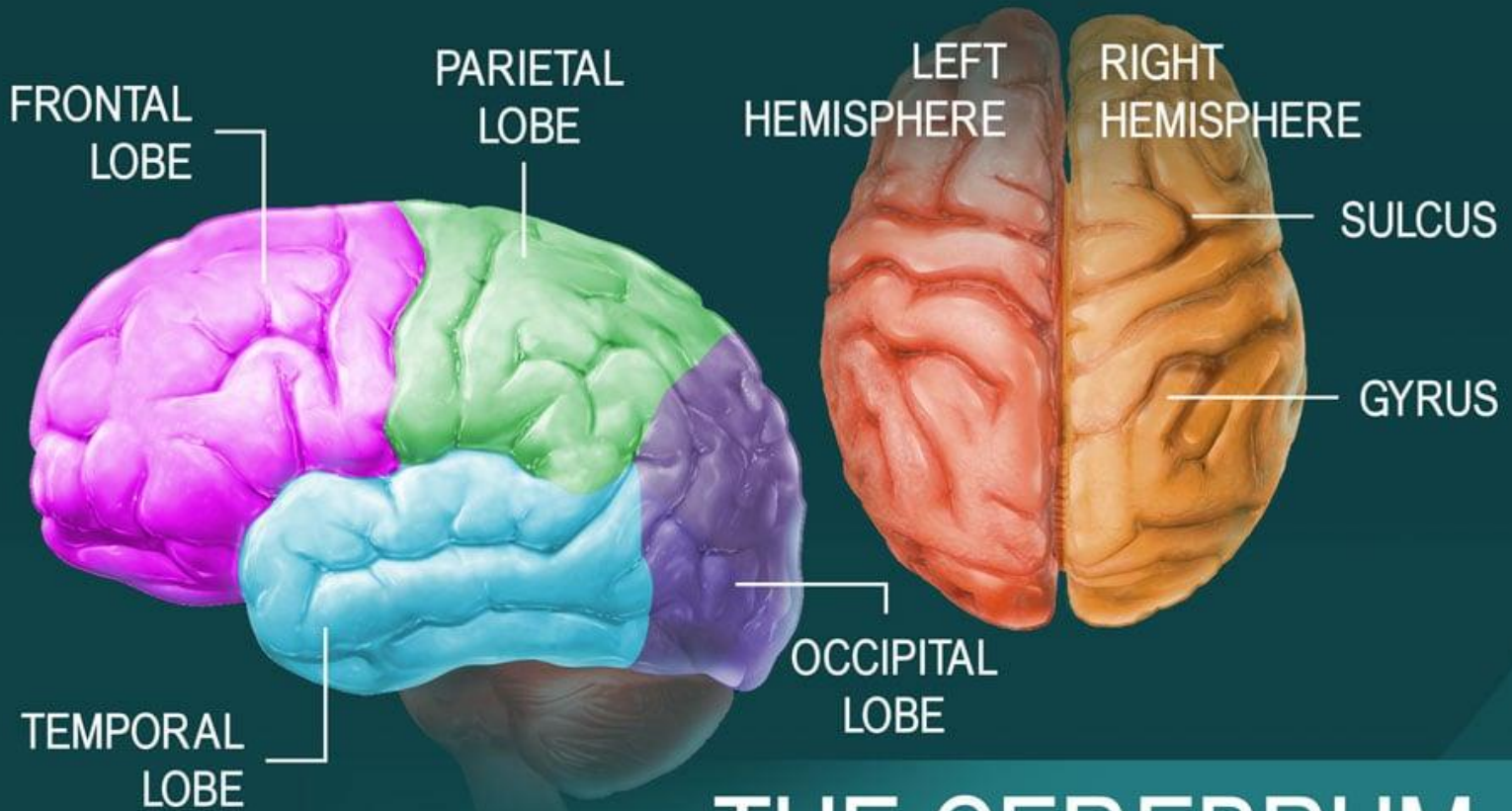
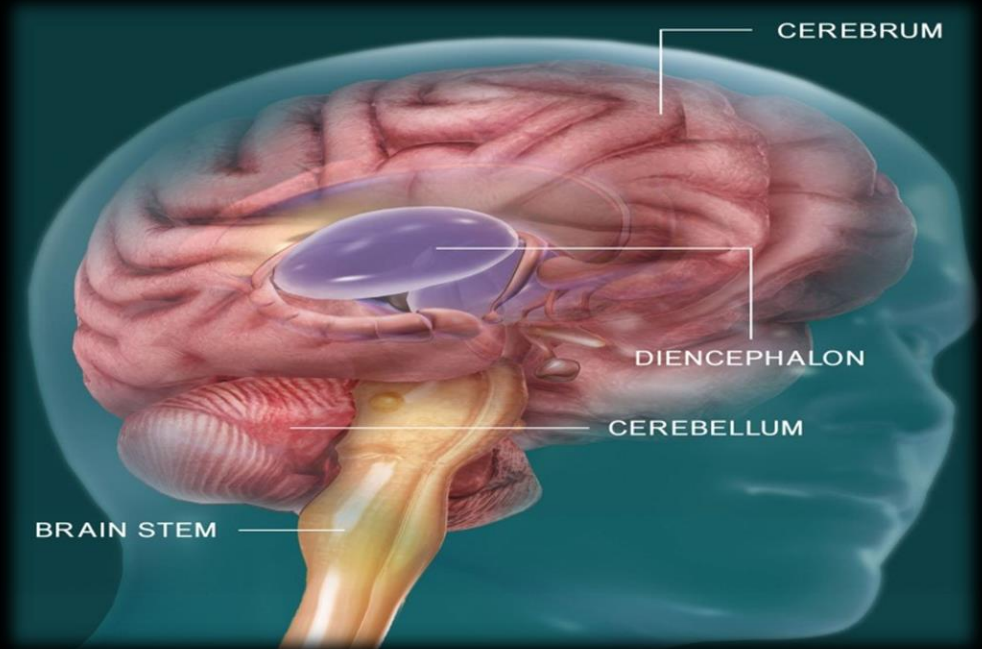


# Study Guide – Second Year MBBS

23<sup>th</sup> Jan – 8<sup>th</sup> March 2023

Duration: 7 weeks

## Neuroscience-1 Module



## THE CEREBRUM



**LIAQUAT NATIONAL HOSPITAL AND MEDICAL COLLEGE**

Institute for Postgraduate Medical Studies & Health Science



S. NO	CONTENTS	PAGE NO
1	Overview	3
2	Introduction to Study Guide	4
3	Learning Methodologies	5-6
4	Module 2: Neurosciences -I	7
4.1	Importance of Neurosciences -I	7
4.2	Objectives and strategies	8-18
5	Learning Resources	19-20
6	Assessment Methods	21
7	LNMC Examination Rules And Regulations	22
8	Schedule	23

Module name: *Neurosciences -I*Year: *Two*Duration: *7 weeks (Jan to March 2023)*

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

### MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR		
Dr. Ahsan Ashfaq (Physiology)		
CO-COORDINATORS		
Dr. Lubna (Anatomy)		
Dr. Faiza (Biochemistry)		
DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING		
BASIC HEALTH SCIENCES	CLINICAL SCIENCES	
<b>ANATOMY</b>	<b>NEUROMEDICINE</b>	
Professor Zia-ul-Islam	Dr. Ahmed Asif	
<b>BIOCHEMISTRY</b>	<b>NEUROSURGERY</b>	
Dr. Faiza Agha	Dr. Aamir Saghir	
<b>PHYSIOLOGY</b>	<b>PSYCHIATRY</b>	
Professor Syed Hafeezul Hassan	Dr. Iqtidar Taufiq	
<b>PHARMACOLOGY</b>	<b>RADIOLOGY</b>	
Professor Tabassum Zehra	Dr. Muhammad Misbah Tahir	
<b>COMMUNITY MEDICINE</b>	<b>SKILL LAB</b>	
Dr. Saima Zainab	Dr. Kehkashan	
<b>PATHOLOGY</b>		
Professor Naveen Faridi		
<b>FORENSIC MEDICINE</b>		
Professor Mukaram Ali		
DEPARTMENT OF HEALTH PROFESSIONS EDUCATION		
Professor Nighat Huda	Professor Sobia Ali	Dr. Afifa Tabassum
Dr Sana Farooq Shah	Dr Ahsan Naseer	
LNH&MC MANAGEMENT		
Professor KU Makki, Principal LNH&MC		
<b>STUDY GUIDE COMPILED BY: Department of Health Professions Education</b>		

## **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:**

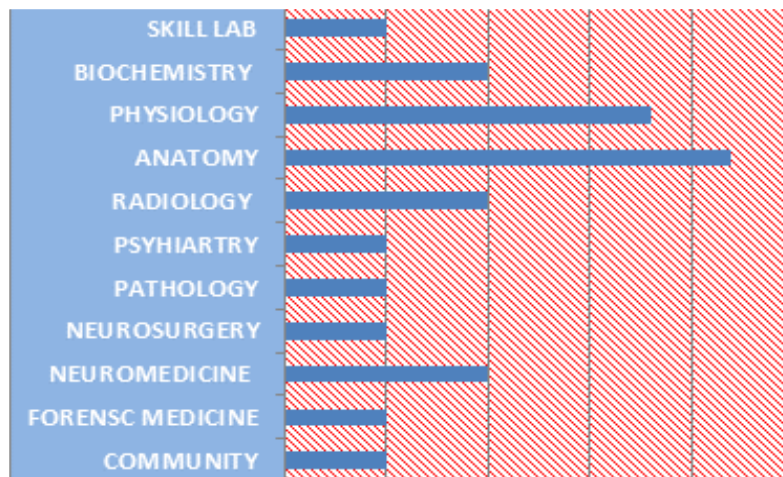
- Communicates information on the organization and management of the module. This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as lectures, small 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.

## INTEGRATING DISCIPLINES OF NEUROSCIENCES MODULE-I



### 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 2: NEUROSCIENCES -I**

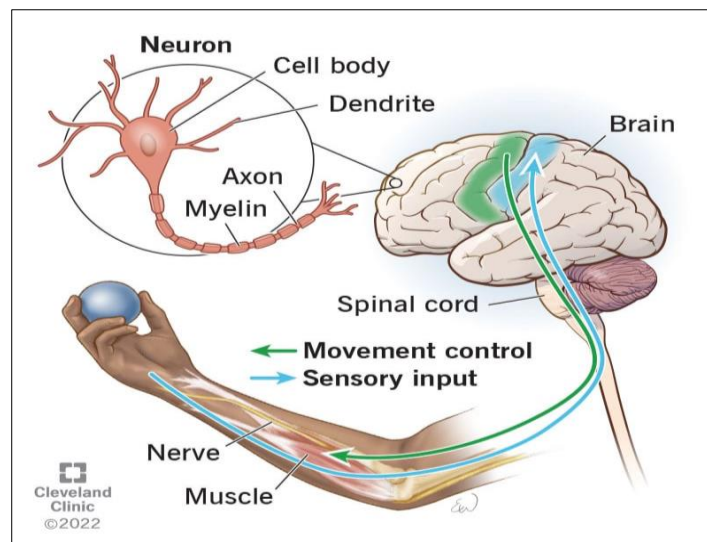
### **INTRODUCTION**

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:

<b>ANATOMY</b>	
<b>1. General organization of the Nervous system, different types of nerve tissue cells (Neurons &amp; Neuroglia)</b>	Interactive Lecture/CBL/Tutorial
<input type="checkbox"/> Define the nervous system.	
<input type="checkbox"/> List the components of the nervous system.	
<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.	
<b>2. Development of Brain and Spinal cord &amp; anomalies</b>	
<input type="checkbox"/> Describe the process of development of the nervous system	
<input type="checkbox"/> Discuss the development of the brain.	
<input type="checkbox"/> List the primary and secondary brain vesicles	
<input type="checkbox"/> Discuss the development of the spinal cord	
<input type="checkbox"/> Describe the following congenital anomalies of the brain & spinal cord;	
<input type="checkbox"/> Spinal bifida occulta, spinal bifida cystic, brain microcephaly, hydrocephalus.	
<b>3. External features of the spinal cord</b>	Interactive Lecture/Tutorial
<input type="checkbox"/> Discuss the extent (starting & terminating point) of the spinal cord	
<input type="checkbox"/> Describe the gross features i.e. shape, length, regions, fissure & sulcus of the spinal cord	
<input type="checkbox"/> List the regional enlargements of the spinal cord.	
<b>4. Histology of spinal cord</b>	
<input type="checkbox"/> Describe the components of grey and white matter in the spinal cord	
<b>5. Internal features of spinal cord I- (Ascending tracts)</b>	Interactive Lecture/Tutorial
<input type="checkbox"/> Discuss the internal features of the spinal cord, gray & white matter.	
<input type="checkbox"/> Discuss in detail the ascending (sensory) tracts of the spinal cord and their lesions.	
<b>6. Internal features of spinal cord II- (Descending tracts)</b>	
<input type="checkbox"/> Discuss the internal features of the spinal cord, gray & white matter.	
<input type="checkbox"/> Discuss in detail the descending (motor) tracts of the spinal cord and their lesions.	
<b>7. Development of forebrain, midbrain &amp; hindbrain</b>	Interactive Lecture/Tutorial
<input type="checkbox"/> Discuss the process of development of the forebrain, midbrain & hindbrain	
<b>8. Blood supply (arterial supply &amp; venous drainage) of the spinal cord and clinical</b>	



<p><b>manifestation of ischemia</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe the arterial supply &amp; venous drainage of the spinal cord</li> <li><input type="checkbox"/> Discuss the division of the arterial system into Carotid &amp; Vertebral Systems</li> <li><input type="checkbox"/> Discuss different areas of the spinal cord supplied by different branches of these arterial systems &amp; drainage by the venous system</li> <li><input type="checkbox"/> Describe the clinical consequences of ischemia of the spinal cord</li> </ul>	
<p><b>9. Spinal cord lesions, transection &amp; spinal shock</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Discuss the lesions of anterior &amp; posterior nerve roots</li> <li><input type="checkbox"/> Elaborate on the lesions of ascending &amp; descending tracts</li> <li><input type="checkbox"/> Discuss the mechanism &amp; consequences of tabes dorsalis, spinal shock syndrome, Brown Sequard syndrome, poliomyelitis, syringomelia</li> </ul>	
<p><b>10. Brainstem I- Medulla Oblongata</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Have a brief introduction about the brainstem.</li> <li><input type="checkbox"/> Discuss the formation and parts of the brainstem.</li> <li><input type="checkbox"/> Describe the gross anatomical features of Medulla Oblongata.</li> <li><input type="checkbox"/> Discuss in detail the internal features of Medulla Oblongata.</li> <li><input type="checkbox"/> List the cranial nerves emerging from the medulla oblongata.</li> <li><input type="checkbox"/> Discuss the clinical conditions associated with the medulla oblongata</li> </ul>	
<p><b>11. Brainstem II- Pons</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe the location of Pons with respect to the brainstem</li> <li><input type="checkbox"/> Discuss the external &amp; internal features of Pons</li> <li><input type="checkbox"/> Discuss the relation of Pons with the 4th ventricle</li> <li><input type="checkbox"/> List the cranial nerves emerging from Pons</li> <li><input type="checkbox"/> Discuss the clinical conditions associated with Pons</li> </ul>	Interactive Lecture/Tutorial
<p><b>12. Brainstem III- Midbrain</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe the location of the midbrain with respect to the brainstem</li> <li><input type="checkbox"/> Discuss the external &amp; internal features of the midbrain</li> <li><input type="checkbox"/> Discuss the relation of Pons with cerebral aqueduct</li> <li><input type="checkbox"/> List the cranial nerves emerging from the midbrain</li> <li><input type="checkbox"/> Discuss the clinical conditions associated with midbrain</li> </ul>	
<p><b>13. Histology &amp; Gross anatomy of Cerebellum</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe the gross anatomy of the cerebellum</li> <li><input type="checkbox"/> Discuss various terms like folia, vermis, tracts, and nuclei of the cerebellum</li> <li><input type="checkbox"/> Discuss the histological features of the cerebellar cortex</li> <li><input type="checkbox"/> Discuss the clinical conditions associated with cerebellar dysfunction</li> </ul>	

<b>14. Diencephalon I- Thalamus</b>	
<input type="checkbox"/> Describe the structure and division of diencephalon	
<input type="checkbox"/> Discuss the boundaries of the diencephalon	
<input type="checkbox"/> Discuss the functions, nuclei, and connections of the thalamus.	
<input type="checkbox"/> Discuss the clinical conditions associated with the thalamus	
<b>15. Diencephalon II- Sub thalamus, Hypothalamus &amp; Epithalamus</b>	
<input type="checkbox"/> Briefly describe the structure, division, and boundaries of the diencephalon	
<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.	
<b>16. Limbic system &amp; Reticular formation</b>	Interactive Lecture
<input type="checkbox"/> List the parts of the limbic system	
<input type="checkbox"/> Discuss the outer arc, middle arc & inner arc of the limbic system	
<input type="checkbox"/> Describe the hippocampus formation	
<input type="checkbox"/> Discuss the disorders of the limbic system	
<b>17. Basal ganglia &amp; its nuclei</b>	
<input type="checkbox"/> Describe the location and components of basal ganglia	
<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	
<b>18. Skull as whole, vault of skull + Anterior cranial fossa</b>	
<input type="checkbox"/> Define Skull	
<input type="checkbox"/> List the bones of the skull	
<input type="checkbox"/> Discuss the sutures of the skull	
<input type="checkbox"/> Discuss different views (normae) 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	
<b>19. Middle &amp; Posterior cranial fossa</b>	Tutorial/Interactive lectures
<input type="checkbox"/> Briefly discuss the division of the cranial cavity	
<input type="checkbox"/> Describe the boundaries, bony prominences, and foramina of the anterior cranial fossa	
<b>20. Gross anatomy of Cerebrum (external features, surfaces, gyri &amp; sulci)</b>	
<input type="checkbox"/> Discuss the gross anatomical features of the cerebrum (surfaces, borders, poles, lobes, sulci& gyri)	
<b>21. Functional cortical areas of the cerebrum &amp; their lesions</b>	
<input type="checkbox"/> Describe different functional areas of the cerebral cortex (motor, sensory, auditory, visual)	

<input type="checkbox"/> Discuss the lesions of the functional cortical areas of the cerebral cortex	
<b>22. Histology of cerebrum</b>	
<input type="checkbox"/> Describe the histology of various parts of the Cerebrum	
<b>23. Functional cortical area of Cerebrum</b>	
<input type="checkbox"/> List the cortical areas	
<input type="checkbox"/> Explain the functions of each cortical area and associated relevant conditions	
<b>24. White matter of cerebrum I- Projection fibers and Internal capsule</b>	
<input type="checkbox"/> Discuss the basic concepts of the white matter of the cerebrum.	Interactive Lecture/Tutorial
<input type="checkbox"/> Discuss the functions of projection fibers	
<input type="checkbox"/> Describe the location, parts, connections, and relations of the internal capsule.	
<b>25. White matter of cerebrum II- Commissural &amp; Association fibers</b>	
<input type="checkbox"/> Briefly describe the white matter of the cerebrum	
<input type="checkbox"/> Discuss the commissural fibers and their connections	
<input type="checkbox"/> Describe the corpus callosum and its parts.	
<input type="checkbox"/> Explain the association fibers and their connections	
<b>26. Ventricular system I- Lateral ventricle</b>	
<input type="checkbox"/> List the ventricles of the brain	
<input type="checkbox"/> Discuss the location, boundaries, and relations of lateral ventricles	
<input type="checkbox"/> Discuss the clinical conditions associated with lateral ventricles	
<b>27. Ventricular system II- 3rd&amp; 4th ventricles and CSF circulation</b>	
<input type="checkbox"/> List the ventricles of the brain along with their location	
<input type="checkbox"/> Describe the structure and location of the 3rd, and 4th ventricles and cerebral aqueduct	
<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	Interactive Lecture/Tutorial
<b>28. Blood supply of the brain &amp; clinical manifestations of ischemia</b>	
<input type="checkbox"/> Enumerate the arteries which supply the brain	
<input type="checkbox"/> Discuss the division of arterial system in carotid and vertebral systems	
<input type="checkbox"/> Describe the formation of the circle of Willis and discuss its branches	
<input type="checkbox"/> Enumerate veins of the brain and spinal cord	
<input type="checkbox"/> Discuss the clinical manifestations of ischemia of the brain	
<b>29. Meninges of the brain &amp; spinal cord</b>	
<input type="checkbox"/> List the meninges of the brain & spinal cord	

<input type="checkbox"/> Discuss the dural infoldings/ extensions and meningeal spaces	
<input type="checkbox"/> Describe the blood and nerve supply of meninges	
<b>30. Dural venous sinuses</b>	
<input type="checkbox"/> Describe the location, relations, and drainage of dural venous sinuses of the brain	
<b>31. Autonomic nervous system</b>	
<input type="checkbox"/> Describe the autonomic nervous system	
<input type="checkbox"/> Discuss the division of ANS into the sympathetic & parasympathetic nervous system	
<input type="checkbox"/> Discuss the components of the sympathetic part of the nervous system (thoracolumbar outflow: lateral gray horn, paravertebral sympathetic chain, prevertebral ganglia, and plexuses)	
<input type="checkbox"/> Describe the different fate (destination) of white and gray rami (preganglionic and post-ganglionic fibers)	Interactive Lecture
<input type="checkbox"/> Discuss the components of the parasympathetic part of the nervous system (craniosacral outflow: parasympathetic cranial nerve nuclei and sacral spinal segments)	
<input type="checkbox"/> List the parasympathetic ganglia	
<input type="checkbox"/> Describe the pathways of pre and post-ganglionic parasympathetic fibers	
<b>32. Cranial nerve nuclei and peripheral distribution with its lesions</b>	
<input type="checkbox"/> Name all the cranial nerves in sequence	
<input type="checkbox"/> List the location of the cranial nerve nuclei	
<input type="checkbox"/> Discuss their distribution and main effects of lesions	
<b>33. Structure of neuron &amp; neuroglia</b>	
<input type="checkbox"/> Describe the structure of a neuron & neuroglia	
<input type="checkbox"/> List the types of neuron & neuroglia	
<input type="checkbox"/> Functions of neuron & neuroglia	
<input type="checkbox"/> Discuss the formation of the blood-brain barrier	
<input type="checkbox"/> Observe the histological sections of a neuron & neuroglia under the light microscope	
	Tutorial/Practical
<b>PRACTICAL</b>	
<b>2. Spinal cord, spinal nerve &amp; ganglia</b>	
<input type="checkbox"/> Have a brief introduction about the spinal cord, spinal nerves, and ganglia	
<input type="checkbox"/> Discuss the histological features of the spinal cord, spinal nerve & ganglia	
<input type="checkbox"/> Observe & identify histological features of the spinal cord, spinal nerve & ganglia under the light microscope	
<b>3. Cerebellar/Cerebellum cortex</b>	
<input type="checkbox"/> Discuss the histological features of the cerebellum in the form of layers, cells & nuclei	
<input type="checkbox"/> Discuss the histological features of cerebrum in the form of layers, cells & nuclei	
<input type="checkbox"/> Observe and identify the histological features of cerebral cortex under light microscope	

PHYSIOLOGY		
<b>1. Neurons membrane, generation &amp; propagation of nerve impulse</b>		
Elaborate 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		
Describe the propagation of nerve impulse/ saltatory conduction.		
<b>2. Synapsis, properties of synapses</b>		
Describe the properties of chemical and electrical synapses	Quiz/CBL	
<b>3. Sensory receptors and neuronal circuits</b>		
Discuss the classification of sensory receptors	Interactive Lecture /Tutorial	
Describe the functions & properties of different types of receptors		
Explain the properties of different types of neuronal circuit		
<b>4. Somatic sensations</b>		
Explain the general organization of somatic sensation: tactile and position senses		
Discuss the dorsal-column medial lemniscal pathway		
Discuss the anterolateral –pathway		
Describe the mechanism of thermal receptors & their excitation.		
<b>5. Physiology of pain – I &amp; headache</b>		
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.		
<b>6. Physiology of pain II- Brain analgesic system</b>		
Explain the brain analgesic system	Interactive Lecture /Tutorial	
Discuss the brain's opiate system		
Discuss visceral & referred pains		
<b>7. Spinal cord and reflexes</b>		
Describe the motor function of spinal cord		
Discuss the mechanism of flexor reflex, crossed extensor reflex, scratch reflex, postural & locomotive reflexes		
Discuss spinal cord transection & spinal shock (Brown Sequard syndrome)		
<b>8. Muscles proprioceptors (muscle spinal &amp; Golgi tendon organ)</b>		
		Quiz/CBL/SDL

Explain the structure & function of muscle spindle	
Discuss the muscle, stretch reflex & its clinical applications	
Explain the mechanism of Golgi tendon reflex& its significance in controlling motor activities.	
<b>9. Somatosensory cortex</b>	
Discuss the orientation of various areas of cortex and their associated function	Interactive Lecture
Describe the layers of somatic sensory cortex and their functions.	
<b>10. Function of brain stem</b>	
Explain the role of brain stem nuclei in controlling motor functions	Tutorial
Discuss the vital and non- vital functions of brain stem (respiratory, cardiac, vasomotor centers & coughing, sneezing & vomiting reflexes)	
<b>11. Cerebellum and its functions</b>	
Explain the functions of cerebellum & its associated disorders	
Discuss the afferent and efferent pathways of cerebellum.	
<b>12. Vestibular system and maintenance of equilibrium</b>	Interactive Lecture
Name the parts of vestibular system	
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	
<b>13. Functions of diencephalon</b>	
Discuss the function of thalamus and its nuclei.	Tutorial
<b>14. Limbic system</b>	
Describe the functions of limbic system	Tutorial
Discuss the role of hypothalamus in Limbic system	
Discuss the importance of reward and punishment centers	
Elaborate on the role of hippocampus and amygdala	
Discuss the effects of Kluver – Bucy syndrome	
<b>15. Basal ganglia and its nuclei</b>	
Explain the functions of caudate & putamen pathways	Tutorial
List the functions of specific neurotransmitters of basal ganglial system	
Explain the disorders associated with basal ganglia (hypokinetic and hyperkinetic)	
<b>16. Motor cortex, pyramidal tract, Upper and lower Motor Neurons</b>	Interactive Lecture
Explain the functions of pyramidal tract	
List the functions of specific cortical areas	

Differentiate between upper & lower motor neuron lesions (UMN & LMN).	
<b>17. Physiology of sleep &amp; sleep disorders</b>	
Explain the physiology of slow-wave sleep & rapid eye movement (REM) sleep	
Explain the basic theories of sleep & origin of brain waves	
<b>18. Learning and memory</b>	
Determine the role of cerebral cortex in higher intellectual functions	
Classify the different types of memories	
<b>19. CSF: formation, circulation &amp; function</b>	
Describe the mechanism of CSF formation, circulation & function	
<b>20. Autonomic Nervous System</b>	
Describe the functions of sympathetic & parasympathetic nervous system	
<b>21. Speech &amp; its disorders</b>	Interactive Lecture Tutorial/CBL
Explain the physiology of speech and associated disorders	
Parkinsonism	
Reticular Activating system	
<b>PRACTICAL</b>	
<b>Examination of Superficial reflexes</b>	
To perform superficial reflexes and emphasize its significance in different neurological disorders	
Corneal reflexes	
Abdominal reflexes	
Plantar reflexes	Practical
<b>2. Examination of Deep reflexes</b>	
perform superficial deep reflexes and its significance	
<b>3. Cerebellar function tests</b>	
Perform cerebellar function tests and identify associated disorders.	
<b>4. Body temperature</b>	
Determine body temperature by using an oral mercury thermometer	Practical
<b>5. EEG</b>	
Interpret brain waves with the help of a power lab.	
<b>6. Examination of Cranial Nerve (V, VII, IX, X)</b>	
Examine the cranial nerves by performing the different tests	



<b>BIOCHEMISTRY</b>	
<b>1. Chemistry of Brain Lipids</b>	Tutorial/ Interactive Lecture
Explain the chemistry of brain lipids (glycolipids)	
<b>2. Introduction to Neurotransmitters-I</b>	
Classify the neurotransmitters, their mechanism of action and their functions	
<b>3. Neurotransmitters-II Acetylcholine &amp; Dopamine</b>	
Explain the neurochemical role of Acetylcholine & Dopamine and their related disorders	
<b>4. Neurotransmitters-III Serotonin &amp; GABA</b>	
Describe the neurochemical functions of Serotonin and GABA and their related disorders	
<b>5. Role of free radicals in Degenerative diseases of CNS</b>	
Describe the role of free radicals in degenerative diseases of CNS	
<b>6. Chemical composition of Blood Brain Barrier</b>	
Explain the biochemical composition and functions of the Blood Brain Barrier	
<b>7. CSF (Chemistry, Composition &amp; changes in diseases)</b>	
Describe the chemical composition of CSF in relation to the different diseased states	
<b>8. Biochemical Importance &amp; Disorders of vitamin B1 &amp; B6</b>	
Discuss the biochemical importance of vitamin B1 & B6 in neurological disorders	
<b>9. Energy needs of the Brain:</b>	
1. Identify the energy sources of brain in a healthy and diseased state	
2. Discuss brain Glucose metabolism and its integration of energetics with function	
3. Discuss the effect of starvation on brain glucose metabolism	
4. Discuss the mechanisms leading to decreased brain information capacity	
<b>10. Sphingolipidosis:</b>	
1. Define Sphingolipidosis.	

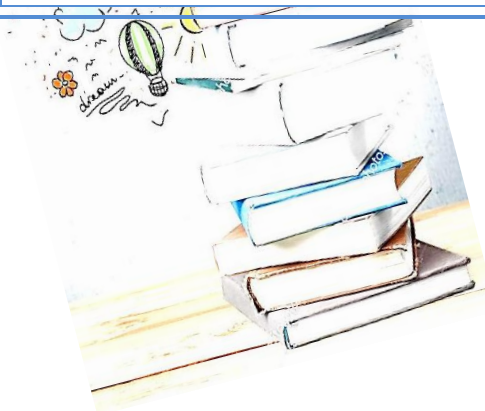
2. Classify Sphingolipidosis based on enzyme deficiencies	Interactive Lecture/Tutorial
3. Explain each type of sphingolipidosis including its relevant signs and symptoms	
4. Discuss the diagnostic criteria for identifying the type of sphingolipidosis	
<b>11. Chemical composition of nervous tissues and types of lipids:</b>	
1. Discuss the structural organization of nervous tissue.	
2. Discuss the lipid, protein and carbohydrate content and distribution of the nervous tissue.	
3. Classify complex lipids and discuss their functions.	
4. Identify phospholipids present in nervous tissue	
5. Define glycolipids. Discuss their distribution and functions in the nervous tissue.	
<b>Practical</b>	
1. Estimation of CSF Glucose	Practical
2. Estimation of CSF protein	
3. Estimation of CSF Chloride and interpretation of CSF	

<b>COMMUNITY MEDICINE</b>		
<b>1. Poliomyelitis</b>		
1. Discuss epidemiology of Poliomyelitis		
2. Discuss sign and symptoms of poliomyelitis		Interactive Lecture
3. Discuss Prevention of poliomyelitis		
<b>FORENSIC MEDICINE</b>		
<b>1. Lie detection</b>		
1. Describe the technique and medico legal importance of Polygraph and Brain Finger Printing.		
<b>NEUROMEDICINE</b>		
<b>1. Stroke</b>		
1. 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		
<b>NEUROSURGERY</b>		
<b>1. Spine</b>		
1. To identify the various spine pathology		
2. To differentiate between compressive and non-compressive patent of neurology		
3. Discuss lesion localization		
<b>PATHOLOGY</b>		
<b>1. Cerebrovascular diseases</b>		
Define cerebrovascular diseases		
Classify types of ischemic and vascular injury to brain		
Discuss the risk factors, pathogenesis, localization, morphology and clinical course of global and focal cerebral ischemia		

PHARMACOLOGY	
<b>1. Pain management</b>	
Classification of basic drugs used in pain management	
Pharmacokinetics and dynamics of NSAIDs	
PSYCHIATRY	
<b>1. Psychiatric illness</b>	
1. Discuss the etiology of multiple psychological illnesses	
RADIOLOGY	
<b>1. Brain and Spinal cord</b>	
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	
<b>1. Mechanical Thrombectomy:</b>	
1. Define Mechanical Thrombectomy	
2. Briefly discuss the principle, procedure and application of Mechanical Thrombectomy	
3. Explain the advantages and disadvantages of the above procedure.	
SKILL LAB	
1. Describe Lumbar Puncture steps	Practical

**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 &amp; Levy Physiology Best &amp; Taylor Physiological Basis of Medical Practice</p> <p>REFERENCE BOOKS Guyton &amp; 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)

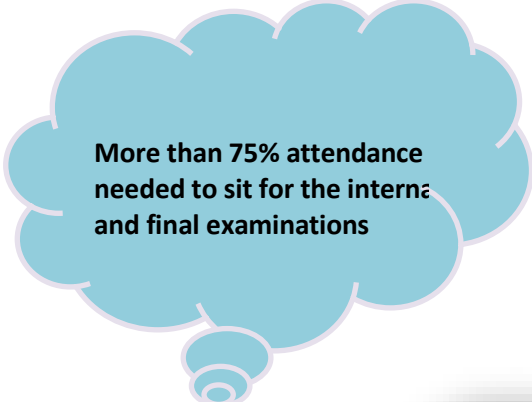
### Internal Evaluation

- 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!**



**More than 75% attendance  
needed to sit for the internal  
and final examinations**



## 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	2nd Year	Month
WEEK 1	GIT & LIVER MODULE-I	19 <sup>th</sup> December 2022
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		21 <sup>st</sup> January 2023
WEEK 1	NEUROSCIENCE MODULE-I	23 <sup>th</sup> January 2023
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		8 <sup>th</sup> March 2023
	Module Examination Dates 10 <sup>th</sup> to 11 <sup>th</sup> March 2023	
WEEK 1	HEAD & NECK MODULE	13 <sup>th</sup> March 2023
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		6 <sup>th</sup> May 2023
<b>Mid Term Examination 12<sup>th</sup> May 2023*</b>		

\*Final dates will be announced later.

