ventricles of the brain and CSF flow	
34. Cranial nerves (I to VI)	
<input type="checkbox"/> Mention the names of all the cranial nerves in sequence.	Tutorial
<input type="checkbox"/> List the location of the cranial nerve nuclei (I to VI).	
<input type="checkbox"/> Discuss their distribution.	
<input type="checkbox"/> Describe the main effects of lesions of cranial nerves.	
35. Cranial nerve nuclei and peripheral distribution with its lesions	
<input type="checkbox"/> List the location of the cranial nerve nuclei (VII to XII).	Tutorial
<input type="checkbox"/> Discuss their distribution.	

<input type="checkbox"/> Describe the main effects of lesions of VII to XII cranial nerves.	
36. Functional cortical areas of cerebellum	Tutorial
<input type="checkbox"/> Discuss the location and lesions of the functional cortical areas of cerebellar cortex.	
37. Blood supply of the brain	
<input type="checkbox"/> Discuss the carotid and vertebral systems of vessels.	
<input type="checkbox"/> List the branches arising from them.	
<input type="checkbox"/> Describe the formation of circle of Willis.	Tutorial
<input type="checkbox"/> Discuss its branches.	
<input type="checkbox"/> Discuss the area of supply of the 3 cerebral arteries.	
<input type="checkbox"/> Discuss the veins of brain and their area of drainage.	
<input type="checkbox"/> Relate the clinical manifestations of ischemia of brain.	
38. Spinal cord and its cut sections (Demonstration on Sectra)	Tutorial
<input type="checkbox"/> Discuss the various cut sections of spinal cord and associated lesions.	
HISTOLOGY	
39. Structure of neuron & neuroglia	
<input type="checkbox"/> Describe the structure of a neuron & neuroglia	
<input type="checkbox"/> List the types and functions of neuron & neuroglia	Practical
<input type="checkbox"/> Discuss the formation of the blood-brain barrier	
<input type="checkbox"/> Identify Observe the histological sections of a neuron & neuroglia under the light microscope	
40. Spinal cord, spinal nerve & ganglia	
<input type="checkbox"/> Identify histological features of the spinal cord, spinal nerve & ganglia under the light microscope	Practical
<input type="checkbox"/> Discuss the histological features of the spinal cord, spinal nerve & ganglia	
41. Microscopic anatomy of cerebellar cortex	
<input type="checkbox"/> Identify the histological features of cerebral cortex under light microscope	Practical
<input type="checkbox"/> Discuss the histological features, layers, cells & nuclei of cerebellum.	
42. Microscopic anatomy of cerebral cortex	
<input type="checkbox"/> Identify the histological features of cerebral cortex under light microscope.	Practical
<input type="checkbox"/> Discuss the histological features, layers, cells & nuclei of cerebrum.	

PHYSIOLOGY	
1. Neurons membrane, generation & propagation of nerve impulse	
Describe the structure and functions of neuron.	Interactive Lecture

Discuss the classification & functions of nerve fibers.	
Describe the threshold & initiation of action potential in neuronal cells.	
2. Synapsis, properties of synapses	
Describe the properties of chemical and electrical synapses.	Interactive Lecture
3. Sensory receptors and neuronal circuits	
Discuss the classification of sensory receptors.	Interactive Lecture
Describe the functions & properties of different types of receptors.	
Explain the properties of different types of neuronal circuit.	
4. Somatic sensations – I	Interactive Lecture
Explain the general organization of somatic sensation: tactile and position senses	
Discuss the dorsal-column medial lemniscal pathway	
5. Somatic sensations – II	Interactive Lecture
Discuss the anterolateral –pathway	
Describe the mechanism of thermal receptors & their excitation.	
6. Physiology of pain – I & headache	Interactive Lecture
Discuss the types of pain (slow & fast) and their characteristics.	
Explain the mechanism of stimulation of pain receptors.	
Discuss the clinical abnormalities of pain: hyperalgesia, headache & its causes.	
7. Physiology of pain II- Brain analgesic system	Interactive Lecture
Explain the brain analgesic system.	
Discuss the brain’s opiate system..	
Discuss visceral & referred pains	
8. Spinal cord and reflexes	Interactive Lecture
Describe the motor function of spinal cord.	
Explain the structure and function of muscle spindle.	
Discuss the muscle, stretch reflex and its clinical applications.	
9. Muscles proprioceptors (muscle spinal & Golgi tendon organ)	Interactive Lecture
Discuss the mechanism of flexor reflex, crossed extensor reflex, scratch reflex, postural and locomotive reflexes.	
Discuss spinal cord transection and spinal shock (Brown-Sequard syndrome).	
Explain the mechanism of Golgi tendon reflex& its significance in controlling motor activities.	

10. Somatosensory cortex	
Describe various areas of cortex and their associated functions.	Interactive Lecture
Discuss the functional importance of somatosensory association areas.	
Define amorphosynthesis.	
11. Function of brain stem	
Explain the role of brain stem nuclei in controlling motor functions.	Interactive Lecture
Discuss the vital and non- vital functions of brain stem (respiratory, cardiac, vasomotor centers & coughing, sneezing & vomiting reflexes)	
12. Cerebellum and its functions	
Explain the functional areas of cerebellum.	Interactive Lecture
List the functions of Vermis, Intermediate zone and lateral zone of cerebellum.	
13. Neuronal circuits of cerebellum and associated disorders	
Discuss the afferent and efferent pathways of cerebellum.	Interactive Lecture
Describe the functions of Purkinje cells and deep cerebellar nuclei.	
Explain the abnormalities associated with cerebellar lesion.	
14. Vestibular system and maintenance of equilibrium	
State the components of vestibular system.	Interactive Lecture
Explain the functions of the vestibular system.	
Discuss the role of utricle & saccule in static equilibrium.	
Discuss the role of semicircular Ducts in Angular Acceleration.	
15. Functions of diencephalon	
Discuss the function of thalamus and its nuclei.	Interactive Lecture
Explain the functions of various nuclei of epithalamus and hypothalamus.	
16. Regulation of body temperature and fever	
Distinguish between skin temperature and core temperature.	Interactive Lecture
Describe the following mechanisms of heat loss from the body; conduction, convention, radiation and evaporation.	
Explain the role of anterior and posterior hypothalamus in regulation of body temperature.	
Elaborate “set-point” of temperature control mechanisms and the role of pyrogens in altering the set point to cause fever.	
17. Limbic system and hypothalamus	
Describe the functional areas of limbic system.	Interactive Lecture
Discuss the role of hypothalamus, hippocampus and amygdala in limbic system.	
Discuss the importance of reward and punishment centers in learning and memory.	

Discuss the effects of Kluver – Bucy syndrome	
18. Basal ganglia and its nuclei	
Explain the functions of caudate & putamen pathways.	
List the functions of specific neurotransmitters of basal ganglial system.	
Explain the disorders associated with basal ganglia (hypokinetic and hyperkinetic)	Interactive Lecture
19. Motor cortex, pyramidal tract, Upper and lower Motor Neurons	
Explain the functions of pyramidal tract.	
List the functions of specific cortical areas.	
Differentiate between upper & lower motor neuron lesions (UMN & LMN).	Interactive Lecture
20. Physiology of sleep & sleep disorders	
Explain the physiology of slow-wave sleep & rapid eye movement (REM) sleep	Interactive Lecture
Explain the basic theories of sleep & origin of brain waves.	
21. Learning and memory	
Determine the role of cerebral cortex in higher intellectual functions	
Classify the different types of memories.	Interactive Lecture
22. CSF: formation, circulation & function	
Describe the mechanism of CSF formation, circulation & function	Interactive Lecture
23. Autonomic Nervous System-I	
Explain the functional division of Autonomic Nervous System.	Interactive Lecture
Discuss the organization of sympathetic & parasympathetic nervous system, their neurotransmitters and receptors in body systems.	
24. Autonomic Nervous System-II	
Explain the effect of sympathetic and parasympathetic nervous system on various organs.	Interactive Lecture
Discuss various abnormalities caused by activation of sympathetic and parasympathetic nervous system.	
25. Speech & its disorders	Interactive Lecture
Explain the physiology of speech and associated disorders	
26. Migraine	
Describe the characteristics of migraine headache.	Tutorial
Identify risk factors of migraine exacerbation.	
Discuss the term aura and its symptoms.	
Differentiate between migraine and another types of headache.	

27. Cerebrovascular accident/ stroke	
Define the terms cerebrovascular accident and coma.	Tutorial
List the risk factors for occurrence of stroke.	
Discuss the effects of upper motor neuron lesion occurring in stroke.	
28. Hydrocephalus	
Define hydrocephalus.	Tutorial
List causes of hydrocephalus.	
Describe the different types of hydrocephalus	
29. Examination of Superficial reflexes	
Perform superficial reflexes viz. Corneal reflexes, Abdominal reflexes & Plantar reflexes.	Practical
Describe their significance in different neurological disorders.	
30. Examination of Deep reflexes	
Perform deep reflexes: Bicep reflex, tricep reflex, knee jerk, ankle jerk, brachioradialis reflex.	Practical
Describe their significance in upper and lower motor neuron lesions.	
31. Cerebellar function tests	
Perform cerebellar function tests.	Practical
Identify disorders of cerebellar function.	
32. Body temperature	
Determine body temperature by using an oral mercury thermometer.	Practical
Describe the other routes of body temperature measurement (axillary, tympanic and rectal route)	
33. EEG	
Record Electroencephalogram with the help of power lab.	Practical
Interpret the given EEG.	
34. Examination of Cranial Nerve (CN I – CN VI)	
Perform different tests for examination of the cranial nerves I-VI.	Practical
35. Examination of Cranial Nerve (CN VII – CN XII)	
Perform different tests for examination of the cranial nerves I-VI.	Practical

BIOCHEMISTRY	
1. Lipids of the nervous system: Chemistry of Brain Lipids	

Classify brain lipids with examples.	Interactive Lecture
Explain the chemistry of brain lipids.	
Describe the chemical composition and functions of myelin.	
Discuss the clinical significance of lipid storage diseases.	
2. Blood Brain Barrier	
Define Blood Brain Barrier.	Interactive Lecture
State the biochemical composition of the Blood Brain Barrier.	
Explain the functions of the Blood Brain Barrier.	
Explain the impact of Blood Brain Barrier disruption.	
Discuss the clinical disorders associated with Blood Brain Barrier disruption.	
3. Cerebrospinal fluid	
Describe the chemical composition of CSF and its functions.	Interactive Lecture
Explain the mechanism of production, route of flow and reabsorption of CSF.	
Explain the procedure of lumbar puncture.	
Interpret the laboratory investigations of CSF in different diseases.	
4. Introduction to Neurotransmitters	
Define Neurotransmitters	Interactive Lecture
Classify Neurotransmitters with examples	
Describe the mechanism of action and functions of Neurotransmitters	
Classify receptors of Neurotransmitters	
Explain the synthesis and degradation pathways of Neurotransmitters	
Discuss the disorders associated with Neurotransmitter	
5. Acetylcholine & Dopamine	
Describe the chemical structure of Acetylcholine and Dopamine.	Interactive Lecture
Describe the metabolism of Acetylcholine and Dopamine.	
Explain the mechanism of action and functions of Acetylcholine & Dopamine.	
Discuss the receptors of Acetylcholine and Dopamine.	
Explain the clinical disorders associated with Acetylcholine and dopamine.	
6. Serotonin & GABA	
Describe the chemical structure of Serotonin and GABA	Interactive Lecture
Describe the metabolism of Serotonin and GABA	
Explain the mechanism of action and functions of Serotonin and GABA	
Discuss the receptors of Serotonin and GABA	
Explain the clinical disorders associated with Serotonin and GABA	

7. Neurodegenerative diseases of CNS	
List the common Neurodegenerative diseases.	Interactive Lecture
Discuss the common mediators of Neurodegenerative diseases.	
Discuss the biochemical changes in Neurodegenerative diseases.	
Describe the biochemical phenomenon of ageing.	
8. Role of free radicals & Vitamins in CNS disorders	
Explain the role of free radicals in Neurodegenerative diseases.	Interactive Lecture
List the free radicals causing degenerative diseases.	
List the sources of free radicals.	
Explain the mechanism of free radical injury.	
Describe the role of free radicals in diseases.	
Classify the antioxidants with examples.	
Discuss the process of oxidative stress response.	
Discuss the biochemical importance of vitamins in neurological disorders	
Discuss the sources, biochemical role and daily requirements of vitamins B1, B6, B9, B12 and folic acid.	
Explain the deficiency diseases related to these vitamins.	
9. Neurotransmitters-1 Acetylcholine & Dopamine	
Discuss the clinical importance of Acetylcholine & Dopamine.	Tutorial
Interpret clinical conditions correlated with their Laboratory investigations.	
10. Neurotransmitters-2 Serotonin & GABA	
Discuss the clinical importance of Serotonin & GABA.	Tutorial
Interpret clinical conditions correlated with their Laboratory investigations.	
11. Cerebrospinal fluid	
Discuss the clinical importance of Cerebrospinal fluid.	Tutorial
Interpret clinical conditions correlated with their laboratory investigations.	
12. Neurodegenerative diseases of CNS	
Discuss the clinical importance of neurodegenerative diseases	Tutorial
Interpret clinical conditions correlated with their laboratory investigations	
13. Lumbar Puncture	
Explain the procedure of Lumbar Puncture (LP).	Practical
Identify the chemical tests and bio-techniques to detect analytes in CSF.	
Identify the parts of LP needle.	
Interpret the laboratory report in different CNS diseases.	
Interpret clinical conditions correlated with their laboratory investigations.	

14. CSF Glucose Estimation	
Identify the procedure & bio-technique to detect glucose in CSF.	Practical
Estimate glucose in CSF.	
Interpret the laboratory report of glucose in CSF.	
Interpret clinical conditions correlated with their laboratory investigations.	
15. CSF Protein Estimation	
Identify the procedure & bio-technique to detect proteins in CSF.	Practical
Estimate proteins in CSF.	
Interpret the laboratory report of proteins in CSF.	
Interpret clinical conditions correlated with their laboratory investigations.	
16. CSF Chloride Estimation	
Identify the procedure & bio-technique to detect chloride in CSF.	Practical
Estimate chloride in CSF.	
Interpret the laboratory report of chloride in CSF.	
Interpret clinical conditions correlated with their laboratory investigations.	

NEUROSURGERY	
1. Spinal Cord Injuries	Interactive Lecture

NEUROMEDICINE	
1. Stroke	Interactive Lecture
Discuss the primarily focuses on how to restore blood flow of affected part of brain Summarize the latest treatment options for stroke induced neurological damage	

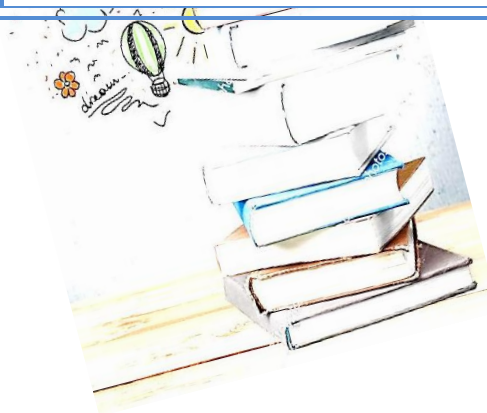
RADIOLOGY	
1. Brain and Spinal cord	Practical/Small Group Discussion
1. Differentiate between CT scan and MRI	
2. Identify normal imaging of different areas of brain and spinal cord.	
3. Recognize imaging features of common neurological disorders like Alzheimer's and Parkinsonism.	
4. Identify CT scan and MRI findings in patients with stroke and hematoma	

FAMILY MEDICINE	
1. Biopsychosocial Model in Family Medicine	Interactive Lecture

PHARMACOLOGY	
1. Antidepressants	Interactive Lecture
RSDC	
1. Lumbar Puncture	Practical
Demonstrate Lumbar Puncture steps	
LONGITUDINAL THEMES	
Leadership, Professionalism and BioEthics (LeaPE), Patient Safety and Research	Interactive lectures/ Small Group sessions
Objectives and reading material are uploaded on Moodle for each longitudinal theme	

LEARNING RESOURCES

SUBJECT	RESOURCES
ANATOMY	<p>GROSS ANATOMY K.L. Moore, Clinically Oriented Anatomy Neuro Anatomy by Richard Snell</p> <p>HISTOLOGY B. Young J. W. Health Wheather's Functional Histology</p> <p>EMBRYOLOGY Keith L. Moore. The Developing Human Langman's Medical Embryology</p>
BIOCHEMISTRY	<p>TEXTBOOKS Harper's Illustrated Biochemistry Lehninger Principle of Biochemistry Lippincott's Illustrated Reviews of Biochemistry Biochemistry by Devlin</p>
PHYSIOLOGY	<p>TEXTBOOKS Textbook of Medical Physiology by Guyton And Hall Ganong 'S Review of Medical Physiology Human Physiology by Lauralee Sherwood Berne & Levy Physiology Best & Taylor Physiological Basis of Medical Practice</p> <p>REFERENCE BOOKS Guyton & Hall Physiological Review Essentials of Medical Physiology by Jaypee Textbook of Medical Physiology by InduKhurana Short Textbook of Physiology by Mrthur NMS Physiology</p>



OTHER LEARNING RESOURCES

Web Link

<http://www.who.int/mentalhealth/neurology/neurologicaldisorders/report.web.pdf>

Hands-on activities/Practical

Students will be involved in Practical sessions and hands-on activities that link with the Nervous system I module to enhance learning.

Labs

Utilize the lab to relate the knowledge to the specimens and models available

Skill Labs

A skills lab provides the simulators to learn basic skills and procedures. This helps build the confidence to approach the patient

Videos

Video familiarizes the student with the procedures and protocols to assist patients.

Computer(Lab/CDs/DVDs/Internet Resources

To increase their knowledge, students should utilize the available internet resources and CDs/DVDs. This will be an added advantage to enhancing learning

Self-Study

Generally means studying without direct supervision. During this session, one learns by himself/herself to search for information to solve cases, read through different resources, and discuss among peers and with the faculty to clarify the concepts

ASSESSMENT METHODS:

- Best Choice Questions(BCQs) also known as MCQs (Multiple Choice Questions)
- Objective Structured Practical/Clinical Examination (OSPE or OSCE)

Internal Evaluation

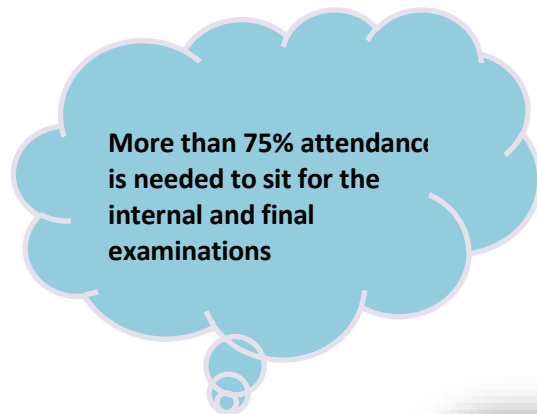
- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% may include class tests, assignments, practicals, and the internal exam which will all have specific marks allocation.

Formative Assessment

The individual department may hold a quiz or short answer questions to help students assess their learning.

The marks obtained are not included in the internal evaluation

For JSMU Examination Policy, please consult JSMU website!



LNH&MC EXAMINATION RULES & REGULATIONS

- Students must report to the examination hall/venue, 30 minutes before the exam.
- **The exam will begin sharply at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of the scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in the examination hall.**
- If any student is found with a cell phone in any mode (silent, switched off, or on) he/she will not be allowed to continue their exam.
- No students will be allowed to sit in the exam without University Admit Card, LNMC College ID Card, and Lab Coat
- Students must bring the following stationary items for the exam: Pen, Pencil, Eraser, and Sharpener.
- Indiscipline in the exam hall/venue is not acceptable. Students must not possess any written material or communicate with their fellow students.

SCHEDULE:

WEEKS	2 nd YEAR	MONTH
7 WEEKS	NEURO SCIENCE MODULE-I	23 rd February 2026
		15 th April 2026
7 WEEKS	HEAD AND NECK & SPECIAL SENSES MODULE	20 th April 2026
		15 th July 2026
6 WEEKS	GIT & LIVER MODULE-I	20 th July 2026
		4 th September 2026
Mid-Term Examination*		

*Final dates will be announced later.

