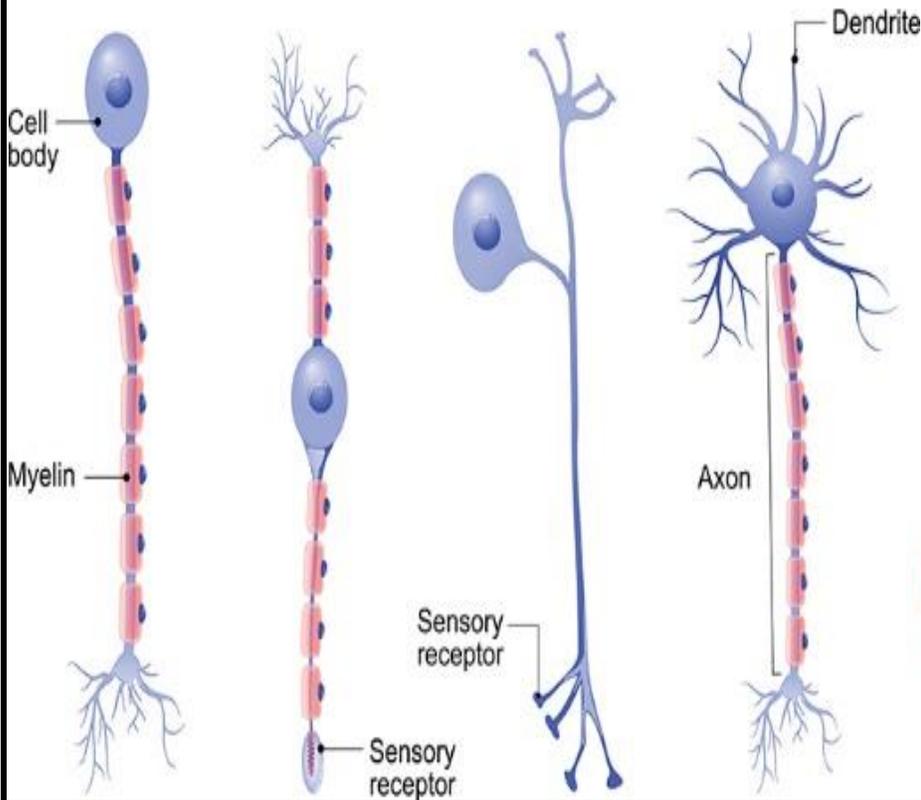


Unipolar Bipolar Pseudounipolar Multipolar



STUDY GUIDE

SECOND YEAR MBBS

3RD MAY- 3RD JULY 2021

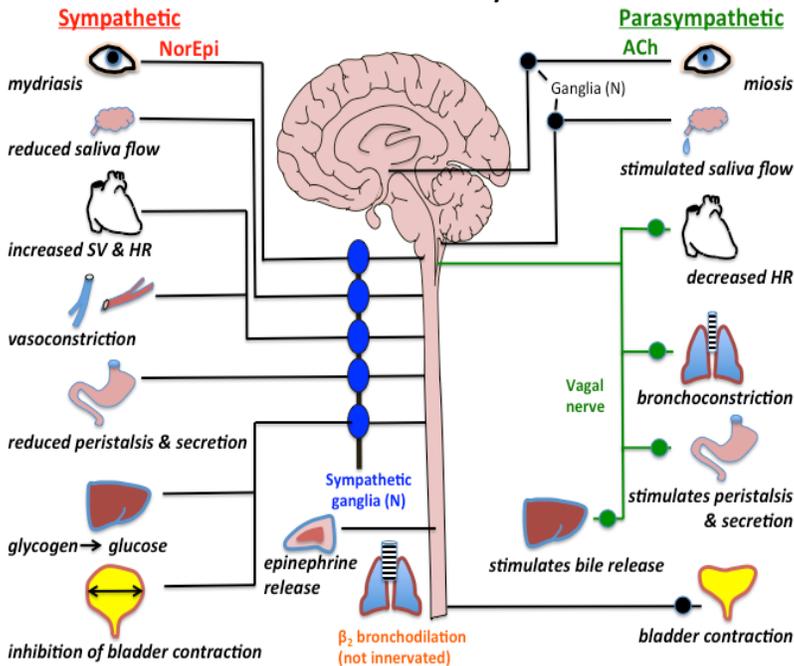
DURATION: 9 WEEKS

5 SENSES

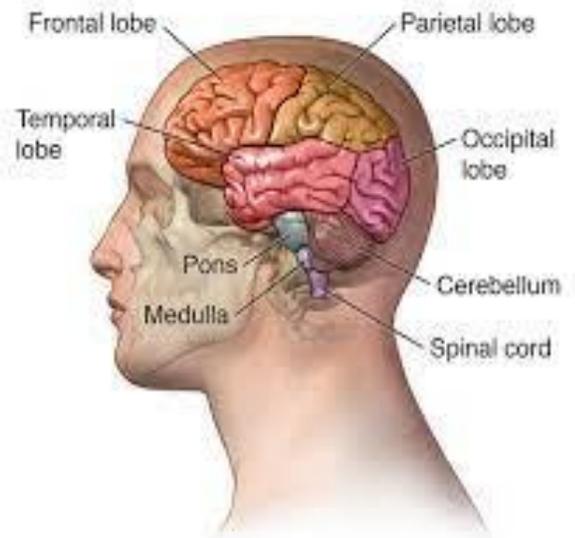


NEUROSCIENCES & SPECIAL SENSES -I MODULE

The Autonomic Nervous System



Anatomy of the brain



STUDY GUIDE FOR NEUROSCIENCES & SPECIAL SENSES-I MODULE

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Module name: *Neurosciences & Special Senses-I* Year: *Two*

Duration: *9 weeks (May – July 2021)*

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

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	<ul style="list-style-type: none"> • Prof. Kashif Nisar (Biochemistry)
CO-COORDINATORS:	<ul style="list-style-type: none"> • Dr. Aneeta Khoso (Community Medicine)

DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING

BASIC HEALTH SCIENCES		
ANATOMY Professor Zia-ul-Islam		
BIOCHEMISTRY Professor Kashif Nisar		
PHYSIOLOGY Professor Syed Hafeezul Hassan		
DEPARTMENT OF HEALTH PROFESSIONS EDUCATION		
<ul style="list-style-type: none"> • Professor Nighat Huda • Dr. M. Suleman Sadiq 	<ul style="list-style-type: none"> • Professor Sobia Ali 	<ul style="list-style-type: none"> • Dr. Afifa Tabassum
LNH&MC MANAGEMENT		
<ul style="list-style-type: none"> • Professor KU Makki, Principal LNH&MC • Dr. Shaheena Akbani, Director A.A & R.T LNH&MC 		
STUDY GUIDE COMPILED BY: Department of Health Professions Education		

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

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

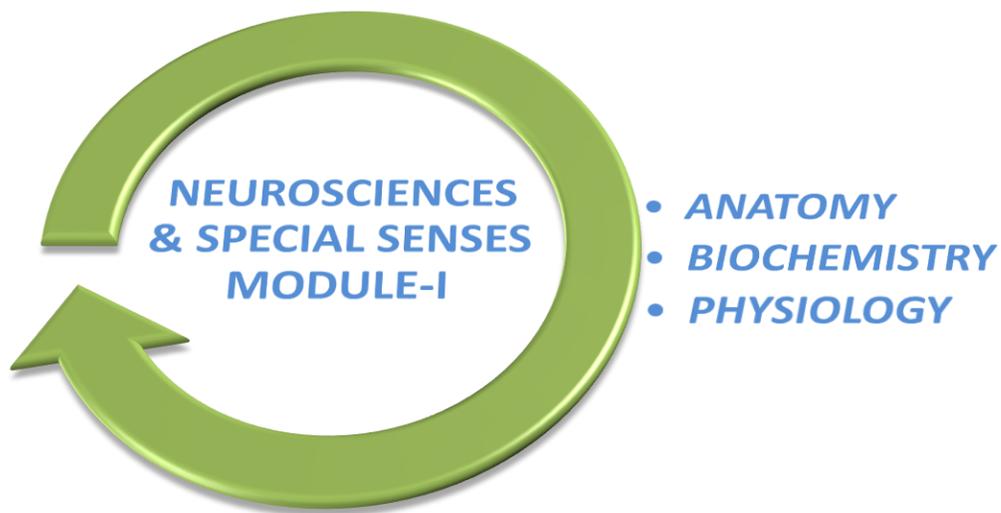
THE STUDY GUIDE:

- Communicates information on 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 in order to maximize their learning.
- Highlights information on the contribution of continuous and semester 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 pertaining to examination policy, rules and regulations.

CURRICULUM FRAMEWORK

Students will experience integrated curriculum similar to previous modules.

INTEGRATED CURRICULUM comprises of system-based modules such as Head and Neck, Nervous system & Special Senses -1 and Endocrinology 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 better understanding of basic sciences when they repeatedly learn in relation to clinical examples. Case-based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of integrated teaching program.

INTEGRATING DISCIPLINES OF NEUROSCIENCES & SPECIAL SENSES -I MODULE**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 Study

INTERACTIVE LECTURES

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

SMALL GROUP DISCUSSION: This format helps students to clarify concepts acquire skills or attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials and self study. The facilitator 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 around a series of questions based on a clinical scenario. Students' discuss and answer the questions 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 respective module are observed and practiced where applicable in skills laboratory or Department of Physiotherapy.

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

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 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 stroke, it is our primary responsibility as future doctors to know not just the treatment but also preventive strategies for a healthy living.

Through this module you will develop an 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 to improve human health.



COURSE OBJECTIVES AND STRATEGIES

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

ANATOMY

OBJECTIVES	TEACHING STRATEGY
1. Describe the process of development of nervous system	Interactive Lecture
2. List the primary and secondary brain vesicles	
3. Describe the development of forebrain, mid brain and hind brain and the spinal cord.	
4. Describe the following congenital anomalies of brain & spinal cord (Spinal bifida occulta, spinal bifida cystic, brain microcephaly, hydrocephalus)	
5. Correlate the development of ventricles and meninges with associated congenital anomalies	
6. Discuss the development of peripheral and autonomic nerves	
7. Discuss the general organization of nervous system	
8. Explain structure and functions of different types of neurons and neuroglial cells	
9. Describe the microscopic features of nervous tissue, sensory receptors, ganglion, myelin sheath and blood brain barrier	Practicals / Skills session
10. Explain cross sectional appearance of a nerve	Interactive Lecture / Small Group Discussion
11. List the meninges of brain & spinal cord	
12. Discuss the dural in foldings / extensions and meningeal spaces	
13. Describe the blood and nerve supply of meninges	Interactive Lecture and practical
14. Discuss the gross anatomy and cross sections of spinal cords at different levels with its neurovascular supply and histology of spinal cord	
15. Discuss the internal features of spinal cord, gray & white matter	Interactive Lecture / Small Group Discussion
16. Discuss clinical importance of the ascending and descending tracts	
17. Describe the formation of spinal nerves and nerve plexuses	
18. Discuss the clinical importance of brain stem (medulla, pons and midbrain) in relation to their structure and vascular supply	
19. Explain the location of cranial nerve Nuclie.	
20. Discuss the clinical conditions associated with medulla oblongata	
21. Discuss the organization of Autonomic Nervous system (ANS)	Interactive Lecture
22. Discuss the divisions of ANS (sympathetic & parasympathetic nervous system)	
23. Discuss the components of sympathetic nervous system (thoracolumbar outflow: lateral gray horn, paravertebral sympathetic chain, prevertebral ganglia and plexuses)	
24. Discuss the components of parasympathetic part of nervous system (craniosacral outflow: parasympathetic cranial nerve nuclei and sacral spinal segments)	
25. List the parasympathetic ganglia	
26. Describe the pathways of pre and postganglionic parasympathetic fibers	
27. Discuss the external and internal structures of cerebellum and associated fibers.	
28. Discuss the clinical conditions associated with cerebellar dysfunction	

29. Describe the gross features of diencephalon (thalamus, hypo- thalamus and epithalamus including pineal gland and their respective nuclei)	Interactive Lecture
30. Discuss the lesions of subthalamus, hypothalamus & epithalamus	
31. Discuss the clinical conditions associated with thalamus	
32. Describe the cerebral hemisphere with surfaces, lobes, sulci and gyri	Interactive Lecture / Small Group Discussion
33. Explain the different cortical areas of brain with their functions and lesions	
34. Describe the histological features of the cerebral and cerebellar cortex with different nerve cell types in cortex	Practicals / Skills session
35. Describe the white matter of cerebral hemisphere (commissural, association and projection fibers)	Small Group Discussion
36. Describe the internal capsule including its fibers in different parts and blood supply	
37. Describe corpus callosum and its parts	
38. Describe the various parts of limbic system	Interactive Lecture
39. Describe the hippocampus formation	
40. Discuss the disorders of limbic system	
41. Describe the basal nuclei of brain	Interactive Lecture / Small group discussion
42. Explain the major components of the limbic system & reticular formation	
43. Discuss the microscopic features of substantia nigra	
44. Discuss the lesions of basal ganglia & its nuclei	
45. Discuss the ventricular system of brain and circulation of cerebrospinal fluid (CSF)	
46. Discuss the applied anatomy of ventricles and CSF flow	
47. Discuss division of arterial system in carotid and vertebral systems Discuss the arterial supply of brain	Interactive Lecture /Team-Based Learning
48. Describe the formation of circle of Willis and discuss its branches	
49. Enumerate veins of brain and spinal cord	
50. Discuss the clinical manifestations of ischemia of brain	
51. Discuss dural venous sinuses along with their clinical importance	Interactive lecture
52. Discuss the Radiological Anatomy of brain and spinal cord	Small Group discussion
53. Describe the gross anatomy of skull	Interactive Lecture / Small group discussion
54. Discuss the sutures of skull	
55. Discuss different views (normal) of skull	
56. Discuss the division of the cranial cavity	
57. Describe the boundaries, bony prominences and foramina of the anterior cranial fossa	
58. Describe the boundaries, bony prominences and foramina of the middle & posterior cranial fossa	
59. Discuss the lesions of anterior & posterior nerve roots	
60. Elaborate the lesions of ascending & descending tracts	
61. Discuss the mechanism & consequences of tabes dorsalis, spinal shock syndrome, Brown Sequard syndrome, poliomyelitis, syringomyelia	

BIOCHEMISTRY

OBJECTIVES	TEACHING STRATEGY
Chemical Composition of Brain (Lipids of Nervous System)	
1. Explain the chemistry of Brain Lipids (Glycolipids)	
2. Classify brain lipids with examples	
3. Describe the chemical composition and functions of myelin.	
4. Discuss the clinical significance of lipid storage diseases	
Blood Brain Barrier	
5. Explain the biochemical composition and functions of the Blood Brain Barrier	
6. Explain the functions of the Blood Brain Barrier	
7. Explain the impact of Blood Brain Barrier disruption	
8. Discuss the clinical disorders associated with Blood Brain Barrier disruption	
Cerebrospinal fluid (CSF)	
9. Describe the chemical composition of CSF	
10. Discuss the biochemical functions of CSF	
11. Explain the mechanism of production, route of flow and re-absorption of CSF	
12. Explain the procedure of lumbar puncture	
13. Interpret the laboratory investigations of CSF in different diseases	
Neurotransmitters	
Introduction of Neurotransmitters	
14. Define Neurotransmitters	
15. Classify Neurotransmitters with examples	
16. Describe the mechanism of action and functions of Neurotransmitters	
17. Classify receptors of Neurotransmitters	
18. Explain the synthesis and degradation pathways of Neurotransmitters	
19. Discuss the disorders associated with Neurotransmitter	
Acetylcholine & Dopamine	
20. Describe the chemical structure of Acetylcholine and Dopamine	
21. Describe the metabolism of Acetylcholine and Dopamine	
22. Explain the mechanism of action and functions of Acetylcholine & Dopamine	
23. Discuss the receptors of Acetylcholine and Dopamine	
24. Explain the clinical disorders associated with Acetylcholine and Dopamine	
Serotonin & GABA	
25. Describe the chemical structure of Serotonin and GABA	
26. Describe the metabolism of Serotonin and GABA	
27. Explain the mechanism of action and functions of Serotonin and GABA	
28. Discuss the receptors of Serotonin and GABA	
29. Explain the clinical disorders associated with Serotonin and GABA	

Interactive
Lecture/Tutorial

Neurodegenerative diseases	
30. List the common Neurodegenerative diseases	Interactive Lecture/Tutorial
31. Discuss the common mediators of Neurodegenerative diseases	
32. Discuss the biochemical changes in Neurodegenerative diseases	
33. Describe the biochemical phenomenon of ageing	
Role of Free Radicals & Vitamins in CNS disorders	
34. Explain the role of free radicals in Neurodegenerative diseases	
35. List the free radicals causing degenerative diseases	
36. List the sources of free radicals	
37. Explain the mechanism of free radical injury	
38. Describe the role of free radicals in diseases	
39. Classify the antioxidants with examples	
40. Discuss the process of oxidative stress response	
41. Discuss the biochemical importance of vitamins in neurological disorders	
42. Discuss the sources, biochemical role and daily requirements of vitamins B1, B6, B9, B12 and folic acid	
43. Explain the deficiency diseases related to these vitamins	
Lumbar Puncture	Practical
44. Explain the procedure of Lumbar Puncture (LP)	
45. Identify the chemical tests and bio-techniques to detect analytes in CSF	
46. Identify the parts of LP needle	
47. Interpret the laboratory report in different CNS diseases	
48. Interpret clinical conditions correlated with their laboratory investigations	
Estimate glucose in CSF	
49. Identify the procedure & bio-technique to detect glucose in CSF	
50. Estimate glucose in CSF	
51. Interpret the laboratory report of glucose in CSF	
52. Interpret clinical conditions correlated with their laboratory investigations	
Estimate proteins in CSF	
53. Identify the procedure & bio-technique to detect proteins in CSF	
54. Estimate proteins in CSF	
55. Interpret the laboratory report of proteins in CSF	
56. Interpret clinical conditions correlated with their laboratory investigations	
Estimate chloride in CSF	
57. Identify the procedure & bio-technique to detect chloride in CSF	
58. Estimate chloride in CSF	
59. Interpret the laboratory report of chloride in CSF	
60. Interpret clinical conditions correlated with their laboratory investigations	

PHYSIOLOGY

OBJECTIVES	TEACHING STRATEGY
Neurons Membrane, Generation & Propagation of Nerve Impulse	Interactive Lecture / Small Group Discussion
1. Elaborate the structure and functions of neuron	
2. Discuss the classification & functions of nerve fibers	
3. Describe the threshold & initiation of action potential in neuronal cells	
4. Describe the propagation of nerve impulse/ saltatory conduction	
Synapsis, Properties of Synapses	
5. Describe the properties of chemical and electrical synapses	
Sensory Receptors and Neuronal Circuits	
6. Discuss the classification of sensory receptors	
7. Describe the functions & properties of different types of receptors	
8. Explain the properties of different types of neuronal circuit	
Somatic Sensations	
9. Explain the general organization of somatic sensation: tactile and position senses	
10. Discuss the dorsal-column medial lemniscal pathway	
11. Discuss the anterolateral –pathway	
12. Describe the mechanism of thermal receptors and their excitation	
Physiology of Pain – I & Headache	
13. Discuss the types of pain (slow and fast) and their characteristics	
14. Explain the mechanism of stimulation of pain receptors	
15. Discuss the clinical abnormalities of pain: hyperalgesia, headache and its causes	
Physiology of Pain II- Brain Analgesic System	
16. Explain the brain analgesic system	
17. Discuss the brain's opiate system	
18. Discuss visceral and referred pains	
Spinal Cord and Reflexes	
19. Describe the motor function of spinal cord	
20. Discuss the mechanism of flexor reflex, crossed extensor reflex, scratch reflex, postural and locomotive reflexes	
21. Discuss spinal cord transection & spinal shock (Brown Sequard syndrome)	
Muscles Proprioceptors (muscle spinal & Golgi tendon organ)	
22. Explain the structure and function of muscle spindle	
23. Discuss the muscle, stretch reflex and its clinical applications	
24. Explain the mechanism of Golgi tendon reflex and its significance in controlling motor activities.	
Somatosensory Cortex	
25. Discuss the orientation of various areas of cortex and their associated function	
26. Describe the layers of somatic sensory cortex and their functions	

Function of Brain Stem	
27. Explain the role of brain stem nuclei in controlling motor functions	
28. Discuss the vital and non- vital functions of brain stem (respiratory, cardiac, vasomotor centers and coughing, sneezing and vomiting reflexes)	
Cerebellum and its Functions	
29. Explain the functions of cerebellum and its associated disorders	
30. Discuss the afferent and efferent pathways of cerebellum.	
Vestibular System and Maintenance of Equilibrium	
31. Name the parts of vestibular system	
32. Explain the functions of the vestibular system	
33. Discuss the role of utricle and saccule in static equilibrium	
34. Discuss the role of semicircular Ducts in Angular Acceleration	
Functions of Diencephalon	
35. Discuss the function of thalamus and its nuclei.	
Limbic System	
36. Describe the functions of limbic system	
37. Discuss the role of hypothalamus in Limbic system	
38. Discuss the importance of reward and punishment centers	
39. Elaborate the role of hippocampus and amygdale	
40. Discuss the effects of Kluver – Bucy syndrome	
Basal Ganglia and its Nuclei	
41. Explain the functions of caudate and putamen pathways	
42. List the functions of specific neurotransmitters of basal ganglial system	
43. Explain the disorders associated with basal ganglia (hypokinetic and hyperkinetic)	
Motor Cortex, Pyramidal Tract, Upper and lower Motor Neurons	
44. Explain the functions of pyramidal tract	
45. List the functions of specific cortical areas	
46. Differentiate between upper and lower motor neuron lesions (UMN and LMN)	
Physiology of Sleep & Sleep Disorders	
47. Explain the physiology of slow wave sleep and rapid eye movement (REM)sleep	
48. Explain the basic theories of sleep and origin of brain waves	
Learning and Memory	
49. Determine the role of cerebral cortex in higher intellectual functions	
50. Classify the different types of memories	
CSF: Formation, Circulation & Function	
51. Describe the mechanism of CSF formation, circulation and function	

Interactive Lecture /
Small Group Discussion

Autonomic Nervous System	
52. Describe the functions of sympathetic and parasympathetic nervous system	
Speech & its Disorders	
53. Explain the physiology of speech and associated disorders	
Examination of Superficial reflexes	
54. To perform superficial reflexes and its significance in different neurological disorders I. Corneal reflexes II. Abdominal reflexes III. Plantar reflexes	Practicals
Examination of Deep reflexes	
55. Perform superficial deep reflexes and its significance	
Cerebellar function tests	
56. Perform cerebellar function tests and to identify associated disorders.	
Body temperature	
57. Determine body temperature by using oral mercury thermometer	
EEG	
58. Interpret brain waves with the help of power lab	
Examination of Cranial Nerve (V,VII,IX,X)	
59. Examine the cranial nerves by performing different test	

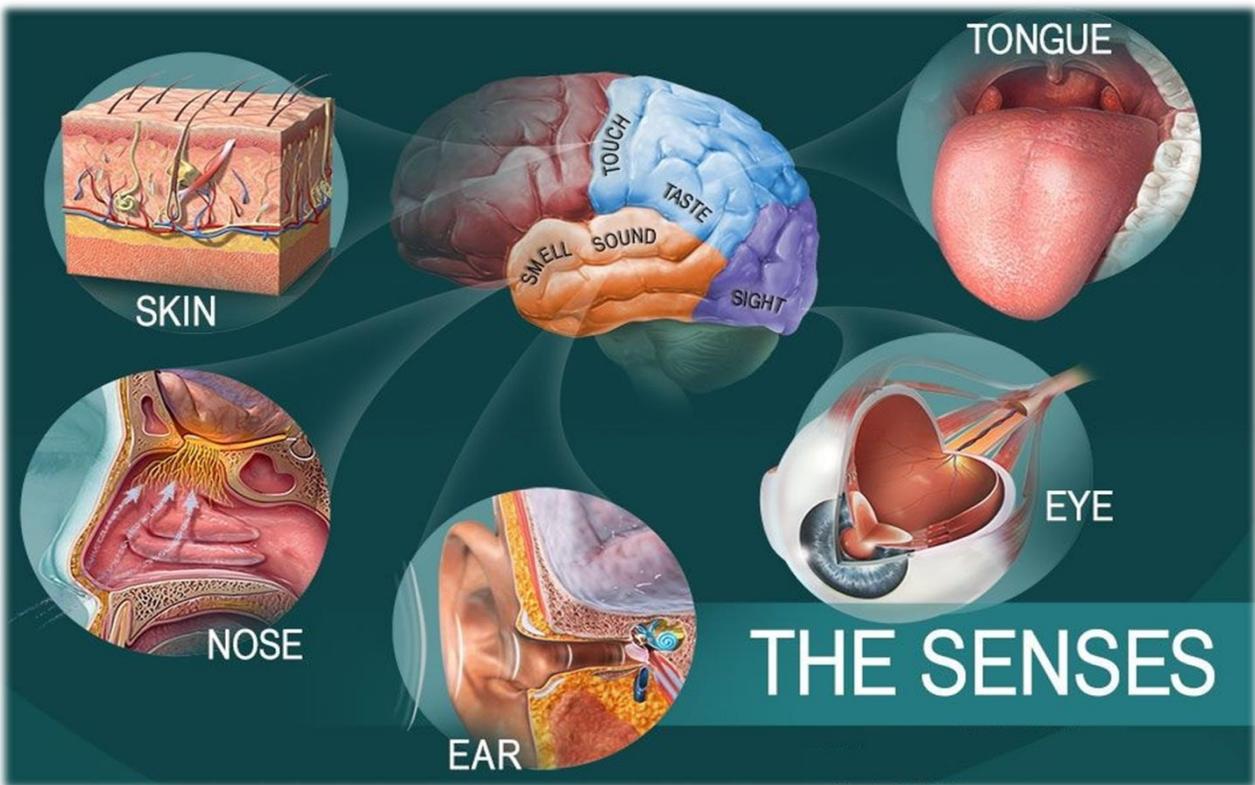
MODULE 2: SPECIAL SENSES-I

INTRODUCTION

Special senses is part of nervous system which is used to perceived the world around. The Special Senses- 1 is a basic module is designed to provide in-depth information about how humans perceive sensations of vision, hearing, smell, taste and touch. Students will learn about the gross and microscopic structures and their related functions.

Students will also be able to understand how abnormalities at a macro and/ or micro levels produce loss of sensations

Diseases related to vision and hearing are very common in every society. Right from errors of refraction to blindness, visual disturbances take up a small yet significant percentage of the burden of diseases. Hearing loss and ear infections are also very common. The understanding of these sensations, hence, becomes imperative at the early stage of medical studies. This module will be directly linked with Special Senses-2 in the 2nd spiral where students will study not only the pathology but also management of various common conditions.



COURSE OBJECTIVES AND STRATEGIES***ANATOMY***

OBJECTIVES	TEACHING STRATEGY
Eyelid and Lacrimal Apparatus	Interactive Lectures/SmallGroup Discussion
1. Discuss Eyelid and its parts	
2. Explain the Innervation and blood supply of eyelids	
3. Describe parts of lacrimal apparatus	
4. Discuss the diseases of lacrimal apparatus	
Eye Ball and Extraocular Muscles	
5. Explain the gross anatomical features of eye ball	
6. Discuss different coats and compartment of the eyeball	
7. Explain the neurovascular supply and lymphatic drainage of the eye ball	
8. Enlist the extra-ocular muscles	
9. Discuss the attachments and nerve supply of these muscles	
10. Explain the actions of Extraocular muscles along with related clinical anatomy	
Norma Occipitalis and posterior part of Basalis	
11. Enlist the Bones forming the posterior aspect and base of skull	
12. Describe the details of posterior part of base of skull	
13. Describe different foramina and structures passing through them	
Development of eye	
14. Describe the development of eye and formation of retina	
15. List the structures which develop from optic cup, neural crest cells and surface ectoderm	
16. Explain the development of iris, ciliary bodies, lens, cornea, eyelid and Lacrimal gland	
17. Discuss the common congenital anomalies of eye	
Gross Anatomy of External Nose, Boundaries, Blood and Nerve Supply	
18. Describe the features of external nose	
19. Name the boundaries of nasal cavity	
20. Describe the blood and nerve supply of nose	
21. Discuss the formation of anastomoses at little's area and its clinical importance	
Histology of Nasal Cavity, respiratory and olfactory epithelia	
22. Describe the epithelia of nasal cavity	
23. Discuss the features of olfactory and respiratory epithelium	
24. Describe the cells of olfactory and respiratory epithelium	

Para nasal Air Sinuses	Interactive Lectures/SmallGroup Discussion
25. List the para nasal air sinuses	
26. Describe their location, important relations, drainage and nerve supply	
27. Discuss the clinical significance of para nasal air sinuses	
Development of nose and Para nasal sinuses	
28. Describe development of different parts of nose and para nasal sinuses	
29. Describe congenital anomalies associated with development of nose and paranasal sinuses	
Gross and Histology: External and Middle Ear	
30. Discuss the division of ear into external, middle and internal ear	
31. Describe the parts of external ear, boundaries and content of middle Ear cavity	
32. Explain the histological features of parts of external and middle ear	
33. Discuss the functions of external and middle ear as an organ for hearing	
34. Define the clinical conditions associated with external and middle ear	
Gross and Histology: Internal Ear	
35. Describe the parts of internal ear	
36. Describe the histological features of parts of internal ear	
37. Discuss the functions of internal ear as an organ for hearing and balance	
38. Discuss the clinical conditions associated with internal ear	
Development of Ear	
39. Explain the development of external, middle and internal ear	
40. Discuss congenital deafness and other anomalies of auricular and rest of the ear	
Integrated lecture on Auditory pathway	
41. Discuss the components of auditory pathway	
42. Describe the function of different parts of auditory pathway	
43. Describe the clinical conditions associated with auditory pathway	
44. Describe the vestibule and oral cavity proper with their contents	
Histology of Eye Ball	
45. Identify the histological features of eyeball	
46. Describe the histological feature of each coat of eye ball	
47. Describe the histology of cornea and lens	
48. Discuss the arrangement and composition of the layers of retina	
Histology of Nasal Cavity, respiratory and olfactory epithelia	
49. Identify various parts on slides	
50. Describe histological characteristics of each part	
Histology: External and Middle Ear	
51. Identify the various parts, gross and microscopic	
52. Explain the characteristic features of each part/ section	
Histology: Internal Ear	
53. Identify the various parts, gross and microscopic	
54. Explain the characteristic features of each part/ section	

BIOCHEMISTRY

OBJECTIVES	TEACHING STRATEGY
Vitamin A and visual cycle	
Explain the biochemical importance of vitamin A and its role in visual cycle	Interactive Lecture/SmallGroup Discussion

PHYSIOLOGY

OBJECTIVES	TEACHING STRATEGY	
Optics Of Eye		
1. Explain the basic physiology of eye and its refractive surfaces	Interactive Lectures/SmallGroup Discussion	
2. Discuss the physical principles of optics		
3. Describe the mechanism of accommodation and its control		
Formation and circulation of aqueous humor		
4. Describe the formation and circulation of aqueous humor		
5. Explain the mechanism of regulation of intraocular pressure		
6. Define glaucoma and its treatment		
Visual Acuity and Errors Of Refraction		
7. Define visual acuity		
8. Describe the errors of refraction (Myopia, hyperopia, astigmatism and their correction by using different lens systems)		
Photo-transduction		
9. Describe the physiology of retinal layers		
10. Explain photochemistry of vision (rhodopsin - retinal)		
11. Describe the mechanism of activation of Rods		
12. Explain the photochemistry of color vision		
Visual Pathway and Its Lesion		
13. Explain the neural circuitry of the Retina		
14. Describe the physiology of visual pathway		
15. Name the optic lesion associated with visual pathway		
Eye movements and its control.		
16. Explain the muscular control of eye movement		
17. Describe the fixation movements of eye		
18. Define accommodation reflex and pupillary light reflex		
Sense of hearing, mechanism and auditory pathway		
19. Describe the physiology of hearing and function of tympanic membrane and ossicular system		
20. Define impedance matching and attenuation reflex		
21. Explain the conduction of sound waves in the cochlea.		
22. Describe the function of the organ of corti		
23. Explain the auditory nervous pathway and abnormalities associated with it.		
24. Describe the function of cerebral cortex in hearing.		

Sense Of Taste and Smell	Interactive Lectures/SmallGroup Discussion
25. List the primary sensation of taste	
26. Explain the mechanism of taste perception and its transmission into central nervous system	
27. List the primary sensation of smell	
28. Describe the stimulation of olfactory cells and its transmission into central nervous system	Practical
Visual acuity and color vision	
29. Perform visual acuity using Snellen's eye chart in a subject provided	
30. Define visual acuity	
31. Interpret the visual acuity recording using Snellen's eye chart	
32. List other methods of recording visual acuity	
33. Demonstrate the refractive errors and their correction	
34. Examine the color vision of a subject using Ishiara eye chart	
35. Discuss the errors in color vision	
Perimetry	
36. Describe various parts of Perimetry and their uses	
37. Perform the technique of plotting visual field	
38. Interpret perimeter chart of a patient be able to tell any abnormality if present	
39. Demonstrate the method of plotting the usual field of individual eye and necessary precautions to be taken	
40. Interpret a given perimeter chart	
41. Enumerate lesions of the visual pathway by performing Perimetry	
Hearing test	
42. Explain the mechanism of hearing and auditory pathway	
43. Describe the principle of various tuning fork tests	
44. Demonstrate the performance of Rinne's, Weber's and ABC tests and precautions needed to be observed	
45. Identify conductive and sensorineural deafness based on the result and interpretation of various tuning fork tests	
Smell and taste	Interactive Lectures/SmallGroup Discussion
46. List the basic sensation of smell	
47. Examine the sense of smell in a subject provided	
48. Identify the abnormalities associated with perception of smell	
49. Map the pathway of sense of smell	
50. List the basic modalities of taste	
51. Examine the senses of taste on the gives samples	
52. Identify the abnormalities associated with sense of taste	

RESEARCH

OBJECTIVES	TEACHING STRATEGY
Performing Literature Search using Databases	Small Group Discussion
1. Perform literature search by following a scientific method	
Writing background and rationale of study	
2. Write the background which should lead to the rationale for the study	
Basic Epidemiologic Study Designs-1 and 2	
3. Explain the basic study designs used in research	

LEARNING RESOURCES

<i>SUBJECT</i>	<i>RESOURCES</i>
ANATOMY	<p>A. <u>GROSS ANATOMY</u></p> <ol style="list-style-type: none"> 1. K.L. Moore, Clinically Oriented Anatomy 2. Neuro Anatomy by Richard Snell <p>B. <u>HISTOLOGY</u></p> <ol style="list-style-type: none"> 1. B. Young J. W. Health Wheather's Functional Histology <p>C. <u>EMBRYOLOGY</u></p> <ol style="list-style-type: none"> 1. Keith L. Moore. The Developing Human 2. Langman's Medical Embryology
BIOCHEMISTRY	<p>A. <u>TEXTBOOKS</u></p> <ol style="list-style-type: none"> 1. Harper's Illustrated Biochemistry 2. Lehninger Principle of Biochemistry 3. Biochemistry by Devlin
PHYSIOLOGY	<p>A. <u>TEXTBOOKS</u></p> <ol style="list-style-type: none"> 1. Textbook Of Medical Physiology by Guyton And Hall 2. Ganong ' S Review of Medical Physiology 3. Human Physiology by Lauralee Sherwood 4. Berne & Levy Physiology 5. Best & Taylor Physiological Basis of Medical Practice <p>B. <u>REFERENCE BOOKS</u></p> <ol style="list-style-type: none"> 1. Guyton & Hall Physiological Review 2. Essentials Of Medical Physiology by Jaypee 3. Textbook Of Medical Physiology by InduKhurana 4. Short Textbook Of Physiology by Mrthur 5. NMS Physiology

OTHER LEARNING RESOURCES

<u>Weblink</u>	http://www.who.int/mental_health/neurology/neurological_disorders_report_web.pdf
<u>Hands-on Activities/ Practical</u>	Students will be involved in Practical sessions and hands-on activities that link with the Nervous system I module to enhance the learning.
<u>Labs</u>	<ul style="list-style-type: none"> Utilize the lab to relate the knowledge to the specimens and models available.
<u>Skill Labs</u>	<ul style="list-style-type: none"> A skills lab provides the simulators to learn the basic skills and procedures. This helps build the confidence to approach the patients.
<u>Videos</u>	Video familiarize the student with the procedures and protocols to assist patients.
<u>Computer Lab/CDs/DVDs/Internet Resources:</u>	To increase the knowledge students should utilize the available internet resources and CDs/DVDs. This will be an additional advantage to increase learning.
<u>Self Study</u>	Self Study which 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 the 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)**

BCQs:

- A BCQ has a statement or clinical scenario of four options (likely answers).
- **Correct answer carries one mark, and incorrect 'zero mark'. There is NO negative marking.**
- Students mark their responses on specified computer-based sheet designed for LNHMC.

OSCE:

- All students rotate through the same series of stations in the same allocated time.
- At each station, a brief written statement includes the task. Student completes the given task at one given station in a specified time.
- Stations are observed, unobserved, interactive or rest stations.
- In unobserved stations, flowcharts, models, slide identification, lab reports, case scenarios may be used to cover knowledge component of the content.
- Observed station: Performance of skills /procedures is observed by assessor
- Interactive: Examiner/s ask questions related to the task within the time allocated.
- In Rest station, students in the given time not given any specific task but wait to move to the following station.

Internal Evaluation

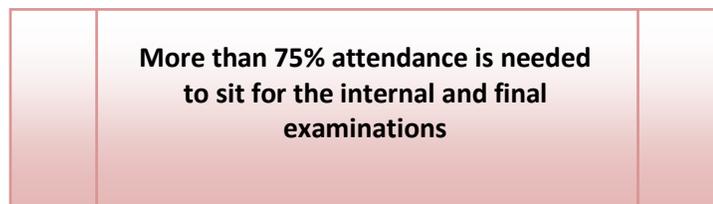
- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% may include class tests, assignment, practicals and the internal exam which will all have specific marks allocation.

Formative Assessment

Individual department may hold quiz or short answer questions to help students assess their own learning.

The marks obtained are not included in the internal evaluation

For JSMU Examination Policy, please consult JSMU website!



LNH&MC EXAMINATION RULES & REGULATIONS

- Student must report to examination hall/venue, 30 minutes before the exam.
- **Exam will begin sharp at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in examination hall.**
- If any student is found with cell phone in any mode (silent, switched off or on) he/she will be not be allowed to continue their exam.
- No students will be allowed to sit in exam without University Admit Card, LNMC College ID Card and Lab Coat
- Student 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
WEEK 1-6	HEAD & NECK MODULE	22 nd March, 2021
		30 th April, 2021
WEEK 1-9	NEUROSCIENCES & SPECIAL SENSES MODULE -1	3 rd May, 2021
		3 rd July, 2021
MID TERM EXAMINATION*		

* Final dates will be announced later.